

HORTICULTURAL RESEARCH INTERNATIONAL

Directory of horticultural research institutes
and their activities in 23 countries

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Foreword

Already in its first meeting the Council of the International Society for Horticultural Science discussed the setting up of an information service on topical horticultural problems all over the world on behalf of those involved in the same or related research work.

As a first step the Council decided to publish, preparatory to the next Congress, classified data on horticultural research institutes, their principal workers and main fields of interest, together with alphabetical lists of these workers.

For this purpose the Secretariat has made use of the information given in *Chronica Horticulturae* under the heading 'Horticultural research throughout the world'. With the help of the institutes involved these data have been revised and completed. Besides, it has made inquiries about the research institutes in USA, the host country of the 17th International Horticultural Congress.

As a result we have collected information on about 1000 research institutions, their 6600 officers and their main activities, in

- 13 European countries
- 50 states of USA, and Canada in North America
- 3 Latin American countries
- Australia and New Zealand
- South Africa and Nigeria
- Japan.

The Council hopes that this information may be useful for the many workers in horticulture, either in research or in related services. This will encourage the Secretariat to strive for completion of the data and inclusion of other countries so that a revised edition can appear before the following congresses.

The Secretary General.

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The Hague (The Netherlands)

EXPLANATION OF THE CODE USED IN THE ALPHABETICAL LIST p. 370-400

NATIONALITY INDICATORS

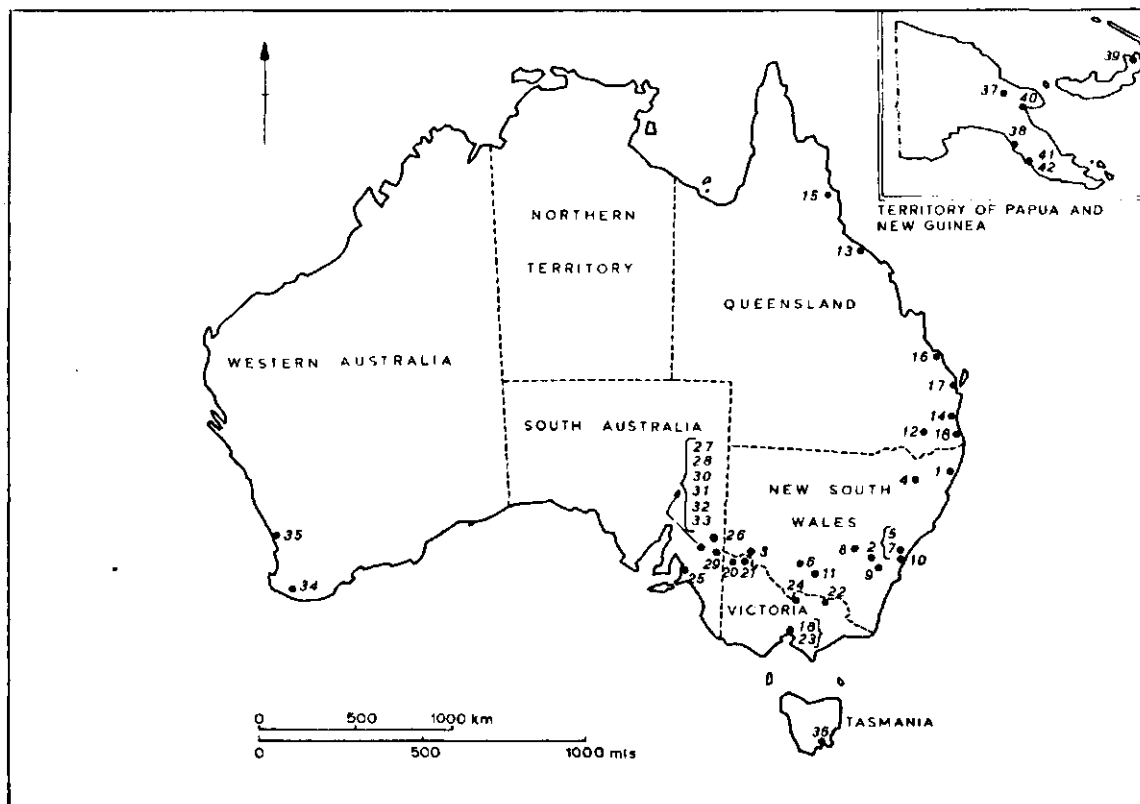
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Australia



NEW SOUTH WALES: 1. Alstonville, 2. Bathurst, 3. Dareton, 4. Glenn Innes, 5. Gosford, 6. Griffith, 7. Narara, 8. Orange, 9. Richmond, 10. Sydney, 11. Yanco. QUEENSLAND: 12. Applethorpe, 13. Ayr, 14. Brisbane, 15. Kamerunga, 16. Maryborough, 17. Nambour, 18. Ormiston, VICTORIA: 19. Melbourne, 20. Merbein, 21. Mildura, 22. Rutherglen, 23. Scoresby, 24. Tatura, SOUTH AUSTRALIA: 25. Adelaide, 26. Berri, 27. Blackwood, 28. Glen Osmond, 29. Loxton, 30. Nuriootpa, 31. Roseworthy, 32. Tenswood, 33. Waite. WESTERN AUSTRALIA: 34. Manjimup, 35. Perth, TASMANIA: 36. Hobart. PAPUA AND NEW GUINEA: 37. Aiyura, 38. Epo, 39. Keravat, 40. Lae, 41. Port Moresby, 42. Sogeri.

CSIRO and horticultural research: historical statement

The Commonwealth Scientific and Industrial Research Organization (CSIRO) undertakes, at the invitation of states concerned, research into those primary industries which are practiced in more than one Australian state. The predecessor of CSIRO, the Council for Scientific and Industrial Research, was formed in 1926. At that time arrangements were made to take over two existing research stations in the two main irrigation areas: the Merbein Station in the Murray river irrigation areas (concerned with problems of irrigation, soil drainage, and cultural practices on grape vines producing fruit for drying) and the Griffith Station in the Murrumbidgee irrigation areas which was concerned with similar

problems in relation to citrus.

CSIRO's Horticultural Research Section (which now embraces the Merbein Station) has made major contributions to the solution of the overriding problem of soil salinity and waterlogging, which threatened extinction to large proportions of grape vine plantings. It has made considerable advances in the methods of field processing (dipping) of grapes prior to drying. In more recent years it has elucidated many aspects of the physiology of the grape vine, including development of methods of forecasting yield from examination of dormant buds in the preceding season, and problems of plant nutrition.

The Irrigation Research Laboratory at Griffith paid most attention in its earlier years to problems of soil management and irrigation

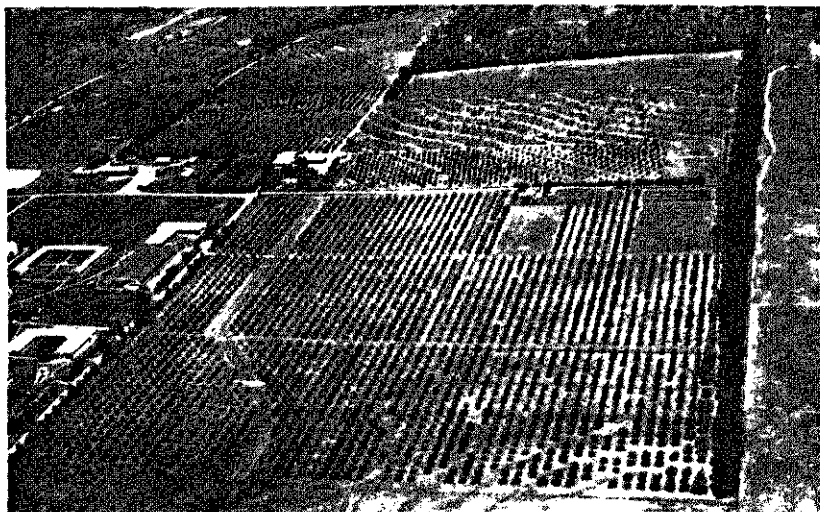
methods aimed at controlling groundwater levels. The inevitability of high water tables arising from heavy rains in certain seasons diverted interest to tile drainage and the station developed field techniques for design of tile drain systems. Considerable information had been obtained on citrus nutrition and physiology, and in more recent years these studies have been extended to other crops, including canning peaches and wine grapes.

In 1932 CSIR commenced investigations at Hobart, Tasmania, on the physiological disorders of apples. By 1939 these disorders had been classified and the factors affecting their incidence identified. A highly significant relationship between disorder and fruit size was established. After 1946 considerable attention was given to a study of the fundamentals of fruit physiology, particularly in relation to post-harvest storage behaviour.

A small field station was established by CSIR at Applethorpe in Queensland in 1932 to examine the relative value of the new apple rootstocks from East Malling. This work has been

the main objective of the station, but in recent years enquiries have been extended into cultural methods with apples. In 1964 the control of the station passed to the Queensland Department of Primary Industries.

In 1935 with the rapid increase in the production of oranges in Australia and the consequent increase in exports particularly to England, many problems associated with the storage and transport of this fruit became evident. Extensive investigations were therefore implemented by the Division of Food Preservation and Transport in cooperation with the Departments of Agriculture in New South Wales, Victoria, and South Australia. From this beginning the present program has been developed over the past 30 years and it now includes investigations on the storage and transport of tropical and sub-tropical fruit, quality and utilization of fruit and fruit products, and the physiology of fruits. Closely associated with these activities are investigations on the various aspects of fruit processing.



Horticultural Research Station, Bathurst, New South Wales

NEW SOUTH WALES

Survey

Following the establishment, in 1890, of the New South Wales Department of Agriculture in Sydney, the seaport capital of the State, the need to establish regional research stations was promptly pursued. The importance of horticulture to the State's economy was well recognised, and within six years, the Department was planting its first orchard at the Bathurst Experiment Farm on the central tablelands, 150 miles west of Sydney. On the northern tablelands of the State, in New England, plantings commenced in 1904, and to the south in the semi-arid Riverina district at Yanco in 1908. Viticultural nurseries were

established at Narara, on the central coast 50 miles north of Sydney in 1913 and at Griffith, adjacent to Yanco, a few years later, primarily to propagate *Phylloxera* resistant rootstocks for sale to grape growers in infected districts. These two latter establishments have gradually expanded their activities from their original function until, during the past decade, they have each become research stations in their own rights. The next Government orchard development was in the early 1920's at Grafton on the north coast of the State, whilst research in fruit preservation commenced in Sydney in 1936. Following World War II, horticultural research in New South Wales was further intensified with the opening of a Citrus Wastage

Research Laboratory at Gosford (near Narara) in 1948, followed by the planting up in 1954 of a sub-station to the Narara Horticultural Research Station. A year later, at Dareton, in the far southwestern corner of the State near the junction of the Darling and Murray River, the planting of a newly established Horticultural Research Station commenced, and in 1960 the first plantings were made at the Tropical Research Station on the far north coast of New South Wales.

Research and plant production work with vegetable crops is undertaken at the Agricultural Research Station, Glen Innes and the Agricultural Research Station, Yanco, mentioned previously; also at Hawkesbury Agricultural College on the Central coast and at the Agricultural Research Station, Orange on the central tablelands of New South Wales.

Under the present organization of the NSW Department of Agriculture, the Chiefs of each of the technical Divisions of Horticulture, Plant Industry (field crops and vegetables), Science Services (pathology, entomology, chemistry, botany), Animal Industry, Dairying, Research Stations, Marketing and Agricultural Economics, Information Services and Regional Extension Services are responsible to the Director of Agriculture, who in turn is responsible to the permanent head of the Department, the Director-General of Agriculture. Within each of the Divisions of Horticulture and Plant Industry, exist research staff (mostly located on Research Stations) and extension staff (initially trained on Research Stations and then located in districts). The Division of Science Services, which is located in Sydney in separate laboratories but with some staff located at major country centres, is essentially a research division, the results of its work being disseminated to the farming communities by the extension staffs of the Division of Horticulture, etc. The extension activities of the Department of Agriculture as a whole, are co-ordinated through the Division of Regional Extension Services, whilst the Division of Information Services provides technical assistance to extension officers in the fields of journalism, radio, television and photography, etc. and administers the Department's libraries and publications.

Publications. Results of horticultural research are usually published in the Australian research journal or the Agricultural Gazette NSW, published monthly by this Department. Another State publication is the Horticultural Research Record which is issued irregularly and briefly records horticultural research projects of the Department.

Following are some particulars on the research institutions of New South Wales.

1. The *Tropical Fruit Research Station*, recently established at Alstonville on the north coast of New South Wales, is principally concerned with problems of bananas and pineapples, the two major tropical fruit crops. Nevertheless, investigations are also planned with the papaw, mango, avocado, passionfruit and custard apple, as well as with various nuts suited to the area - particularly the Macadamia nut.

Detailed investigations with bananas involve nutrition, soil/plantwater relations, chemical weed control and nematode control together with post-harvest studies of the 'mixed ripe' problem, pre-cooling, packaging, handling and ripening.

With pineapples, a clonal selection programme is in progress, together with trials on type and size of planting materials and a study of the effect of nematodes and scarab beetles (*Rhagoia* sp.) on pineapple growth.

The initial work with the Macadamia nut involves assessment of the potential of locally selected seedlings and investigation of methods of vegetative propagation.

2. *Agricultural Research Station, Bathurst* (formerly Bathurst Experiment Farm) has played a leading part in the development of the pome and stone fruit industries of the State, maintaining a continuous flow of information on a wide range of subjects such as varieties, rootstocks, nutrition, pest and disease control, processing techniques, soil erosion control and alternate cropping.

Early planting consisting of apples, pears, quinces, prunes, plums, peaches, nectarines, grapes, apricots, cherries, berry fruits and various nuts proved the suitability or otherwise of these fruits for growing under tableland conditions. Then followed a period of further variety testing and especially valuable contributions towards improving control measures for Codling Moth and Black Spot of apples and pears.

During the 1930's a new era of development commenced with the establishment of extensive apple, pear and plum rootstock trials, and investigations into methods of controlling soil erosion in orchards, and selection of cross-bred fruit seedlings.

Some of the more outstanding contributions made to the industry through research at Bathurst include: 1. The development of the contour system of planting as a practical means of overcoming the devastating effects of soil erosion in orchards. This practice which started at Bathurst has contributed much towards stabilising the fruit industry in highland areas. 2. Proving the value of a range of rootstocks for apples, pears and plums. The outstandingly successful Pirus Calleryana rootstocks for pears and the Ruck stock for plums were tested and proven at Bathurst. 3. The introduction, proving and

recommending of all the leading commercial dessert peach and plum varieties grown inland up to the present time. 4. Recommendations for chemical thinning of apples (NAA and Sevin proved efficient). 5. The breeding selection and release of the apple Redbow.

3. The *Horticultural Research Station at Dareton* in the arid south western corner of New South Wales on the Murray River, was established principally to engage in investigations of the problems of citrus growing in this area. Plantings were commenced in 1955 and the work involves scion-rootstock trials, studies of the stem pitting disease of grapefruit, assessment of the close-planting of orange trees and various short term trials. A small stone fruit variety collection is also established and investigations with the growing of dried vine fruit crops will be commenced shortly.

4. *New England Agricultural Research Station, Glen Innes* is the site of the earliest work in Australia on the control of 'cork' in apples and pears by boron. The early experimental work on application rates and toxic effects under NSW conditions resulted in the standard recommendations in use today with the result that losses from 'cork' are a thing of the past and seldom if ever encountered in NSW orchards today.

The Gravenstein is an old and highly esteemed early apple variety, commonly regarded as the best of the early types. Owing to a particular characteristic known as "Twist", which often resulted in serious deterioration and even death of the tree at an early age, the variety had fallen into disrepute and was rapidly disappearing. Research during the thirties resulted in an efficient commercial control of "Twist", which is now recognised as a virus, and growers can now plant Gravenstein with confidence.

A trial, commenced well over 20 years ago of the Rome Beauty apple and two highly coloured 'sports' (Ohio and Washington Dark Red) imported from USA, has resulted in the adoption of the latter and few Rome Beauty trees have been planted of recent years other than these.

At one time lime sulphur was practically the only fungicide used on pome fruits throughout the growing season, but was for long suspected of an adverse effect on tree health and cropping. A trial extending over 5 years showed that trees sprayed with modern organic fungicides over this period yielded approximately 20% more fruit than those on which lime sulphur was used.

Much of the early research in spray thinning of apples was carried out on the Glen Innes Farm Orchard.

Today, spray thinning is accepted as standard practice throughout the State and by assisting

in the elimination of alternate cropping, is partly responsible for a marked increase in average production over the past 7 or 8 years. There are also small plantings of varieties of Barcelona nut, strawberries, boysenberries and currants.

Close planting trials for apples with dwarf and semi-dwarf rootstocks are planned.

The station is the centre at which the Department's potato breeding project is conducted. Some 15,000 first year seedlings are grown under glass annually, being 'screened' for late blight by spraying with a spore suspension. Each year about 4,000 second year seedlings are grown in single hills in the field. The most promising second year seedlings, generally comprising 5 to 7½%, are tested and culled in subsequent generations. In recent years the potential as parents of certain European and United States breeding commercial varieties from many countries have been assessed and a crossing programme has been planned to concentrate on those parents which consistently produce promising progeny.

5. The *Citrus Wastage Research Laboratory*, established at Gosford on the central coast of New South Wales in 1948 in response to urgent industry pressures, is conducted in co-operation with the CSIRO and staffed by this Department. The Laboratory has investigated control of wastage in fresh citrus fruits (principally due to green mould caused by *Penicillium digitatum*) by dip, impregnated wrap and fumigation methods, as well as washing and waxing treatments and lemon curing. Recent investigations have demonstrated a successful and acceptable commodity treatment of oranges for Queensland Fruit Fly (*Pacus tryoni*), using ethylene dibromide fumigation. Its application to mandarins, lemons and grapefruit is currently being assessed. A low temperature sterilization treatment is being evaluated for pears and apples.

6.1 *CSIRO Irrigation Research Laboratory* at Griffith. Citrus and wine grapes, two of the main horticultural crops grown on the Murrumbidgee Irrigation Area where the laboratory is situated, are being investigated. The studies of the orange are aimed at determining the factors affecting the quality of the fruit and of the canned, frozen juice. In addition studies are being conducted on the effect of daylength and temperature in the growth of Washington Navel orange and Valencia Late orange. Vines are being examined to find some of the effects of irrigation on the plant and on the quality of the grape juice for wine. As a part of a wider study on water use, the effect of water stress on a range of plants is also being studied. The drainage of soils, especially under irrigated horticultural

crops, receives attention. The relation between measured environment and plant water use is studied.

6.2 *Viticultural Research Station, Griffith* was the site of early research on vine spacing, grape breeding, nutrition, pollination, and pest and disease control. The compatibility of the various *Vitis vinifera* scion varieties on a wide range of *Phylloxera* resistant rootstocks was studied in permanent experiments established in 1926 and concluded in 1947. The variety Nyora, a Cornichon type table grape, resulted from the breeding programme. The results of this research were of considerable economic significance to the early development of the wine and grape industry and formed the basis of the viticultural extension programme at the time.

An experiment which made a major contribution to the stability of the State's citrus industry was commenced in 1947. This was the first demonstration that dwarfing and scaly butt of Washington Navel on *Poncirus trifoliata* rootstocks could be avoided, by selection of virus free bud-wood. As a result, *P. trifoliata* which is immune to *Phytophthora* root rot, has become the main citrus rootstock in many districts.

In common with many horticultural farms in the area, high water tables and salt problems had seriously affected the grape plantings by the early 1950's. It was feared that the station would be destroyed and rootstock propagation was transferred to other farms.

However, following favourable soil tests, underground tile drainage was installed in 1960. These proved very effective and since then the Station has been rapidly developed as the main centre for viticultural research in the State.

Drainage research has also been centred at the Station and in 1961 an important field investigation was commenced to study response of citrus, peaches, wine grapes and prunes to various depths and spacing of tile drains.

7. *Horticultural Research Station, Narara*, originally established as a viticultural nursery was subsequently developed as a citrus research centre, and in addition currently includes investigations with strawberries, passionfruit, stone and pome fruits and vegetables.

Citrus trials relate to virus and root diseases, nutrition and variety compatibility. Other major studies with citrus have been concerned with Black Spot (*Guignardia citricarpa*) and White Wax Scale (*Ceroplastes destructor*). Work with passionfruit involves developing acceptable strains which are resistant to Fusarium wilt, whilst strawberry studies involve production of new varieties free of virus infection. Current investigations with stone and pome fruits concern

propagation techniques and study of virus diseases, whilst with vegetables new insecticides and fungicides are examined, together with studies of spraying techniques.

A sub-station situated a few miles distant is devoted almost entirely to citrus investigations, including citrus virus diseases, varieties and rootstocks. There is also an arboretum of many species, varieties and strains of citrus.

8. *The Agricultural Research Station, Orange* was established in 1963 as the centre of potato research which was formerly undertaken at the Research Station, Bathurst. Foundation seed production using tuber indexing and tuber unit planting is carried out. Advanced yield trials of new varieties developed overseas are in the Department's breeding programme and research on cultural techniques is in progress.

9. *Hawkesbury Agricultural College, Richmond* has been the Department's main centre of vegetable breeding and research for many years. Breeding programmes are currently being undertaken to develop indeterminate tomatoes for the field and glasshouse, stringed and stringless French beans and peas, while some attention is paid to the improvement of capsicums. Exploratory trials with growth regulating substances, fungicides, insecticides, fertilisers and mulching materials are carried out as required.

10. *CSIRO Division of Food Preservation, at North Ryde, Sydney*. The Division investigates the nature and property of fruit in relation to its processing and preservation. Disciplines involved include biochemistry, chemical engineering, food technology, microbiology, organic chemistry, physical chemistry, physics, and plant physiology. Frequently, workers from several of these disciplines form teams to study applied problems from all aspects, and work in close association during the particular investigation. Work carried out in collaboration with other organizations include:

Organization	Subject
University of Sydney Botany Department	Plant physiology
University of Sydney Mechanical Engineering Department	Heat and mass transfer
Commonwealth Department of Primary Industry and State Departments of Agriculture of N.S.W., Vic., Qld., and S.A.	Sterilization of citrus fruits and pears against Queensland fruit fly

11. *Agricultural Research Station, Yanco.*
Citrus Fruits: In citrus plant breeding, 10 hybrids possessing a high degree of resistance to *Phytophthora citrophthora* have been selected from an original population of 600 for test as rootstocks. Rough lemon, sweet orange, Cleopatra mandarin and several strains of Poncirus trifoliata rootstocks with Valencia and with Navel scions are being assessed for use on old land typical of the heavier horticultural soil types of the area. Rough lemon failed early in the trials while P. trifoliata has performed well so far. Trials to investigate the influence of nitrogen fertilizing on citrus fruit quality demonstrated that high nitrogen produced inferior fruit but significant differences in quantity did not occur.

Stone Fruits: Investigations relate to a field condition known as Apricot Breakdown, and breeding and testing new varieties. A selection named Morocco is promising better crops and less breakdown than the standard Trevatt but further work is necessary. Variety

selection and evaluation for canning occupies an important place in peach research. Most of the current popular canning varieties were tested at Yanco before release. Other current investigations relate to method and effect of irrigation systems, pruning and thinning. Increased yields with lower production costs have been obtained with prunes as a result of research on pruning methods. The biennial pruning programme is now widely adopted in the area.

Pome Fruits: Research has been directed towards providing William pears of even and symmetrical shape for cannery processing. Most promise has come from inducing parthenocarpic fruitsetting by use of growth regulating substances such as 2,4-D. A rootstock trial using 16 rootstocks with Granny Smith scion and 6 rootstocks with Red Jonathan is the major apple investigation. Planted in 1959 the trial is still in its early stage.

Vegetables: Vegetable research with particular reference to production under the system of flood irrigation common in the district is carried out. Breeding programmes with determinate tomatoes, dwarf stringless French beans and peas for processing are in progress and cultural techniques for these crops are being investigated.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

AUS 1.1 - 5.1

Seat/Nature of program	Institution and projects	Address and staff
1. Alstonville 1.1 <i>Tropical fruit</i>	Tropical Fruit Research Station Principally concerned with problems of bananas and pineapples; also investigations with the papaw, mango, avocado, passionfruit custard apple and nuts. Further particulars above, under 'Survey'.	Alstonville, New South Wales
2. Bathurst 2.1 <i>Subtropical fruit</i>	Agricultural Research Station Investigations in the whole field of subtropical fruit growing. Further details above, under 'Survey'.	Bathurst, New South Wales
3. Dareton 3.1 <i>Citrus</i>	Horticultural Research Station Various trials on the culture of grapefruit and oranges. Further particulars above, under 'Survey'	Dareton, New South Wales
4. Glen Innes 4.1 <i>Fruit</i>	New England Agricultural Research Station Trials of new seedling varieties, 'sports' and imported varieties and strains; evaluation of intermediate stem-pieces, and a nutrition trial with pears; an apple rootstock trial with the varieties Granny Smith, Jonathan and Delicious on a full range of Malling-Merton rootstocks. Further particulars above, under 'Survey'.	Glen Innes, New South Wales
5. Gosford 5.1 <i>Citrus preservation</i>	Citrus Wastage Research Laboratory Conducted in co-operation with the CSIRO and staffed by this Department. Further particulars above, under 'Survey'.	Gosford, New South Wales

Seat/Nature of program	Institution and projects	Address and staff
6. Griffith	CSIRO Irrigation Research Laboratory	Griffith, New South Wales
6.1 Citrus and wine grapes	Investigations on citrus and wine grapes. (See also under 'Survey'.) Plant physiology Nutritional chemistry Irrigation technology Salt tolerance of plants Physical chemistry Plant physiology, citrus Climate and water use Agronomy Soil physics Measurement of plant environment	Off. in ch.: E.R. Hoare H. D. Barrs, Ph. D. / F. M. Melhuis, Ph. D. P. R. Cary P. M. Fleming H. Greenway, Ir. Agr. A. R. G. Lang, Ph. D. F. Lenz, Dr. Agr. E. T. Linacre, M. A., M. Sc. W. A. Muirhead/J. E. Saunt, Mr. Sc. Ir. T. Talsma, Ph. D. E. S. Trickett
6.2 Fruit	Viticultural Research Station Investigations into pruning and training and the effect of varying irrigation programmes on the yield and quality of wine grapes. Further particulars under 'Survey'.	Griffith, New South Wales
7. Narara	Horticultural Research Station	Narara, New South Wales
7.1 Fruit, vegetables	Particulars on the investigations under 'Survey'.	
8. Orange	Agricultural Research Station	Orange, New South Wales
8.1 Seed potatoes	Particulars concerning research work on seed potatoes before, under 'Survey'.	
9. Richmond	Hawkesbury Agricultural College	Richmond, New South Wales
9.1 Vegetables	Breeding and research of vegetables. Further particulars under 'Survey'.	
10. Sydney	CSIRO Division of Food Preservation	North Ryde, Sydney, New South Wales
10.1 Fruit preservation	Investigations carried out in collaboration with other organizations (see under 'Survey') Chemistry of fruit products Food chemistry Handling and storage of fruit Storage of fruit Fruit physiology Quality of fruit products Disinfestation of fruit by irradiation Transport of fruit	J. F. Kefford, M. Sc. / B. V. Chandler, Ph. D. K. E. Murray, D. Sc. E. A. Hall F. F. Huelin/W. B. McGlasson, Ph. D. R. M. Smillie, M. Sc., Ph. D. D. J. Casimir, M. Sc. / R. S. Mitchell, M. Sc. J. J. McFarlane J. Middlehurst, M. Sc. / J. D. Mellor
10.2 General	Department of Agriculture, Division of Science Services	Rydalmere, Sydney, New South Wales
11. Yanco	Agricultural Research Station	Yanco, New South Wales
11.1 Fruit and vegetables	For particulars about research work on citrus fruits, stone fruits, pome fruits and vegetables, see under 'Survey'.	

QUEENSLAND

Survey

Horticultural research in Queensland has been a major commitment of the Queensland

Department of Primary Industries during the past 80 years. It began with the establishment of State nurseries at Kamerunga and Mackay in 1889. The first of these functioned until 1915 as a plant introduction centre for

tropical plants and is now the Kamerunga Horticultural Research Station.

During the period 1897-1910, experimental orchards were planted at Hermitage, near Warwick, Westbrook on the Darling Downs, and at Redland Bay near Brisbane with a range of fruit varieties adapted to their respective climatic zones. In 1922, an additional nursery was opened at Bribie Island to handle banana and avocado introductions in isolation.

Research moved a further step forward in 1935 with the establishment of the Bureau of Tropical Agriculture at South Johnstone near Innisfail. The Bureau was concerned, amongst other things, with selection and propagation studies in mangoes and papaws. About the same time, Nambour became the local point for horticultural investigations in plantation crops (pineapples, bananas and papaws) grown in a sub-tropical climate. In the mid-1930's, the Commonwealth Scientific and Industrial Research Organization initiated apple rootstock research at its Applethorpe Field Station. This property, now known as the Granite Belt Horticultural Research Station, was taken over in 1961 by the State Department of Primary Industries and the scope of its work was extended.

In 1945, the Maroochy Horticultural Research Station was founded. It is located close to Nambour and is currently the principal centre for plantation fruit research. Two years later in 1947, the Redlands Horticultural Research Station came into being. It lies in the heart of an intensive vegetable growing area and the staff is mainly pre-occupied with research in tomatoes, beans, cruciferous vegetables and various staple vegetables. In 1958, the Pineapple Research Laboratory was erected with adequate glasshouse facilities on the Maroochy Horticultural Research Station. The staff is concerned with plant physiology studies in the pineapple crop, one of the more important fruit industries of the State.

Coast (Nambour), f. North Moreton (Brisbane), g. South Moreton (Ormiston), h. Parling Downs (Toowoomba), and i. Granite Belt (Stanthorpe).

The senior officer in each district is responsible for the definition of research problems, allocation of staffs to particular research projects, and supervision of the work.

Liaison with industry organizations is maintained through Advisory Committees with representation from research staffs and industry organizations.

Research programmes are financed mainly through consolidated revenues but substantial grants have been made from time to time by industry organizations towards the cost of buildings, plant and laboratory equipment.

Publications. Results derived from the horticultural research programmes in Queensland are issued in various publications. The more important of these are: a. Queensland Journal of Agricultural Science; b. Queensland Agricultural Journal; c. Annual Report of the Department of Primary Industries; and d. Occasional Technical Bulletins. Specialist papers of restricted interest are published in other scientific journals.

Administration. Horticultural research is handled by several Branches in the Division of Plant Industry of the State Department of Primary Industries. Branches with an interest in this field are Horticulture (production), Food Preservation Research (post-harvest physiology and transport), Entomology (insect pests), Plant Pathology (plant diseases) and Botany (systematics). All are serviced by a Biometrics Section.

The State comprises nine horticultural districts: a. Wet Tropics (Cairns), b. Dry Tropics (Ayr), c. Central Queensland (Rockhampton), d. Burnett (Maryborough), e. North

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

AUS 12.1 - 14.1

Seat/Nature of program	Institution and projects	Address and staff
12. Applethorpe	Granite Belt Horticultural Research Station	Applethorpe, Queensland
12.1 Fruit	Deciduous fruit rootstocks Apple nutrition Plant pathology: deciduous fruit diseases Entomology: deciduous fruit insects	Chief: L.A. Thomas R.B. Morwood K. Shea M. Rengston
13. Ayr	Department of Primary Industries	Ayr, Queensland
13.1 General horticulture	Tropical vegetables and mango varieties	A.R. Mitchell
14. Brisbane	Department of Primary Industries	William Street, Brisbane,

Seat/Nature of program	Institution and projects	Address and staff
14.1 <i>General horticulture</i>	Plant breeding Plant pathology Entomology Botany	Queensland Dir.: J.H. Smith; Ass. dir.: R.G. Cannon Chief: H.M. Groszmann B. Oxenham Dr. W.A. McDougall S. Everist
14.2 <i>Preservation</i>	Food Preservation Research Laboratory Physiology: fruit transport and storage Food technology: processing of fruit and vegetables Biochemistry	Hamilton, Brisbane, Queensland Dir.: Dr. S.A. Trout C.D. Stevenson R.E. Leverington T. Hope
15. Kamerunga	Kamerunga Horticultural Station	Redlynch, via Cairns, Kamerunga, Queensland
15.1 <i>Tropical fruits</i>	Propagation of tropical fruits Pathology: banana diseases	S.E. Stephens W. Pont
16. Maryborough	Department of Primary Industries	Maryborough, Queensland
16.1 <i>Citrus</i>	Citrus rootstocks Citrus nutrition	W.V. Mungomery K.R. Jorgenson
17. Nambour	Maroochy Horticultural Research Station	Nambour, Queensland
17.1 <i>Fruit</i>	Plantation crop management and clonal selection Soil managements and weedicides Plant pathology: citrus diseases	F.W. Berrill M.E. Nicholson K. Pegg
17.2 <i>Pineapple</i>	Pineapple Research Laboratory Plant physiology: pineapple nutrition Plant physiology: soil moisture relationships Biochemistry Pineapple nutrition	Nambour, Queensland Chief: Dr. R.F. Black N.A. Cornwall P.E. Page W.B. Hogarth
18. Ormiston	Redlands Horticultural Research Station	Ormiston, Queensland
18.1 <i>Vegetables</i>	Vegetable crops and soil management Plant physiology: vegetable nutrition Weedicides Plant improvement in tomatoes, strawberries and beans	Chief: K.M. Ward R.C. Menary B.W. Cull I.A. Bonner

VICTORIA

Survey

Research in fruit and vegetable growing in Victoria is one of the responsibilities of the *Horticultural Division of the Department of Agriculture*.

Following the creation of the Department of Agriculture in 1872, an experimental area of grapes was planted at Rutherglen in north-eastern Victoria for research into the production problems of wine grapes and wine production. This was followed in 1890 by the erection of buildings for a Viticultural Education College. These buildings were never used for this purpose but became the headquarters for the Viticultural Station and subsequently Rutherglen Research Station, the latter concentrating on agricultural subjects rather than horticultural.

The Merbein Viticultural Station was established in 1919 by a group of growers in conjunction with the CSIR as it then was, and CSIR assumed full control in 1927. Recently the interests of the group have widened and this has led to the establishment of the Horticultural Research Section of the CSIRO with headquarters in Adelaide, where new laboratories have been erected, and Merbein Station will remain as a Field Station for the Section.

The creation of the Horticultural Division in the Department of Agriculture in 1923 and the appointment of J.M. Ward as the first Superintendent laid the foundations for the present Division and allowed proper emphasis to be given to horticultural research. With active support from the Chemist's Branch - responsible for a considerable proportion of analytical work - and the Biology Branch,

responsible for investigations into pest and disease control, the Research Branch of the Division is now responsible for the conduct of all horticultural research throughout the State. The recent establishment of the Vegetable Branch allows a greater degree of specialisation between fruit and vegetables than was formerly possible.

Research work (mostly applied in character) was carried out on growers' properties throughout the State until the establishment of the Horticultural Research Station at Tatura in 1936. This Station is located in the Goulburn Valley, which is the centre of the canning fruits industry in Victoria and concentrates on fruit production problems such as soil management, fertilizers, irrigation, pruning, rootstocks etc., with the logical development that some of the basic principles underlying the practices are now being investigated in well equipped laboratories and a glasshouse.

The Scoresby Horticultural Research Station was established in 1946 with the aim of serving horticultural interests of essentially non-irrigated horticulture in Southern Victoria. The erection of the Sir George Knox Laboratories at Scoresby in 1956 enabled the cool storage research staff to take up their headquarters there and this is now the centre for cool storage research work in Victoria. The acquisition of additional areas of land next to the original Station area has assisted in safeguarding the Station from suburban development and it is hoped that the Station has sufficient land to allow adequate rotation of the planted areas. The establishment of rootstock trials was the first objective of the research programme and the satisfactory development of these blocks will enable

further planning for soil management and fertilizer work.

The administration of both of these Stations has been assisted by Advisory Committees, consisting of representatives of growers organizations and, where appropriate, processors organizations. None of these organizations, however, contributes funds towards the operation of the Stations. The citrus industry, centred in Mildura, is now served by the Horticultural Research Station, Mildura, established in 1954, and concentrating on rootstock and variety problems at this stage. Vegetable research has been mainly on growers properties, although canning tomato research work was headquartered at Tatura Horticultural Research Station until the establishment of the Irrigation Research Station at Kyabram, a small area of which has been made available for tomato work.

Scoresby Horticultural Research Station was also the headquarters for district vegetable work but it is likely that this will be centred at Frankston when the proposed new Vegetable Research Station becomes fully operative.

Publications. Research results are made available in the Journal of Agriculture, Victoria, and in national and international research journals and in annual reports and communications from each research establishment. All research projects are listed in the appropriate biennial copies of the Australian Horticultural Research Newsletter and national co-operation of horticultural research is assisted by the five yearly technical conferences, one for fruit and one for vegetables, authorised by the Australian Agricultural Council.



Victoria. A portion of the apple rootstock trials at the Scoresby Horticultural Research Station. - Here Malling Merton stock immune to woolly aphid and Malling stock are being tested under Southern Victorian conditions



Victoria. Irrigating three year old peach trees in the Goulburn Valley. - Tatura Horticultural Research Station serves this area. - Canning peaches and pears and export pears are the main crops

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

AUS 19.1 - 20.1

Seat/Nature of program	Institution and projects	Address and staff
19. Melbourne	Department of Agriculture, Head Office	Treasure Place, Melbourne
19.1 <i>General horticulture</i>	Horticultural inspection	C 2, Victoria
	Mildura Horticultural Section	C.E.Cole/R.S.Harper
	District Horticultural Office	Civic Blds., Deakin Ave, Mildura (Victoria)
19.2 <i>Fruit</i>	Department of Agriculture, Research Branch	W.I.Nankivell/R.J.Webber
	Plant physiology	Melbourne, Victoria
	Deciduous tree fruits, citrus, vines, nutrition	Head: E.A.Mullett
	Deciduous tree fruits, growth regulators	P.Baxter
	Deciduous tree fruits, citrus, rootstocks, soil management, irrigation	N.Veinbrandts
	Mildura Branch	W.J.Packer
	Citrus, vines, rootstocks, nutrition, growth regulators	Mildura, Victoria
	Robinvale Branch	I.Krigel
19.3 <i>General horticulture</i>	Vines, citrus, irrigation, growth regulators	Dep.of Agr.,Robinvale, Victoria
	Department of Agriculture, Instruction Branch	A.J.Heslop
	Research liaison	Melbourne, Victoria
19.4 <i>Vegetables</i>	Department of Agriculture, Vegetable Branch	Head: G.W.Gayford
	Vegetables	K.B.Higgins/J.Kenez
	Varieties, nutrition	Melbourne, Victoria
20. Merbein	CSIRO, Horticultural Research Section	Head: M.N.Kinsella
20.1 <i>Fruit</i>	Nutrition	A.Morgans
	Vine improvement	Merbein, Victoria
	Tree culture	J.G.Baldwin
	Fruit biochemistry	A.J.Antcliff/R.C.Woodham
	Nematology	D.H.Maggs
	Fruit and tree culture	F.Radler, Dr. rer. nat./
	Field forecasting	M.Grnarevic, Ing. Agr.
		M.R.Sauer
		D.McE.Alexander
		M.F.Clayton

Seat/Nature of program	Institution and projects	Address and staff
21. Mildura 21.1 Fruit	Mildura Horticultural Research Station Citrus, weedicides	Civic Blds., Deakin Ave. Mildura, Victoria Off. i. ch.: L.M. Stafford M. J. Toomey
22. Rutherglen 22.1 Viticulture	Viticultural Station	Rutherglen, Victoria Man.: A.W. Allan
23. Scoresby 23.1 Preservation	Cool Storage Research Station Cool storage	Burwood Road, Ferntree Gully, Scoresby, Victoria Sen. Res. Off.: G.B. Tindale Hort. Res. Off.: I.D. Peggie
23.2 Fruit	Scoresby Horticultural Research Station Deciduous tree fruits, soil management, nutrition, rootstocks Deciduous tree fruits, stock-scion relationships, plant physiology Deciduous tree fruits, nutrition Deciduous tree fruits, nutrition, plant physiology Deciduous tree fruits, soil management, irrigation Deciduous tree fruits, berry fruits, propagation, water tolerance	Burwood Road, Ferntree Gully, Scoresby, Victoria Man.: C.R. Brough J.D.F. Black S.D. Filipovic V.O. Grasmanis Mrs. J.C. Lundmark P.D. Mitchell R.N. Rowe
24. Tatura 24.1 Fruit	Horticultural Research Station Soil water movement Soil physics, soil management Deciduous tree fruit, fruit processing, fruit quality Deciduous tree fruit, nutrition, soil management, growth regulators Deciduous tree fruit, nutrition, crop control Deciduous tree fruit, soil management, growth regulators Deciduous tree fruit, nutrition, plant physiology Deciduous tree fruit, crop management, fruit quality	Tatura, Victoria Man.: K.L. Avent A.C. Bakker B. Cockcroft/K. Olsson A. Czerkaskyj J.C.R. Keatly G.J. Kidman A. Selimi B.K. Taylor L.A.G. van Heek

SOUTH AUSTRALIA

Survey

There is no single body in South Australia responsible for carrying out research into problems of the horticultural industries. The organisations concerned are: a. South Australian Department of Agriculture, b. Waite Agricultural Research Institute, c. CSIRO

Horticultural Research Station, d. Australian Wine Research Institute, e. Roseworthy Agricultural College. There is no formal grouping of these bodies into any association or council. In the case of some specialised fields liaison committees have been set up but personal discussion at various levels is more usual, thus preventing overlap or duplication of endeavour.

Seat/Nature of program	Institution and projects	Address and staff
25. Adelaide	Department of Agriculture - Horticultural Branch: The primary aim is the provision of	Box 901 E, G.P.O. Adelaide, South Australia

Seat/Nature of program	Institution and projects	Address and staff
25.1 <i>General horticulture</i>	an advisory service to growers supported by an active programme of applied research carried out in the main horticultural areas of the State both on Research Stations and growers' properties. - This work has enabled sound recommendations concerning fertilizer and soil management practices, pruning, pest and disease control, variety improvement, bulk handling, transport and storage of produce. Viticulture Citrus Irrigation Pathology Stone fruits Physiology Vegetables Potatoes Entomology Potato viruses	Dir.: A.G.Strickland, M. Ag. Sc. Chief: T.C. Miller M.B. Spurling Advisory Staff: D.T. Kilpatrick/R.L. Wishart/ J.P. Jennings/W.J. Baskett/ D.E. Moss/J.N. Steed/G.W. Botting/J.A. Gursansky/C.M. Cooper Research Staff: Sen. Res. Off.: W.B. Harris E.W. Boehm J.R. Bothar M.R. Till W.J. Moiler/J.W. Randles F.J. Gathercole D.H. Simons/J.B. Robinson I.S. Rogers H.D. Feddersen N.L. Richardson Dr. R. Howles
26. Berri	Berri Experimental Orchard	Berri, South Australia
26.1 <i>Fruit</i>	Controlled by the S.A. Dep. of Agr. Research on citrus, vines, stone fruits and pome fruits, grown under irrigation in an arid climate (rainfall 10 in.).	Man.: D.R. Spurling
27. Blackwood	Blackwood Experiment Orchard	Blackwood, South Australia
27.1 <i>Fruit</i>	Controlled by the S.A. Dep. of Agr. Research on pome and stone fruits and cool storage in a mediterranean climate (rainfall 25-30 in.).	Man.: R.W.I. Cowley
28. Glen Osmond	Australian Wine Research Institute	Private Bag, Glen Osmond, South Australia
28.1 <i>Oenology</i>	This institute, created under special Act of Federal Parliament in 1955, is engaged in research into wine making and factors affecting wine quality. It is financed from funds contributed by the industry, supplemented by an annual grant from CSIRO.	Dir.: J.C.M. Fornachon, M.Sc.
28.2 <i>Viticulture</i>	Viticulture CSIRO Horticultural Research Section Physiological and nutritional studies of grape vines and studies of the physiology, incidence and control of plant parasitic nematodes. Plant physiology and nutrition Nematology Plant physiology	Dr. C.R. Hales Hartley Grove, Glen Osmond, South Australia Off. i. ch.: J.V. Possingham, M.Sc., Ph.D. H.R. Wallace, Ph.D., D.Sc./A.F. Bird, M.Sc., Ph.D. M.S. Buttrose, M.Sc., Dr.Sc.nat./ P. May, Ing. Agr., Dr.Sc.nat./ W.N. Arnold, Ph.D./M.G. Mullins, Ph.D., Dip. Agric.
29. Loxton	Loxton Research Centre	Loxton, South Australia
29.1 <i>Fruit</i>	Controlled by the S.A. Dep. of Agr. Research on citrus, vines and stone fruits under irrigation in an arid climate (rainfall: 10 in.)	Man.: R.F. Hilder
30. Nuriootpa	Nuriootpa Viticultural Research Station	Nuriootpa, South Australia
30.1 <i>Viticulture</i>	Controlled by the S.A. Dep. of Agr. Research on wine grapes in mediterranean climate (rainfall: 20 in.)	Man.: H.W. Tulloch

Seat/Nature of program	Institution and projects	Address and staff
31. Roseworthy 31.1 <i>General horticulture</i>	Roseworthy Agricultural College Essentially a training institution granting diplomas in agriculture and oenology and presenting a balanced training in horticulture, viticulture and oenology. Horticulture Oenology	Roseworthy, South Australia Head: R.I. Herriot D.H. Simons R. Guy
32. Tenswood 32.1 <i>Fruit</i>	Tenswood Research Centre Controlled by the S.A. Dep. of Agr. Land purchased 1963; to be established as a research centre for the Adelaide Hills pome stone and berry fruit growing areas	Tenswood, South Australia
33. Waite 33.1 <i>Plant protection</i>	Waite Agricultural Research Institute of the University of Adelaide Studies involving gummosis of apricots, ecology of insect pests and growth studies of plants and fruit. - Entomology Department Entomology - Plant Pathology Department Pathology Virology Nematology - Plant Physiology Department Viticulture Apples Stone fruits	Private Bag, Glen Osmond South Australia Dir.: J. Melville, Ph.D., M.Sc. Head: Prof. T.O. Browning Dr. B. Johnson/Dr. D. Maelzer Head: Prof. N.T. Flentje Dr. M.V. Carter/B.H. Pratt Dr. N.C. Crowley/Dr. R.I.B. Francki J.M. Fisher
33.2 <i>Fruit</i>	Waite Experimental Orchard This orchard is in the process of development for work on stone fruits, pome fruits and vines, both field planted and in containers for use by staff of the various departments of the Waite Agricultural Research Institute and the CSIRO Horticultural Research Section at Glen Osmond.	Head: Prof. L.H. May Dr. B.G. Coombe G.R. Edwards D. Jackson/B.K. Taylor Private Bag, Glen Osmond South Australia

WESTERN AUSTRALIA

Survey

The State Department of Agriculture was first formed as Agricultural Bureau in late 19th century. - Early technical officers in horticulture were: Mr. Despeissis, viticulture; Mr. Moody, tree fruits. - Research into horticultural problems has been carried out

for over 60 years. The Horticultural Division has the responsibility for the application of research findings to horticulture as well as carrying out some of the research work. Other work in the fields of plant pathology and entomology is carried out by the Biological Services Division and in plant nutrition and some agronomic aspects by the Plant Research Division.

Seat/Nature of program	Institution and projects	Address and staff
34. Manjimup 34.1 <i>Vegetables</i>	Manjimup Experiment Station, Department of Agriculture	Manjimup, Western Australia

Seat/Nature of program	Institution and projects	Address and staff
35. Perth	Department of Agriculture	South Perth, Western Australia
35.1 <i>General horticulture</i>	Belongs to the State Government. Equipment: glasshouses; controlled environment facilities are being installed. - Division of Horticulture Fruit production, rootstocks, fruit storage Vegetable production, potato quality, pea quality Viticulture and oenology Field trials, apple tree die back - Biological Services Division Isolation and propagation of canker free red flowering Eucalypts State Herbarium: toxic plants Toxic plants - Plant Research Division Plant nutrition: vegetables and grapes Tree fruits: control of fruiting, soil management Tree fruits: plant nutrition - Field Experiment Stations: Tree fruits, pome fruits, stone fruits and citrus Vegetables (Vide: 34.1) Vegetables	Dir.: T.C. Dunne, Ph.D. Chief: H.R. Powell Ass. chief: J.P. Elkersley F. Melville J. Fallon W. Jamieson, M.D.A., Dip. Oen. S. Hardisty W.P. Cass-Smith Curator: R.D. Royce T.E. Aplin L.T. Jones J. Cripps N.J. Halse, M.Sc.
35.2 <i>General horticulture</i>	University Institute of Agriculture Equipment: Glasshouses, controlled environment facility. Genetics	Stoneville Manjimup Medina Crawley, Perth, Western Australia
35.3 <i>Botanics</i>	Botanic Gardens Autonomous with State Government support. A new botanic garden of indigenous species is being developed.	J.C. Gladstones, Ph.D. Kings Park, Perth, Western Australia J.S. Beard, M.Sc., M.A.D. Ph.
TASMANIA		
36. Hobart	CSIRO Division of Plant Industry, Tasmanian Regional Laboratory	Hobart, Tasmania
36.1 <i>Apples (storage)</i>	Investigations in progress deal almost entirely with apples. They include studies on tree nutrition and pre- and post-harvest physiology of apple fruits in relation to storage disorders, storage techniques and the energy metabolism of fruits in relation to storage behaviour. Plant physiology and nutrition of pome fruits	Off. i. ch.: D. Martin, D.Sc. T.L. Lewis, M.Sc., Ph.D. / J. Cerny, Dr. Tech. Sc.
36.2 <i>General horticulture</i>	Department of Agriculture - Horticulture Division Research projects (1964): - Apples 1. Breeding and varieties, 2. Propagation and rootstocks, 3. Soil management, 4. Irrigation, 5. Nutrition and tree composition, nutrition and soil applications, nutrition and foliage applications, 6. Training and pruning, 7. Spraying for cultural purposes, 8. Harvesting,	P.O. Box 192R, G.P.O. (Murray Street), Hobart, Tasmania Dir.: F.W. Hicks Head: W.F. Walker

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Hobart (36.2)	handling and storage, 9. Weed control and miscellaneous trials. - Berry fruits 1. Breeding and varieties, 2. Propagation, 3. Nutrition - Citrus fruits Varities and rootstocks - Hops 1. Breeding and varieties, 2. Propagation, 3. Nutrition, 4. Quality and composition, 5. Harvesting and drying - Pears 1. Propagation and rootstocks, 2. Nutrition and tree composition, 3. Thinning and spraying for cultural purposes, 4. Harvesting and storage - Stone fruits Breeding and varieties - Vegetables Broad beans: 1. Varieties, 2. Processing. Carrots: 1. Varieties, 2. Nutrition, 3. Cultural practices, 4. Processing French beans: 1. Varieties, 2. Nutrition, 3. Cultural practices, 4. Processing. Green peas: 1. Varieties, 2. Seed, 3. Nutrition, 4. Cultural practices. Swedes: Nutrition - Miscellaneous Varieties Pomology and vegetable crops Vegetables: cultural problems in vegetable crops with special reference to culture and processing of root crops Vegetables: cultural problems in vegetable crops with special reference to culture and processing of peas and beans Hops: breeding and cultural problems, brewing qualities Berry fruits and vegetables: nutritional and cultural problems Pomology: pruning, harvesting, marketing and storage problems, apples and pears Pomology: crop control (apples and pears), physiology, nutrition and growth regulators Pomology: general pomological problems, pruning, rootstocks	T.D. Raphael, M. A. Dip. Hort. B.M. Beatty B.D. Frappell C.R. Geard J.C. Laughlin J.B.O. Loughlin R.R. Richards B.D. Richardson



South Tasmania, Huonville District - River Huan and bridge. Apple and pear growing

PAPUA AND NEW GUINEA

Survey

Papua and New Guinea is essentially an agricultural country. Agriculture was and still is to a large extent the main occupation of the people of the Territory. Subsistence agriculture is practised in village plots called 'gardens' and the basic agricultural pursuit is in fact gardening: the culture of the principal food crops such as sweet potato, taro, yam, cassava, banana, as well as a wide range of subsidiary food crops, mainly pulses and vegetables grown for their foliage or seed. Thus subsistence food production in Papua and New Guinea is more in the nature of horticulture than agriculture. An additional factor favouring a horticultural pursuit is the scale of operations. Owing to the terrain and the social organization of the people, usually only hand tools are used for cultivation and consequently the unit areas cultivated are small and consist of isolated spots amid forest or grass lands. Permanent cropping is rare and practically all food production is carried out under the 'bush-fallow' shifting agriculture system.

The percentage of European and New World species customarily grown in subsistence agriculture is very high (G.P. Keleny: 'Notes on the origin and introduction of the basic food crops of the New Guinea people'. Proceedings of the UNESCO Symposium on the Vegetation of the Humid Tropics at Goroka, September 1960). They include basic subsistence crops such as the sweet potato (*Ipomoea batatas*), cassava (*Manihot utilissima*), as well as fruits and subsidiary crops, e.g. 'Kong-Kong' taro (*Xanthosoma* sp.), maize (*Zea mays*), peanut (*Arachis hypogaea*), Irish potatoes (*Solanum tuberosum*), tobacco (*Nicotiana tabacum*), papaw (*Carica papaya*), and a wide range of vegetables.

Some of these European and New World species found their way to New Guinea in the course of contacts with early explorers, but the largest number (though perhaps not in order of importance) was the result of systematic introductions by the German and Australian Administrations.

The major centre pre-war for the distribution of new species was the Botanic and Economic Garden at Rabaul. It was established by the German Administration in 1909-10 and by the 1920's contained over 1200 species both of economic and ornamental plants. The Gardens were maintained and greatly extended by the Australian Administration by means of a continuous programme of introductions (Supplement to the New Guinea Agricultural Gazette Vol. 4, No. 4, Dec. 1938). These very extensive Gardens containing a highly valuable source of material were completely destroyed during the Japanese occupation of Rabaul during the 2nd World War.

The Lowlands Agricultural Experiment Station at Keravat, near Rabaul in New Britain was started in 1928 by E.R. Hopkins. The Station was greatly extended and established as a research centre for tropical crops by F.C.D. Green, who was Superintendent from 1935 until the Japanese occupation in 1942. The scientific work of the Station, particularly plant breeding and selection was under the control of R.E.P. Dwyer, who was Economic Botanist from 1934 till 1942. Keravat played a major role in the establishment, testing and distribution of lowland crops throughout the region. Following its destruction during the 2nd World War, the Experiment Station was re-opened by F.C. Henderson, who was Economic Botanist in the immediate post-war years.

The exploration of the Highland areas on the New Guinea Mainland was closely followed by the establishment in 1936 of the Highlands Agricultural Experiment Station at Aiyura on the Upper Ramu under the direction of W. Brechin (killed during the war). This Station at Aiyura was responsible for the introduction of a very wide range of new crops into the previously isolated Highland region. These crops included *Coffea arabica*, *Cinchora succubra*, and *C. ledgeriana*, potatoes, peanuts, and other pulse crops and the full range of European vegetables, e.g. beans, tomatoes, cabbage, lettuce, carrots, radish etc., shade crops such as *Crotalaria anagyroides*, pastures and so on.

In pre-war Papua, horticultural development and assistance to indigenous producers to diversify their cropping programme and diet were less spectacular but equally persistent. Of particular importance was the nursery and economic garden at Gobaragere on the Kemp-Welsh River near Rigo in the Central District, which was established by Sir William McGregor who was governor during 1880-1898. The collection included a wide range of economic plants and fruit trees. This Economic Garden was maintained right to the post-second war period. Agricultural development and the introduction and distribution of new species was receiving particular attention during the directorship of M.S.C. Smith. Experiment Stations were established at Hombrow Bluff near Port Moresby and at Waga-Waga at Milne Bay. Both these stations had large nurseries for the propagation for distribution of fruit trees, vegetables, food crops, spices and other economic species. Agricultural demonstrations were also maintained at a number of centres in conjunction with magisterial stations e.g. at Kokoda, Kerema, Kikori, Kapari (near Cape Rodney), Higaturu. All these centres were active in the dissemination of seeds and plants.

On conclusion of the second world war, Papua and New Guinea were united under a joint administration. A Department of Agriculture,

Stock and Fisheries was formed with responsibility for all aspects of agricultural development. Agricultural experiment stations were established in the major climatic regions of the Territory for the conduct of experiment work on a wide range of crops and cultural problems. Each station is equipped with a laboratory for use by agronomists and

other specialists (entomologists, plant pathologists, chemists etc.). In addition a series of demonstration stations was initiated, called District Agricultural Stations, for local multiplication and distribution of plant material in the various administrative districts.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

AUS 37.1 - 41.1

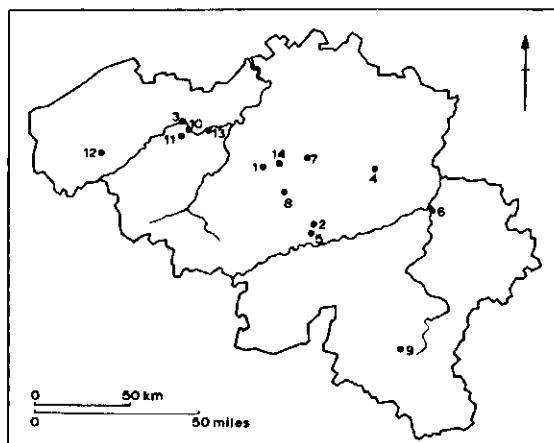
Seat/Nature of program	Institution and projects	Address and staff
37. Aiyura 37.1 <i>General</i>	Highlands Agricultural Experiment Station Major research station for all high altitude crops Agronomy Horticultural experiments	Aiyura via Kainantu, Eastern Highlands District Head: R.S. Carne T.J. Quinlan/D.R. Petty/ C.R. Coffman K.H. van Horck
38. Epo 38.1 <i>General</i>	Agricultural Experiment Station Experiment Station for the dry monsoonal region of Papua.	Epo, Central District Agronomist: R. Brownhall
39. Keravat 39.1 <i>General horticulture</i>	Lowlands Agricultural Experiment Station Major research station for all lowland crops. Agronomy Entomology Plant pathology Chemistry Horticultural experiments	Keravat, via Rabaul, New Britain District Head: P.N. Byrne J.B.O' Donoghue/G.I. Jamieson/ L.A. Douglas/J.H. Sumbak/M. Burton G.S. Dunn/A.G. Basson/ T.L. Fenner R.J. van Velsen/P.G. Hicks C.R. Levy J.E. Hofman
40. Lae 40.1 <i>Botanics</i>	Botanic Gardens Under the control of the Department of Forests. Large collection of all classes of tropical ornamental plants, both New Guinean and introduced species, including orchids. Herbarium for all classes of plant material under the control of the Division of Botany. The mycological herbarium and insect pest reference collection are maintained by the Plant Pathology and the Entomology Sections of the Department of Agriculture, Stock and Fisheries at Port Moresby.	Lae J.S. Womersley
40.2 <i>General</i>	Bubia Plant Industry Centre Subsidiary research centre on the New Guinea Mainland for lowland tropical crops and for the dry monsoonal zone in the Markham Valley.	Lae, Morobe District Agronomists: C.S. Edwards/K.J. Blackburn
41. Port Moresby 41.1 <i>General horticulture</i>	Department of Agriculture, Stock and Fisheries At the Division of Plant Industry agricultural and horticultural research is conducted. Economic botanics Plant introduction Plant pathology Microbiology Entomology Chemistry	Port Moresby Dir.: F.C. Henderson Chief: A.W. Charles A.E. Charles G.P. Keleny Dr. Dorothy E. Shaw/ W.A. Layton M.J. Trinick Dr. J.J.H. Szent-Ivany/ A. Catley D.W.P. Murthy/P.J. Southern/ Miss P.M. Thorne/Miss C.A. Fowler/C.C. Martin/G. Hart

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

AUS 41.2 - 42.1

Seat/Nature of program	Institution and projects	Address and staff
41.2 <i>General horticulture</i>	Laloki Plant Introduction and Quarantine Station Plant quarantine, plant introduction and multiplication centre for the whole territory. Horticultural experiments	Port Moresby R. S. Montgomery Tech. ass.: Kana Aburu
42. Sogeri 42.1 <i>Rubber</i>	Bisianumu Rubber Centre Propagation and testing of rubber clones, rubber seed production. Horticultural experiments	Sogeri, via Port Moresby A. J. van Haaren

Belgium — Belgique



Sommaire général

Bien qu'en Belgique l'horticulture soit à l'honneur pour ses diverses spécialités depuis le début du siècle dernier, la recherche horticole, entreprise par des organismes officiels ou semi-officiels, ne remonte qu'à une date relativement récente. Ce ne fut en effet qu'après la deuxième guerre mondiale que les autorités responsables s'occupèrent sérieusement du développement de la recherche scientifique en horticulture.

Dès le siècle dernier, quelques importantes firmes horticolas entreprirent des travaux de recherche et d'amélioration orientés vers la pratique. Etant donné les connaissances limitées en sciences fondamentales de l'époque, ces travaux furent plutôt élémentaires. Les grandes exploitations d'alors pourraient toutefois, sans aucun doute, être considérées comme les précurseurs des sciences horticolas actuelles.

Les publications dont elles furent l'origine forcent encore l'admiration à l'heure actuelle. Nous ne citerons ici que les périodiques connus à l'époque sur le plan international:

Revue de l'horticulture belge et étrangère,
Flore des serres et des jardins de l'Europe,
La Belgique horticole,
L'illustration horticole.

En agriculture, la recherche scientifique proprement dite, effectuée par des organismes créés à cette fin, ne débuta que dans la seconde moitié du XIX^e siècle. En effet, en 1872, grâce à la collaboration entre la science, la pratique et les instances publiques, une Station agricole fut établie à Gembloux où douze ans auparavant, l'Institut agronomique avait été créé.

1. Bruxelles/Brussel, 2. Gembloux, 3. Gent/Gand, 4. Gorsem-St. Truiden/St. Trond, 5. Grand Manil, 6. Grivegnée, 7. Heverlee, Leuven/Louvain, 8. La Hulpe, 9. Libramont, 10. Melle, 11. Merelbeke, Lemberge, 12. Rumbeke, 13. Wetteren, 14. Wezembeek, Oppem.

L'évolution ultérieure se fit assez lentement. Néanmoins la Belgique comptait, immédiatement avant la seconde guerre mondiale, plusieurs organismes s'occupant activement de travaux de recherches dans le domaine agricole et localisés surtout dans et autour des Instituts agronomiques de l'Etat de Gand (fondé en 1920) et de Gembloux (1860) et de l'Institut agronomique de l'Université libre de Louvain (1878).

La recherche spécifiquement horticole remonte aux années qui précèdent et suivent immédiatement la seconde guerre mondiale. En effet, la création d'une Chaire d'horticulture aux Instituts agronomiques (respectivement en 1937 à Gand et en 1938 à Gembloux) fut suivie, à partir de 1946, de la création de Stations de recherches et de Laboratoires s'occupant entièrement ou partiellement de recherche scientifique en horticulture.

L'Administration de la recherche agronomique au Ministère de l'Agriculture, créée en 1957, coordonne l'activité des Centres de recherches de l'Etat.

Structure et organisation

En Belgique, il serait difficile de parler de recherche scientifique dans le domaine horticole, sans décrire la structure générale de la recherche agronomique. Cette dernière, prise dans son sens le plus large (y compris donc l'horticulture et la sylviculture), est effectuée par:

- (A) des organismes d'Etat,
- (B) des institutions subventionnées par l'Etat,
- (C) des organismes officiels, autonomes ou privés, subventionnés par l'IRSIA (Institut pour l'encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture)

ou le FNRS (Fonds National de la Recherche Scientifique),

- (P) des organismes subventionnés par des administrations provinciales ou communales, dans le cas de recherches spéciales,
- (F) des institutions autonomes.

A Des organismes d'Etat. Ils sont de loin les plus importants.

A.1 Les Institutions pour la recherche scientifique du Ministère de l'Agriculture. Actuellement au nombre de 21, ces Stations de recherches sont réparties en deux grands Centres de recherches agronomiques: Gand avec 9 stations et Gembloux avec 12 stations. Chaque Centre jouit d'une certaine autonomie, aussi bien du point de vue budgétaire. Les programmes de recherches sont élaborés, en confrontation avec la science, la pratique et la vulgarisation, essentiellement au sein du "Conseil supérieur de la recherche agronomique", établi depuis 1957 (précédemment au Comité National de la recherche agronomique, 1948). Pour la réalisation des programmes, la personnalité du chercheur est respectée autant que possible, de même que son indépendance intellectuelle.

Il incombe aux Stations de recherches du Ministère de l'Agriculture un rôle d'utilité publique au sens le plus large. Leur activité concerne avant tout des problèmes dont la solution est directement et immédiatement favorable à l'économie agricole.

Les Stations s'occupant entièrement ou partiellement de recherches spécifiquement horticoles, sont les suivantes:

Au Centre de Gand:

- Station de Recherches pour l'amélioration des plantes ornementales,
- Station d'Entomologie,
- Station de Phytopathologie,
- Station de Génie rural.

Au Centre de Gembloux:

- Station de Recherches pour l'amélioration des plantes fruitières et maraîchères,
- Station d'Entomologie,
- Station de Phytopathologie,
- Station de Phytopharmacie,
- Station du Génie rural.

Depuis 1960, le Ministère de l'Agriculture dispose de crédits spéciaux destinés aux travaux de recherches relatifs à des problèmes agricoles urgents. Ces recherches sont effectuées par des Groupes de travail spécialement créés pour ces missions.

Ils travaillent généralement en collaboration très étroite avec les Stations de recherches existantes, mais ils ne sont pas intégrés comme elles dans la structure administrative du Département. En ce moment, dans le domaine horticole, les groupes de travail suivants sont en activité:

Culture des Plantes ornementales, à Melle (Gand),

Culture du Cerisier, à Grand-Manil (Gem-

bloux),

Chauffage des Serres, à Lemberge (Gand),
Organisation du Travail en horticulture, à Gand.

L'Administration de la Recherche agronomique, à Bruxelles, coordonne l'activité des Stations de recherches de Gand et de Gembloux, de même que du Jardin botanique de l'Etat à Meise, du Centre de recherches vétérinaires d'Uccle, du laboratoire chimique de Tervueren et des groupes de travail créés par le Ministère de l'Agriculture. Créé en 1957 et autonome, cette administration a comme missions principales: 1. d'établir les programmes généraux de recherches, en liaison avec le Conseil supérieur de la Recherche scientifique en Agriculture, 2. de surveiller l'exécution des programmes de recherches établis, 3. de veiller à ce que l'outil qui constitue les Services de recherches soit continuellement adapté aux besoins réels, 4. de maintenir un courant sérieux et suivi entre la Recherche et la Vulgarisation, 5. de coordonner le travail au sein des Centres de recherches agronomiques, 6. d'étudier, sur le plan international, les ressources que l'étranger peut apporter en matière de recherches, 7. de favoriser l'établissement d'une collaboration active avec les Stations étrangères de recherches.

En Belgique, dans le domaine agricole et horticole, la majeure partie des travaux de recherches sont effectués par les organismes de recherches appartenant à l'Administration de la Recherche agronomique.

A.2. Les Chaires et Laboratoires des Instituts agronomiques dépendant du Ministère de l'Education nationale et de la Culture. Quelques Chaires et Laboratoires s'occupent également de travaux de recherches en horticulture. Il s'agit en général de recherches fondamentales effectuées souvent en fonction de l'Enseignement supérieur. Sous l'impulsion du Conseil supérieur de la Politique scientifique, dont il sera question plus loin, est envisagée l'extension de la Recherche scientifique, le but principal restant toutefois la formation d'étudiants au niveau supérieur. Les programmes de recherches y sont entièrement libres.

De la recherche fondamentale en horticulture est effectuée:

- dans les Instituts agronomiques de l'Etat à Gand et à Gembloux
- à l'Université de l'Etat à Liège
- aux Universités libres de Bruxelles et de Louvain.

B. Des Institutions subventionnées par l'Etat
Certaines Institutions privées ou autonomes reçoivent une aide financière du Ministère de l'Agriculture, pour la recherche scientifique en agriculture (recherches sous contrat). Les principales appartiennent à l'Université catholique de Louvain (elle-même

subventionnée par l'Etat). La recherche scientifique dans le domaine horticole y est surtout effectuée par:

- Le Laboratoire de Génétique appliqué
- Le Laboratoire de Pédologie.

C. Des organismes officiels, autonomes ou privés, subventionnés par l'IRSIA ou le FNRS
C.1. IRSIA (Institut pour l'encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture). Des crédits sont alloués pour des recherches, en principe temporaires, dans le domaine agricole.

L'IRSIA est un organisme paragouvernemental créé, par la loi du 27 décembre 1944, afin de promouvoir et d'encourager, au moyen de subventions, les recherches scientifiques et techniques susceptibles d'assurer le progrès de l'industrie et de l'agriculture. Les crédits sont prévus au budget du Ministère des Affaires économiques.

L'IRSIA est soumis au contrôle des Départements des Affaires économiques et de l'Agriculture.

Il comprend notamment les comités de recherches suivants:

- Centre national pour l'étude de la culture fruitière
- Comité pour l'étude de la conservation des fruits et légumes
- Comité pour l'étude de la culture maraîchère
- Comité de recherches du fraisier
- Comité d'application des méthodes isotopiques aux recherches agronomiques (CAMIRA)
- Centre de recherches scientifiques et techniques des conserves de légumes et des industries connexes (CERCOL)
- Centre d'étude des plantes ornementales
- Centre d'études et de recherches sur l'aquiculture
- Centre de recherches sur les mauvaises herbes
- Comité pour l'établissement de la carte des sols et de la végétation de la Belgique
- Centre de recherches de Gorsem
- Comité pour les recherches scientifiques en viticulture
- Centre d'information pour l'horticulture dans la province de Flandre Orientale
- Centre d'étude pour l'électricité appliquée en agriculture et en horticulture.

C.2. FNRS (Fonds National de la Recherche Scientifique). Créé suivant une initiative privée (Fondation universitaire), le Fonds national a été approuvé par Arrêté royal du 2 juin 1928. Les ressources du FNRS sont destinées à l'octroi de subventions à des chercheurs, à l'équipement de laboratoires, bref à tout ce qui est étroitement lié à l'évolution de la recherche scientifique et en particulier à la recherche scientifique pure.

D. Recherches spéciales subventionnées par les Gouvernements provinciaux ou communaux. Ces initiatives consistent principalement en Jardins d'essais créés par les Administrations provinciales.

E. Des Institutions de recherches autonomes. S'occupant entièrement ou partiellement de recherche agronomique, elles font appel, pour la majeure part, à l'initiative privée, aux associations professionnelles et autres. Les organismes repris sous D. et E., sont de moindre importance quant à la recherche scientifique dans le domaine horticole.

Organismes coordonnés

Depuis 1959 (Arrêté royal du 16 septembre 1959), il existe une organisation nouvelle de l'ensemble de la politique scientifique:

1. *Le Comité ministériel de la politique scientifique.* Présidé par le Premier Ministre, il coordonne les activités des Ministères intéressés à la politique scientifique.

2. *Une Commission interministérielle de hauts fonctionnaires.* Elle met au point les mesures qui exigent l'intervention de plusieurs départements ministériels.

3. *Le Conseil national de la Politique scientifique.* Ce Conseil, consultatif, trace les grandes lignes de la Politique scientifique et en suit l'évolution.

En ce qui concerne plus particulièrement la recherche scientifique en agriculture, les activités du Ministère de l'Agriculture sont coordonnées par le *Conseil supérieur pour la Recherche scientifique en agriculture*. Il donne son avis au Ministère de l'Agriculture pour tous les problèmes qui intéressent les recherches scientifiques en agriculture. Il comprend des délégués de: l'administration, les organismes scientifiques, l'enseignement supérieur agricole, la pratique et les organisations professionnelles. Il est présidé par le Directeur général de l'Administration de la Recherche agronomique.

Vulgarisation des résultats obtenus

Pour être efficace, la recherche scientifique doit, au plus tôt, communiquer aux milieux intéressés les résultats obtenus.

En ce qui concerne les Stations de recherches et les Institutions semblables du Département de l'Agriculture, la vulgarisation est assurée, au plus haut niveau, par le Conseil supérieur de la Recherche agronomique. Les contacts indirects sont réalisés par des articles scientifiques, semi-scientifiques et de vulgarisation, paraissant dans les périodiques et les revues professionnelles (cf. liste).

Les Chaires et Laboratoires des Instituts agronomiques sont généralement moins directement en contact avec la pratique. Leurs observations sont publiés dans des revues

scientifiques.

Quelques centres subventionnés par l'IRSIA travaillent en collaboration étroite avec la pratique. Il en est de même de tous les groupes de travail dépendant du Département de l'Agriculture.

De cette façon, on essaye de créer, à différents niveaux, un courant suivi, dans les deux sens, entre la science horticole et la pratique.

Ci-après, nous citons quelques revues dans lesquelles sont publiés les rapports des travaux relatifs à des recherches scientifiques en horticulture:

Bulletin de l'Institut agronomique et des Stations de recherches de Gembloux (trimestriel, français)

Mededelingen van de Landbouwhogeschool en de opzoekingsstations van de Staat te Gent (trimestriel, flamand)

Revue de l'Agriculture, Bruxelles (mensuel, français)

Landbouwtijdschrift, Bruxelles (mensuel, flamand)

Le Fruit belge, Liège (mensuel, français)

Tuinbouwberichten, Louvain (mensuel, flamand)

Belgische Fruit-Revue, Gand (mensuel, flamand).

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
1. Bruxelles/ Brussel	Bureau de Biométrie de l'Institut pour l'encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture (IRSIA)	Rue Heger-Bordet 7, Bruxelles 1 Dir.: Prof. dr. L. Martin prof. G. Hirsch Chef de travaux: Ir. Anne Lenger Ass.: Ir. P. Gilbert
1.1 Biométrie	Biométrie, études expérimentales, analyse et interprétation d'essais biologiques, échantillonnage, génétique mathématique	Rue Archimède 13, Bruxelles Prés.: M. Jean Denolin Dir.: Ir. R. Laruelle Pharmacien:
1.2 Plantes médicinales	Centre Belge d'Etude des plantes médicinales Organisme privé, subventionné par l'IRSIA. Station d'expérimentation de Lessines. Amélioration des plantes médicinales indigènes Laboratoire de l'Association Pharmaceutique	Institut Agronomique de l'Etat, Rue du Bordia 8, Gembloux Ir. P. Grandjean Ir. E. Seutin
2. Gembloux	Centre d'Etude des Pesticides Agricoles (CEPA)	Institut Agronomique de l'Etat, Gembloux Dir.: Prof. P. H. Martens
2.1 Phyto- pharmacie	Subventionné par l'Etat, sous contrat annuel. Recherches en physico-chimie Méthodes d'essais sur insecticides	Prof. P. H. Martens Ir. R. Caussin Ir. R. Vervier
2.2. Phyto- pharmacie	Centre de Recherches de Phytopharmacie Institution à statut privé, subventionnée par l'IRSIA et un groupe industriel Spécialisations: 1. l'application des appareils pour les traitements de phytopharmacie 2. la formation et dégradation des dépôts d'insecticides et de fongicides sur cultures 3. persistance d'herbicides dans les sols. Analyse chimique, phytopharmacie, préparation, contrôle et utilisation des pesticides agricoles Appareils de traitement Méthodes d'analyse de traces de pesticides	Avenue de la Station 2, Gembloux Prof. A. Lecrenier Prof. J. Debuissou Dr. Ir. A. Nisen Dr. Ir. G. Neuray
2.3 Horticul- ture générale	Chaire d'Horticulture, Institut Agronomique de l'Etat Dépend du Ministère de l'Education Nationale et de la Culture Installations: 7 chambres conditionnées et un phytotron pour arbres en fonctionnement; 2 autres chambres en voie de réalisation. Arboriculture fruitière, culture maraîchère Plantes ornementales Physiologie des plantes, thermophotopériodisme, construction des serres Croissance des plantes (Cyclamen)	Rue du Bordia 8, Gembloux Dir.: R. Vanderwalle Gh. Sommerijns L. Defosse Van Moorter Jadot
2.4 Phytopa- thologie	Comité de Recherches de Parasitologie Végétale Etudes des relations hôtes-parasites Biochimie Physiologie pathologique Respirométrie, enzymologie Biologie de <i>Peronospora tabacina</i>	Institut Agronomique de l'Etat, Gembloux Dir.: Prof. R. Vanderwalle Chef de travaux: Dr. J. Semal
2.5 Virologie	Laboratoire de Pathologie végétale Problèmes de virologie,	Institut Agronomique de l'Etat, Gembloux Dir.: Prof. C. Corin Chef de travaux: Ir. F. Massaux
2.6 Physique	Laboratoire de Physique Travaux subventionnés par l'IRSIA 1. Applications des radio-isotopes aux recherches agronomiques (en collaboration avec le prof. Lecrenier de l'Institut Agronomique)	

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Continuation Gembloux (2.6)	2. Dispersion des solutions salines dans le sol 3. Translocation de certains éléments dans les plantes 4. La fécondation de witloof.	Ass. de l'IRSIA: Ir. J. Rodenbourg (CAMIRA) et Ir. J. Krotoszyner (CAMIRA)
2.7 <i>Phytovirologie</i>	Laboratoire de Phytovirologie Appartient à l'IRSIA et aux Ministères des Affaires Economiques et de l'Agriculture. Diagnose Sérologie Viroses des arbres fruitiers Vecteurs (cicadères)	Rue du Bordia 8, Gembloux Dir.: G. Roland G. Roland J. Tahon P. Roxus Van der Veken
2.8 <i>Phytopathologie</i>	Station de Phytopathologie de l'Etat Etudes virologiques, mycologiques et épidémiologiques. Virologie Mycologie Epidémiologie	Rue du Bordia 8, Gembloux Dir.: R. Vanderwalle G. Roland G. Parmentier C. Populer
2.9 <i>Phytopharmacie</i>	Station de Phytopharmacie A cette station appartient le Centre d'Etude des Pesticides Agricoles (CEPA) (voir 2.1). Application des insecticides, herbicides, etc. Méthodes d'analyse Fongicides dans l'horticulture (mildiou de la pomme de terre) et l'arboriculture fruitière (tavelure, oïdium); désinfectants des semences Publ.: Collaboration à l'édition "Parasitica" (revue trimestrielle). L. Detroux: "Les herbicides et leur emploi" (Ed. Duculot, Gembloux) 1960, 1965.	Institut Agronomique de l'Etat, Gembloux Dir.: Ir. E. M. Tilemans Ir. L. Detroux Ir. J. Henriët Ir. J. Fraselle
3. Gent/Gand	Centre de Recherches sur les Plantes Ornementales	Coupure links 235, Gand Dir.: Prof. ir. J. van den Brande
3.1 <i>Plantes ornementales</i>	Appartient à l'IRSIA. Entomologie et nématologie appliquées en horticulture (plantes ornementales: Azalea sp., Begonia sp., Lilium sp.)	Ass.: Ir. R. de Clerck
3.2 <i>Cartographie des sols</i>	Centrum voor Bodemkartering/Centre de Cartographie des Sols Etablissement de la carte des sols de la Belgique. - Subsidié par l'IRSIA.	Rozier 6, Gand Dir.: Prof. dr. R. Taverne Dir.-adj.: Prof. dr. J. Ameryckx Autres collaborateurs: Dr. ir. P. Pahaut/ dr. ir. A. van Wambeke/ dr. ir. J. Deckers/ ir. G. Henrard/ ir. R. Leys/ ir. F. de Coninck/ ir. F. Geelhand de Merxem/ ir. P. Avril/ ir. R. Stefens/ ir. E. de Roubaix/ L. Raeyens/ F. B. Oldenhove de Guertechin/ J. Remy/ H. Vandenhoudt Collaborateurs libres: Prof. dr. R. Maréchal/ prof. dr. F. Snacken/ prof. dr. P. Bourguignon/ prof. dr. ir. C. Sijs/ ir. A. Louis/ L. Walschot

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3.3 Recherches apicoles	Comité voor Rijenonderzoek/Comité de Recherches Apicoles Appartient à l'Institut Supérieur Agronomique de l'Etat. Pollinisation, produits répulsifs, productions de gelée royale et de pollen Analyse pollinique, développement du nid à couvain, maladies des abeilles	Coupure links 235, Gand Dir.: Prof. ir. J. van den Brande Ir. N. Martens Dr. O. van Laere
3.4 Physiologie	Laboratoire de Physiologie Végétale, Faculté des Sciences, Université de Gand Dans un avenir rapproché: un nouveau laboratoire, comprenant quatre chambres à température contrôlée (avec et sans lumière artificielle). Physiologie de la floraison des plantes supérieures, physiologie de la reproduction des algues et des hépatiques Physiologie de la floraison des plantes supérieures, physiologie de la formation des anthocyanes Physiologie et biochimie de la résistance des plantes supérieures aux champignons	K. L. Ledeganckstraat 35, Gand Dir.: Prof. dr. J. Maton Prof. dr. J. Maton Dr. H. Frédéricq J. de Greef
3.5 Zoologie	Leerstoel voor Dierkunde/Chaire de Zoologie Appartient à l'Institut Supérieur Agronomique de l'Etat.- Chambre à température et humidité contrôlées (avec lumière artificielle). Zoologie générale, entomologie générale et appliquée, nématologie (azalées, begonias, gloxinias, lis du Japon, roses, chrysanthèmes, oeillets, pépinières) Entomologie appliquée, nématologie, hydrobiologie (azalées, begonias, tomates) Phytopharmacie Nématodes phyto-parasites libres (oeillets) Influences des radiations radioactives sur la fertilité des insectes Ennemis des plantes ornementales Problèmes de pollinisation et cultures fruitières Publ.: J. van den Brande et A. Gillard: Algemene Insektenleer. Vyncke, Gand 1960.	Coupure links 235, Gand Dir.: Prof. ir. J. van den Brande Prof. ir. J. van den Brande Dr. ir. A. Gillard Ir. R. Kips Ir. A. de Grisse Ir. C. Pelerents (IRSIA) Ir. R. de Clercq Ir. N. Martens
3.6 Phyto-technie/Mauvaises herbes	(a) Leerstoel voor Phytotechniek/Chaire de Phytotechnie (b) Centre de Recherches sur les Mauvaises Herbes Laboratoire et serres Appartiennent à (a) l'Institut Supérieur Agronomique de l'Etat; (b) l'IRSIA. Désherbage sélectif.	Coupure links 235, Gand Dir.: Prof. ir. M. Slaats Maître de Recherche: Prof. dr. ir. J. Stryckers Ass.: Ir. H. Braeckman Bosstraat 13, Melle
3.7 Mycologie	Leerstoel voor Plantkunde/Chaire de Botanique Appartient à l'Institut Supérieur Agronomique de l'Etat. Mycologie générale Mycologie du sol Systématique des fungi	Coupure links 235, Gand Dir.: Prof. ir. J. van Holder Prof. Ir. J. van Holder Ir. W. Welvaert Ir. P. Bosmans
3.8 Horticulture générale	Leerstoel voor tuinbouw/Chaire d'Horticulture Appartient à l'Institut Supérieur Agronomique de l'Etat.	Coupure links 235, Gand Dir.: Prof. ir. S. F. Cortvriendt

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Continuation Gent/Gand (3.8)	Recherche sur les camélias, les orchidées, les rosiers, les plantes ornementales, les techniques horticoles. Régions tempérées, régions tropicales, bouturages, cultures ornementales Orchidées, rosiers, plantes ornementales (arbres et arbrisseaux, conifères) Azalées, plantes ornementales de serre, automatisation des cultures horticoles	Prof. ir. S. F. Cortvriendt Ir. G. Roesman Ir. D. Wilde
3.9 Entomologie Voir: 13.2	Rijksstation voor Insectenkunde/Station d'Entomologie de l'Etat.	
3.10 Economie	Rijksstation voor Landbouweconomie/Station d'Economie Rurale de l'Etat Service de comptabilité agricole en parties simples, auquel les exploitations agricoles peuvent s'affilier librement. - Etudes concernant: (1) la commercialisation de la viande de porc; (2) la commercialisation de la viande bovine; (3) les normes de travail dans les exploitations agricoles; (4) les normes de travail dans les exploitations horticoles. Economie rurale, méthodes de recherche de l'économie Débouchés des produits agricoles et horticoles, les finances, le crédit et les prix en rapport avec l'agriculture	Coupure 235, Gand Dir.: Prof. dr. A. G. Baptist Prof. dr. A. G. Baptist Ir. A. Verkinderen
3.11 Phytopathologie	Rijksstation voor Plantenziekten/Station de Phytopathologie de l'Etat Maladies des plantes ornementales, maraîchères et de pépinières. Mycologie Dotichiza et Peronospora tabacina Physiologie des fungi	Coupure 235, Gand Dir.: Prof. ir. J. van Holder Prof. ir. J. van Holder Ir. R. Veldman Ir. O. Kamoen
4. Gorsem, St. Truiden/Gorsem, St. Trond	Centre de Recherches de Gorsem Appartient à une Association Sans But Lucratif, subventionnée par l'IRSIA. - Laboratoires, chambres d'infection, serres, parcelles expérimentales.	Gorsem, St. Truiden/Gorsem, Saint Trond Dir.: Dr. ir. A. Soenen
4.1 Phytopathologie, physiologie	Phytopathologie, physiologie, entomologie, service d'avertissement Oïdium et tavelure du pommier et du poirier, maladies du peuplier, climatologie Maladies des arbres fruitiers à noyaux et petits fruits, chancre du pommier, Phytophthora du pommier Maladies et parasites des fraisiers Expérimentation de nouveaux produits Mycologie, culture de champignons, conditions d'infection des différentes cryptogames pathogènes sur arbres fruitiers Avertissements, insectes et acariens des arbres fruitiers Laboratoire de Physiologie Végétale Comprend un bureau d'analyse foliaire. Maladies de conservation Produits stimulant ou freinant la croissance Métabolisme chlorophyllien	Dr. ir. A. Soenen Ir. R. Aerts Ir. W. Porreye Ir. G. Gilles Ir. A. Busschots Ir. S. Sys G. Vanwetswinkel Dir.: Dr. C. Sironval Ir. H. Clijsters R. Marcelle M. F. Michel-Wolwertz

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
5. Grand Manil	Station d'Amélioration des plantes fruitières et maraîchères	Chaussée de Charleroi 68, Grand Manil (Gembloux) Dir. a.i.: Ir.E.Dermine
5.1 Amélioration	Recherches en culture fruitière et maraîchère, recherches sur petits fruits et sur la conservation de produits fruitiers et maraîchers. Culture fruitière (pommier, prunier), désherbage chimique, taille en pommier et poirier, variétés de collection, sujets porte-greffe Petits fruits: sélection sanitaire, création de nouvelles variétés; conservation de produits fruitiers et maraîchers Culture fruitière (poirier, cerisier), greffe intermédiaire, qualité des fruits Culture maraîchère: amélioration des plantes, techniques culturales Culture maraîchère: sélection et amélioration des plantes, techniques culturales Sous-stations expérimentales: a. Mussy-la-Ville (13 ha) Culture maraîchère et culture fruitière Installations en voie de construction. b. Wavre-Ste Catherine (4 ha) Culture maraîchère Installations en voie de construction.	Ir.E.Dermine Ir.R.Linden Ir.A.Monin Ir.V.E.Tilkin Ir.W.Plumier Ir.V.E.Tilkin Ir.W.Plumier
5.2 Conservation	Comité pour l'Etude de la Conservation des Fruits et Légumes Ce Comité, subventionné par l'IRSIA, constitue l'une des Commissions d'Etude de CEREF (Centre National pour l'Etude Scientifique de la Conservation par le Froid des denrées périssables, ASRL). Techniques frigorifiques, essais culturaux, conservation en milieu gazeux Chimie et physiologie de la conservation des fruits et légumes	Chaussée de Charleroi 68, Grand Manil (Gembloux) Dir.: Prof.A.Lecrenier Ir.R.Linden Dr.S.Dormal-van den Bruel et Ir.J.C.Sacre
5.3 Culture fruitière	Comité pour l'Etude de la Culture Fruitière Organisé sous les auspices de l'IRSIA. Divers problèmes relatifs à la culture fruitière: fumure, valeur culturale, taille, éclaircissage des fruits. Valeur culturale des variétés fruitières, éclaircissage chimique Fumure, analyse foliaire Fumure, application des radioisotopes à ces recherches, expérimentations en phytotron Physiologie végétale	Chaussée de Charleroi 68, Grand Manil (Gembloux) Prés.: Prof.A.Lecrenier Ir.O.Liard Ir.T.Trzcinski Mlle Ir. M.Th.Ferauge Ir.Crabbe
5.4 Culture maraîchère	Comité pour l'Etude de la Culture maraîchère, section II Organisé sous les auspices de l'IRSIA. Chicorée-witloof, asperge	Chaussée de Charleroi 68, Grand Manil (Gembloux) Prés.: Prof.A.Lecrenier Secr.: Ir.W.Plumier Mlle Ir. Y.Paris
5.5 Cerisier	Groupe de travail pour l'étude du cerisier et de la qualité des fruits Nanification du cerisier	Chaussée de Charleroi 68, Grand Manil (Gembloux) Prés.: Prof.A.Lecrenier Responsable de la recherche: Ir.A.Monin Ir.R.Trefois

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
6. Grivegnée 6.1 <i>Fraisier</i>	Comité de Recherches du Fraisier Institution privée subventionnée par l'IRSIA. Section 1. Amélioration de la culture des fraises de table (sièges à Tihange et Wépion) Section 2. Amélioration de la culture des fraises industrielles (sièges à Vilvorde-Duffel et Hoogstraeten) Section 3 Publ.: Rapports annuels; "Le Bulletin du Fraisieriste" (bimestriel).	Rue Fraischamps 143, Grivegnée Conseil scientifique: Prés.: R.Habran/ C.Laurent/ A.Lecrenier/ R.Linden/ C. Sironval/ L. Vanderlinden/ A.Soenen/ P.Nicolai/ R.Lemaître R.Habran/R.Lemaître/ Bernard L.Vanderlinden A.Soenen/G.Gilles
7. Heverlee, Leuven/Louvain 7.1 <i>Pédologie</i>	Centre d'études des sols horticoles de l'Institut Agronomique de l'Université de Louvain Etude des fumures et de l'aptitude du sol pour l'horticulture. Equipement: 1. Serre pour l'aménagement des cultures d'essais en vases de végétation 2. Parcelles d'essais en plein champ, en collaboration avec le "proeftuin/Jardin d'essai Hageland-Zuiderkempen" 3. Laboratoire pour les analyses des échantillons provenant des expériences. Champs d'essais, vases de végétation sur les classes d'aptitude Analyses de terres et des produits végétaux Multiplication et sélection des asperges Utilisation des terrains agricoles pour l'horticulture	Avenue Cardinal Mercier 72 Heverlee, Louvain Dir.: Prof.dr.G.Scheys Ir.J.Wijnhoven Dr.ir. Lamberts Ir.A.Palasthy Ir.K. van Nerum
7.2 <i>Horticulture appliquée</i>	Laboratoire de Cultures Horticoles appliquées de l'Institut Agronomique de l'Université de Louvain Fructification des arbres fruitiers, sujets porte-greffes, croisement, dormances.	Avenue Cardinal Mercier 92 Heverlee, Louvain Dir.: Ir.K.J.Hiemeleers
7.3 <i>Génétique appliquée</i>	Laboratoire de Génétique appliquée de l'Institut Agronomique de l'Université de Louvain Collaboration avec la Station de Sélection d'Heverlee (30 ha de terrains d'expérimentation + serres). Génétique, étude des gènes de la chlorophylle et de l'anthocyane, croisement (<i>Lactuca</i> et <i>Pisum</i>)	Vandenbemptlaan 16, Heverlee, Louvain Dir.: Prof.dr.ir. A.G.Dumon Prof.dr.ir. A.G.Dumon/ Ir.R.Laeremans/Ir.L. Kempeneers
7.4 <i>Phytopathologie</i>	Laboratoire de Phytopathologie de l'Institut Agronomique de l'Université de Louvain Equipement: laboratoires, serres, champs d'essais. Phytopathologie de <i>Cyclamen persicum</i> Désinfection du sol, e.a. par voie chimique Virus de la mosaïque de la tomate Neutralisation des virus Fusariose de l'asperge Plasmodiophora sur les choux Botrytis, Rhizoctonia et <i>Dydymella</i> sur les tomates	Avenue Card. Mercier 92, Heverlee, Louvain Dir.: Prof.ir.C.van Assche Ir.A.van Winckel/Ir.H.Vandenbroeck/Ir.E.Geenen/Ir. M.Geypens

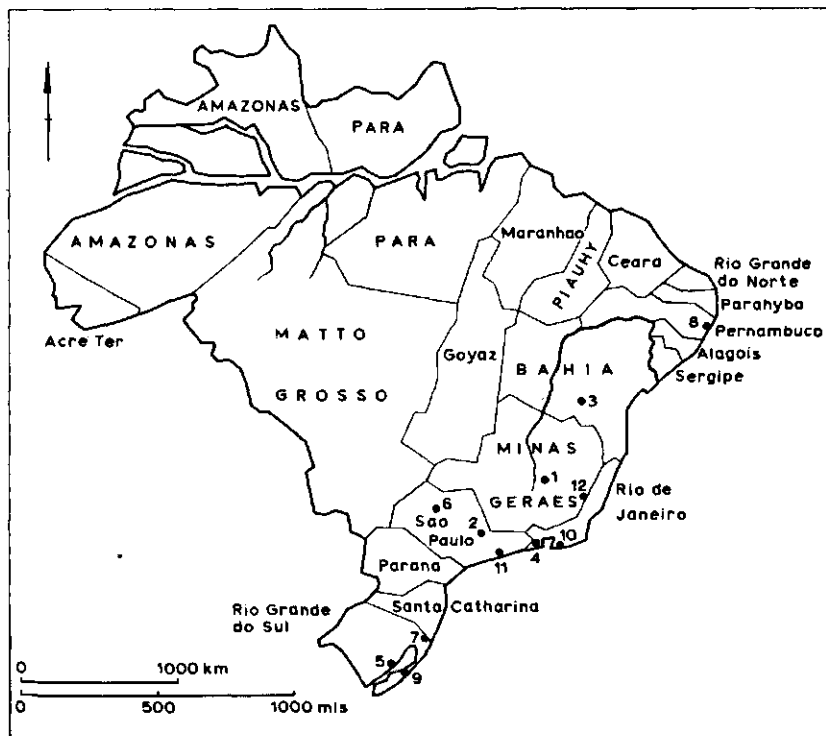
Siège/Caractère du programme	Institution and projects	Address and staff
8. La Hulpe 8.1 Viticul- ture, pédolo- gie e.a.	Station Provinciale de Recherches Scientifi- ques Agricoles et Viticoles 1. Recherches scientifiques: a. Viticulture, hybridations en collaboration avec M. Branas, Montpellier b. Produits phytopharmaceutiques en collabo- ration avec M. Tielemans, Gembloux 2. Pédologie, analyses de terres et d'essais de fumures. Service de dépistage des nématodes, de dosage de matières sèches, d'essais de culture avec éclairage, de biologie végétale, etc. Reconversion des serres à vignes, l'étude de la direction à lui imprimer et les essais adé- quats. Recherches en viticulture, phytopathologie en général Pédologie, cultures fruitières, essais de fu- mures, horticulture Pédologie, analyse des terres, des fourrages, etc. Nématodes Attachés au Comité de Recherches Scientifiques en Viticulture, subventionné par l'IRSA Publ.: Tous les 2 ans un rapport traite des hybridations, du problème des porte-greffes étrangers, du neo-enracinement provoqué en ser- re, des concentrations salines, des essais de substances excitatrices, de la lutte contre l'araignée rouge (<i>Tetranychus telarius</i>), les cochenilles, l'<i>Armillariella mellea</i>, l'<i>Oïdium</i> et le phomopsis.	Rue St. Nicolas 17, La Hulpe Dir.: Ir. R. Delhayé Ir. R. Delhayé Ir. P. Bovenrade Ir. R. Delmotte M. Lecomte/Ir. A. Derden Ir. M. d'Anethan/Ir. Cl. Pâques
9. Libramont 9.1 Pommes de terre	Station de Recherche de l'Etat pour l'Amélio- ration de la Culture de la Pomme de terre 1. Obtention de nouvelles variétés de pomme de terre 2. Lutte contre les maladies à virus et pro- duction de plantes élite 3. Recherches sur la fumure, les qualités d'utilisation de la pomme de terre, la phyto- technie des plantes de la rotation. Laboratoires de chimie et de phytopathologie, chambres isothermiques, installation de froid (-25°C), serres, abris toilés. Génétique, virologie Recherches chimiques et biochimiques Génétique Virologie	Rue de Serpont, Libra- mont Dir.: Ir. N. Rigot Ir. N. Rigot Ir. L. Nys Ir. V. Melard Ir. G. Fouarge
10. Melle 10.1 Plantes ornementales	Rijksstation voor Sierplantenveredeling en Werkgroep voor de Sierplantenteelt/Station de Recherches de l'Etat pour l'Amélioration des Plantes Ornementales et Groupe de Tra- vail pour les Plantes Ornementales Ressort du Ministère de l'Agriculture, Admi- nistration de la recherche agronomique. Amélioration des espèces de plantes orne- mentales, important sur le plan économique; mise au point de méthodes culturales plus rationnelles, surtout des plantes bulbeuses et tubereuses, éricacées, plantes à feuillage ornemental, roses et arbustes ornementaux.	Caritasstraat 17, Melle Dir.: Ir. J. van Onsem

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation Melle (10.1)	La Station est surtout occupé à des missions de plus longue durée (p.e. l'amélioration). Le Groupe de Travail a été chargé des tâches les plus urgentes, se rapportant aux méthodes culturales. 1. Fleurs à bulbes et à tubercules 2. Floriculture en plein air et ericacées 3. Cultures sous verre 4. Pépinières 5. Cytologie et chimie Publ.: J. van Onsem: Geschiedenis van de bloementeel in Oost-Vlaanderen / Histoire de la floriculture en Flandre Orientale.	Ir. J. Haegeman Ir. R. Hartmann/Ir. A. Goossens Ir. J. Heursel Ir. K. Otten Ir. G. Vyncke/Ir. H. Crauwels Ir. N. de Boodt
11. Merel- beke-Lemberge 11.1 Construc- tion etc. des serres	Rijksstation voor Boerderijbouwkunde, afdeling Konstruktie, verwarming en klimatisatie van kassen/Station de Génie rural, section Construction, chauffage et climatisation des serres Appartient à l'Etat. Les essais sont exécutés en général dans des exploitations horticoles. Génie rural, technique horticole: combustibles, combustion, analyse des fumées pour le contrôle de la combustion, détermination du rendement de chaudières, construction, chauffage et climatisation des serres	Van Gansberghelaan 61, Merelbeke-Lemberge Dir.: Dr. ir. A. Maton Ir. Taveirne
12. Rumbeke 12.1 Horti- culture in- dustrielle	Provinciaal Onderzoek- en Voorlichtingscentrum voor Nijverheidsteelten/Centre provincial de Recherche et d'Information pour les Cultures Industrielles Organisme provincial. La section "Cultures légumières" s'occupe des recherches phytotechniques sur des légumes cultivés pour la conserverie. Laboratoire chimique, biologique et physique.	Iepersestraat 87, Rumbeke Dir.: Ir. L. Bockstaele Chercheurs: Ir. J. Derolez et ir. G. Vulsteke Chefs de culture: N. van Oost et D. Callewaert
12.2 Culture fruitière	Westvlaamse Proeftuin/Jardin d'essai de la Flandre Occidentale Association Sans But Lucratif, dirigé par un conseil de direction, assisté par un Comité technique. Recherche expérimentale de la culture fruitière en basses tiges. Salle de réunion, espace frigorifique.	Iepersestraat 91, Rumbeke Sécr.: Westkouter 29, Roelselaere/Roulers Comité technique: Cumps, Prof. Siaens, Ir. Vanhooren, Desmedt, Pollet
13. Wetteren	Proefstation voor de Tuinbouw/Station de Recherches pour l'Horticulture	Stoektestraat 1, Wetteren Dir. BVO: R. de Keijzer Prés. du Conseil d'admini- stration: Ir. E. de Wilde
13.1 Horti- culture géné- rale	Station fondée dans le cadre de l'Association Sans But Lucratif "Bedrijfsvoorlichtingsdienst voor de Tuinbouw in de provincie Oost-Vlaanderen" (BVO) Subventionnée par l'IRSIA, la chambre provinciale de l'agriculture, le "Belgische Boerenbond", le Ministère de l'Agriculture, les municipalités et diverses associations. 1. Floriculture et pépinières: bouturages mist system (Azalea indica et japonica); toute la gamme de la pépinière (substrats et fumure - Azalea, Philodendron, Sansevieria, Ficus, Dianthus); désherbage sélectif, amélioration des terres, technique culturale des rosiers et pépinières.	

INSTITUTIONS ET PROJETS DE RECHERCHE
B 13.1 - B 14.1

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation Wetteren (13.1)	2. Cultures maraîchères: fumure par irrigation (tomates et laitue); technique culturale des cornichons. Problèmes généraux Azalées Plantes vertes Pépinières Tomates, laitues, cornichons Propriétés physiques des substrats Dianthus	Ir. R. Blomme Ir. G. Piens/R. de Dobbelaere Ir. H. Herregods/E. Verheggen Ir. J. van Hulle/J. Vanwezer/ M. de Pauw/H. van Herreweghe Ir. H. van Bastelaere/F. Haegeman A. Schelstraete H. de Vijlder
13.2 Entomologie	Rijksstation voor Insectenkunde/Station d'Entomologie de l'Etat Dépend du Ministère de l'Agriculture; Centre de Recherches Agricoles, Gand. Phytonématologie Entomologie Apiculture	Oosterzelesteenweg 86, Vantegem-Wetteren Dir.: Ir. J. d'Herde Ir. W. Coolen Ir. R. de Clerq Dr. O. van Laere
14. Wezembeek- Oppem	Institut National pour l'Amélioration des Conserves de Légumes (INACOL)	Rue du Long Chêne 78, Wezembeek-Oppem
14.1 Légumes industrielles	Institution privée à caractère corporatif (usines de conserves de légumes); Association Sans But Lucratif. Recherches appliquées d'ordre agronomique et d'ordre technologique	Dir.: Ir. M. Bruneau Ir. M. Bolly/Ir. M. La-valleye

Brazil



1. Belo Horizonte, 2. Campinas, 3. Cruz das Almas, 4. Município, 5. Pelotas, 6. Piraciaba, 7. Porto Alegre, 8. Recife, 9. Rio Grande, 10. Rio de Janeiro, 11. São Paulo, 12. Vicosa.

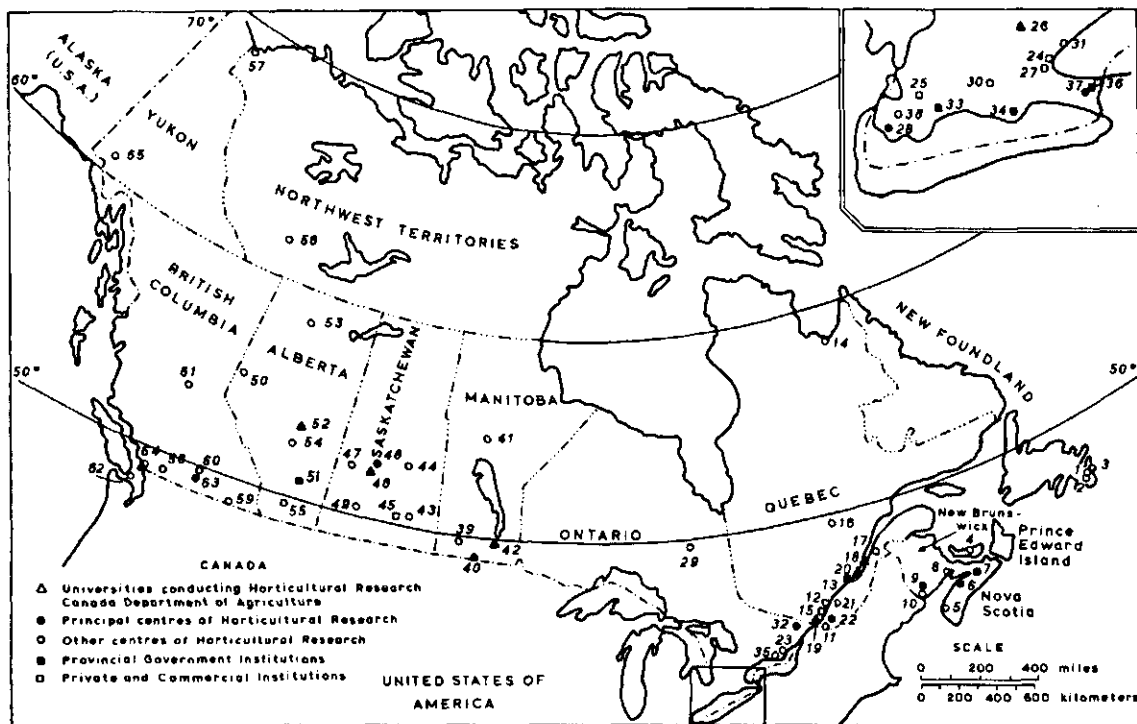
Seat/Nature of program	Institution and projects	Address and staff
1. Belo Horizonte 1.1 General horticulture	Instituto Agronômico do Estado de Minas Gerais/ <i>Agricultural Institute of the State of Minas Gerais</i> Belongs to the Secretariat of Agriculture of the State of Minas Gerais. Specializes, amongst other activities, in fruits (citrus). Sections: Botany, virology, physiology, taxonomy, entomology, phytopathology and mycology, genetics, fruit, vegetables and ornamental plants.	Caixa Postal 515, Belo Horizonte Estado de Minas Gerais Dir.: Dr.R.Alves de Araujo
2. Campinas 2.1 General horticulture	Instituto Agronômico/ <i>Institute of Agricultural Sciences</i> Belongs to the Secretariat of Agriculture of the State of São Paulo. All horticultural crops. Specializes in citrus fruits. The following sections are active in the field of horticulture: 1. <i>Agricultural department</i> Sections for citriculture, subtropical fruits, tropical fruits, tobacco, medicinal plants and insecticides, pulses, vegetables and ornamental plants, tropical plants, root and tuberous crops, oleaginous crops, viticulture. 2. <i>Biological department</i> Sections for botany, cytology, entomology, virology, phytopathology, physiology, genetics and breeding. 3. <i>Soil and engineering department</i> Sections for soil science, soil protection, soil fertility, irrigation, agricultural engineering, chemistry and technology. <i>Experimental stations:</i> Estação Experimental Central de Campinas; Estação Experimental de Limeira (citrus) Estação Experimental de Jundiaí (fruits) Estação Experimental de São Roque (vines)	Caixa Postal 28, Campinas, Estado de São Paulo Dir.: Dr.G.Pinto Viégas
3. Cruz das Almas 3.1. Tropical fruits	Instituto Agronômico do Leste/ <i>Agricultural Institute of East Brazil</i> Belongs to the Ministry of Agriculture. Crops: tropical fruits. Departments: Experimental station, botany, phytopathology, entomology, genetics and horticulture.	Cruz das Almas, Estado da Bahia
4. Município de Itaguaí 4.1 General horticulture	Instituto de Ecologia e Experimentação Agrícola/ <i>Institute of Ecology and Agricultural Experiments</i> Belongs to the Ministry of Agriculture. Departments: Genetics, agricultural botany, phytopathology, entomology, horticulture, central experimental station.	Km 47 da Rodovia Rio-São Paulo, Distrito de Seropédica, Município de Itaguaí, Estado do Rio de Janeiro
4.2 General horticulture	Escola Nacional de Agronomia/ <i>National Agricultural School</i> Horticultural lectures.	Km 47 da Rodovia Rio-São Paulo, Distrito de Seropédica, Município de Itaguaí, Estado do Rio de Janeiro

Seat/Nature of program	Institution and projects	Address and staff
5. Pelotas 5.1 General horticulture	Instituto Agronômico do Sul/Agricultural Institute of South Brazil Belongs to the Ministry of Agriculture. All horticultural crops. Departments: Horticulture, botany, phytopathology, entomology, genetics.	Caixa postal E, Pelotas Estado do Rio Grande do Sul
5.2 General horticulture	Escola de Agronomia "Eliseu Maciel"/Agricultural school 'Eliseu Maciel' Belongs to the Ministry of Agriculture. Horticultural lectures.	Praça 7 de julho 52, Pelotas, Estado do Rio Grande do Sul
6. Piracicaba 6.1 General horticulture	Escola Superior de Agricultura "Luis de Queiroz"/Agricultural College 'Luis de Queiroz', University of São Paulo Some research work on horticultural crops: genetics, botany, phytopathology, etc.	Piracicaba, Estado de São Paulo
7. Porto Alegre 7.1 General horticulture	Escola de Agronomia da Universidade do Rio Grande do Sul/Agricultural College of the University of Rio Grande do Sul Some research work on horticultural crops. Departments: Botany, entomology and parasitology, phytopathology, microbiology, genetics.	Caixa postal 776, Porto Alegre
8. Recife 8.1. Fruits	Instituto Agronômico do Nordeste, Estação Experimental de Itaperema/Agricultural Institute of Northeast Brazil, Experimental Station of Itaperema Belongs to the Ministry of Agriculture. Crops: Tropical fruits.	Caixa postal 205, Estado de Pernambuco
9. Rio Grande 9.1 General horticulture	Estação Experimental de Horticultura "Domingos Petronilli"/Horticultural Experimental Station 'Domingos Petronilli' Belongs to the Secretariat of Agriculture. Crops: Onions, potatoes and various other horticultural products.	Município de Rio Grande, Estado do Rio Grande do Sul
10. Rio de Janeiro 10.1 Botany	Jardim Botânico/Botanical Garden Belongs to the Ministry of Agriculture, Silvicultural Service. Outstanding botanical garden in Brazil with arboretum rich in Brazilian species of plants. Departments: General botany, systematical botany, electronical microscopy.	Rua Jardim Botânico 1008, Estado do Rio de Janeiro
11. São Paulo 11.1 Biology	Instituto Biológico do Estado de São Paulo/Institute of Biology of the State of São Paulo Belongs to the State Secretariat of Agriculture, São Paulo. Research work on horticulture is included. Divisão de Biologia Vegetal/Department of Plant Biology General phytopathology, fungicides, plant physiology, plant biochemistry, plant bacteriology, plant parasitology, plant canker. Divisão de Defesa Vegetal/Department of Plant Protection Plant health inspection service, plant health advisory service, insecticides, plant health import control service, chemistry.	Avenida Conselheiro Rodrigues 1252, São Paulo Dir.-gen.: Dr.P.Nobrega Dir.: A.A.Ritancourt Dir.: E.R.Figueiredo jr.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of São Paulo (11.1)	Divisão de Experimentação Agrícola/ <i>Department of Agricultural Experiments</i> Agricultural entomology, applied phytopathology, applied plant physiology, experimental farm.	Dir.: O.Falanghe
11.2 Botany	Instituto de Botanica de São Paulo/<i>Institute of Botany of São Paulo</i> Belongs to the Secretariat of Agriculture. Situated in the São Paulo Botanical Garden. Botanical studies. Mycology and taxonomy of the Polyporaceae. <i>Division of Phytology</i> Botany: Anatomy and taxonomy of medicinal and toxic plants <i>São Paulo Botanical Garden:</i> Culture of conifers Section of Biological and Experimental Stations: Maintenance of biological stations Cryptogamic section: Mycology and taxonomy of the Polyporaceae Mycology and taxonomy of Phycomycetes Marine algae Sweet water algae Hepatics Pteridophyta Section of Geobotany: Water balance - Photoperiodism Palinology, developmental physiology Palinology, ecological physiology Water balance, developmental physiology Ecological physiology Ecological morphology Ecological morphology, leaves Phytogeography Ecological morphology, seeds and fruits, spec. Gramineae Section of Morphology and Anatomy: Pharmacognosy Phytochemistry Anatomy of medicinal and toxic plants Plant Anatomy Wood anatomy Section of Ornamentals and the State Orchid Garden: Cyto-genetics of Orchidaceae Ornamentals Lauraceae Phanerogamic section: General systematics, Myrtaceae General systematics, Leguminosae	Caixa postal 4005, São Paulo Estado de São Paulo Dir.-gen.: Dr.A.R.Teixeira Dir.: Prof.Wilson Hoehne, agr.eng. Deputy director: P.L.Cienciulli, agr.eng. E.Kühn (chief), A.M.Ferraz, agr.eng. Dr.O.Fidalgo (chief)/ Maria Eneyda P.K.Fidalgo/ João Salvador Furtado Adanto I.Milanez Marilza Cordeiro/Noemi Takagaki Yamaguishi Carlos E.Mattos Bicudo/ Rosa Maria T.Bicudo D.M.Vital C.Piedemonte de Lima/ L.Zimmermann L.F.Gouvêa Labouriau, Ph.D. (chief) Maria Léa Salgado Labouriau/ Sônia M.de Campos Dietrich G.Martins Felipe Ivany F.M.Válio Therézinha S.Melhem Francisca M.Rios Magalhães W.Handro L.Guimarães de Azevedo Tatiana Sendulsky Renato J. de Siqueira Jaccoud, Ph.D. (chief) E. Angelino Marina T. Andreucci Colemann José F.R.M. Campos Reinaldo A. Pinho H.Dias Bicalho, Agr.D. (subst.chief) Nilva de Oliveira Fialho, agr.eng. B.Coe Teixeira João Rodrigues de Mattos, agr.eng. (subst.chief) Nilza Fischer Mattos, agr.eng.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of São Paulo (11.2)	General systematics, Cyperaceae Cyto-taxonomy, Manihot General systematics, Oxialidaceae General systematics, Gesneriaceae, Orchidaceae Turneraceae Survey of "cerrado" plants Section of Plant Introduction: Culture of conifers	Liene J. Teixeira Eiten, agr. eng. Neuza Diniz da Cruz George Eiten, Ph.D. O. Handro (visitor) Carlos A. F. de Moura Itiriki Mimura P. L. Cianciulli, agr. eng. (chief)
11.3 General horticulture	Cooperativa Central Agrícola Sul Brasil/ <i>Central Agricultural Cooperation of South Brazil</i> Private organization. Experimental station in Atibaia: Research work on horticultural products, especially potatoes and tomatoes.	Avenida Americo Brasiliense 419, São Paulo, Estado de São Paulo G. Yamazoe, agr. eng.
11.4 General horticulture	Cooperativa Agrícola de Cotia/ <i>Agricultural Cooperation of Cotia</i> Private organization founded by Japanese immigrants. Experimental station: Research work on horticultural crops.	Rua Cardeal Arcoverde 2539, São Paulo, Estado de São Paulo
12. Vicos 12.1 General horticulture	Escola Superior de Agricultura da Universidade Rural do Estado de Minas Gerais/ <i>College of Agriculture of the State of Minas Gerais</i> Horticultural lectures.	Vicos, Estado de Minas Gerais

Canada



NEW FOUNDLAND: 1. Avondale, 2. Colinet, 3. St. John's West. PRINCE EDWARD ISLAND: 4. Charlottetown. NOVA SCOTIA: 5. Acaciaville, 6. Kentville, 7. Truro. NEW BRUNSWICK: 8. Alma, 9. Fredericton, 10. Tower Hill. QUEBEC: 11. l'Acadie, 12. l'Assomption, 13. Deschambault, 14. Fort Chimo, 15. Montreal, 16. Normandin, 17. La Pocatière, 18. Quebec, 19. Ste Anne de Bellevue, 20. St Augustin de Portneuf, 21. Ste Clothilde, 22. St Jean. ONTARIO: 23. Belleville, 24. Burlington, 25. Chatham, 26. Guelph, 27. Hamilton, 28. Harrow, 29. Kapuskasing, 30. London, 31. Oakville, 32. Ottawa, 33. Ridgetown, 34. Simcoe, 35. Smithfield, 36. St Catharines, 37. Vine-land Station, 38. Woodslee. MANITOBA: 39. Brandon, 40. Morden, 41. Wabowden, 42. Winnipeg. SASKATCHEWAN: 43. Indian Head, 44. Melfort, 45. Regina, 46. Saskatoon, 47. Scott, 48. Sutherland, 49. Swift Current. ALBERTA: 50. Beaverlodge, 51. Brooks, 52. Edmonton, 53. Fort Vermilion, 54. Lacombe, 55. Lethbridge. NORTHWEST TERRITORIES: 56. Fort Simpson, 57. Inuvik. BRITISH COLUMBIA: 58. Agassiz, 59. Creston, 60. Kelowna, 61. Prince George, 62. Saanichton, 63. Summerland, 64. Vancouver. YUKON: 65. Mile 1019, Alaska Highway.

General Survey

The many diverse and contrasting areas of horticultural production in Canada provide a wide range of problems requiring investigation. Work in the development of better types of horticultural crops must be continued through the creation of new varieties resistant to disease, drought and low winter temperature. Studies must also be continued in the present and in new areas of horticultural crop production to improve cultural conditions for higher production and better quality. Finally, research must improve the handling and use of horticultural crops and adapt them better to meet these requirements.

Centres of horticultural research in Canada

may be grouped in four categories:

- (1) university departments,
- (2) establishments of the Canada Department of Agriculture,
- (3) provincial government institutions, and
- (4) private and commercial institutions.

The Universities

Seven universities have departments of horticulture or departments of plant science in which horticulture forms a part. These are the Universities of British Columbia, Alberta, Saskatchewan, Manitoba, Guelph (Ontario Agricultural College), McGill University (Macdonald College) and Laval University. All support some horticultural research as

well as teaching.

These universities give agricultural degrees in which, as one possible option course, emphasis may be in horticulture. Postgraduate training to the Master's and Doctorate level is also given in all cases. At Laval University lectures are given primarily in French; the other institutions are English speaking. Money for university research is received principally from federal and provincial government sources. In addition to these general funds for the support of teaching and related research, the National Research Council offers assistance to relatively fundamental investigations through grants for research and for the purchase of major items of equipment; the Canada Department of Agriculture also makes grants for specific projects which extend the applied research program of the Department; and casual or continuing financial support for research projects is obtained from various segments of the horticultural and chemical industries.

The Canada Department of Agriculture

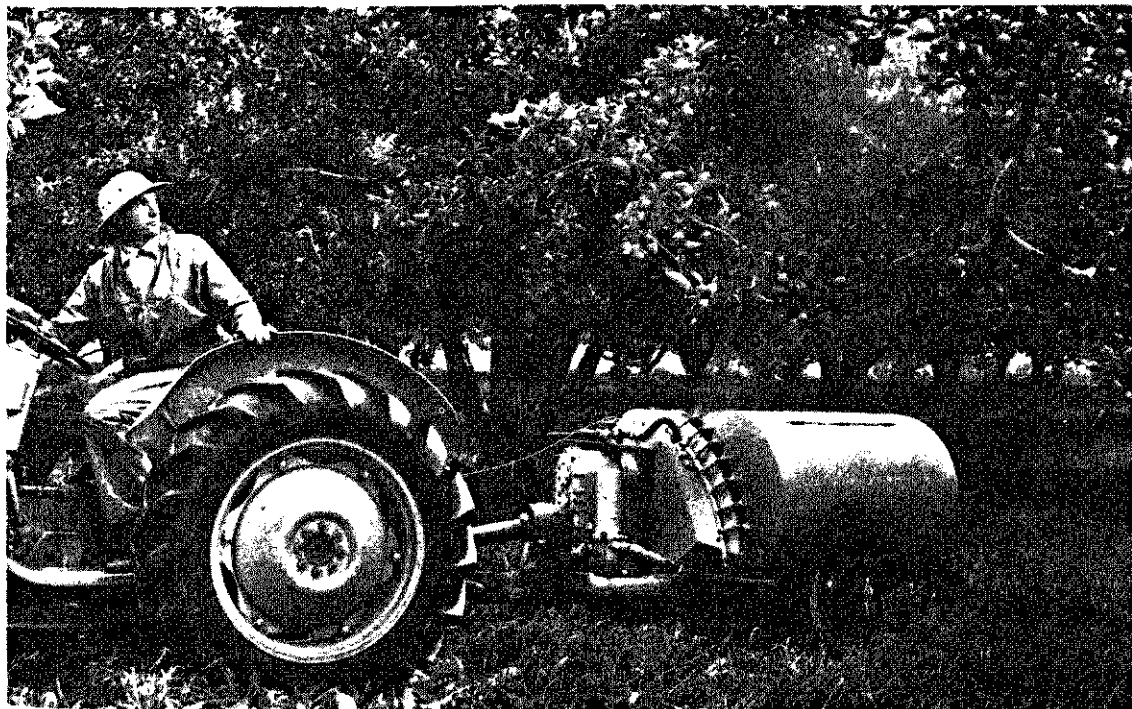
The basis for research in the Canada Department of Agriculture was laid with the passage by the Canadian Parliament on 12 May 1886, of an "Act Respecting Experimental Farm Stations". This act authorized the establishment of a Central Experimental Farm at Ottawa and four Experimental Farms to serve other regions of the country. The farms were to

carry out experimental and investigational work in different phases of agriculture and, with respect to horticulture, to discover cultural methods and varieties best suited to the different parts of Canada.

By the end of 1887 the five farms had been established and a Dominion Horticulturist had been appointed to oversee horticultural research at all of the centres.

Of the five original farms, three in particular have maintained notable interests in horticulture, namely those at Agassiz in British Columbia, Indian Head in Saskatchewan and Ottawa in Ontario. Early in the present century, as variations in soils and climate became more fully understood, and as needs arose for control over disease and insect pests and for studies on irrigation, plant nutrition, storage, processing and other aspects of production and utilization, other research establishments were created. Now well known for their contribution to research in three specialized fruit growing regions, centres were established in the Okanagan Valley at Summerland, British Columbia in 1914, in the Niagara Peninsula of Ontario at Vineland Station and at St. Catharines in 1911 and 1912, and in the Annapolis Valley at Kentville, Nova Scotia in 1912.

Also in 1912 research centres were established at La Pocatiere, Quebec and at Fredericton, New Brunswick. In both, particular attention has been given to vegetable variety



Compact type of concentrate orchard sprayer developed at the Research Station of Summerland (British Columbia)

improvement with emphasis on potatoes. In 1914 and 1915 centres were established at Lennoxville, Quebec, for studies on orchard problems, and at Morden, Manitoba, for the specialized study of horticulture in the prairie region. In southwestern Ontario, which is one of the most important areas of diversified horticultural production in Canada, a station at Harrow, established in 1909 for tobacco studies, turned its attention in the 1920's to investigations on early vegetables, tree fruits and other crops. Studies of vegetable production on organic (black muck) soils were undertaken in 1935 at Ste. Clothilde, Quebec and, in 1940, a research laboratory was established at Saint-Jean, Quebec which has become a major centre conducting investigations at that location and also continuing the work at Ste. Clothilde as a substation; particular attention is given to studies on insects and diseases affecting horticultural crops in this important fruit and vegetable growing region of Quebec. A re-organization of the Canada Department of Agriculture in 1959 placed responsibility for horticultural research under the Research Branch. Its Research Stations, Experimental Farms and Laboratories are situated in all major agricultural areas of Canada. In addition, a smaller number of Research Institutes selected more fundamental problems common to a large part of Canada; they provide basic and applied research information which is of assistance to other establishments in the Department and other groups in Canada. Those concerned in part with horticulture include the Research Institute, Belleville, Ontario (working especially on biological control of insects); the Research Institute, London, Ontario (especially for chemical pesticide studies); and the Food Research and Plant Research Institutes at Ottawa.

Provincial Government Institutions

The Provincial Horticultural Station, Brooks, Alberta had its origin about 1916 when irrigation was commenced in the adjacent areas. No longer concerned specifically with studies in irrigation, the Station directs its research toward the improvement of gardens and grounds of farm home owners and to advising and assisting the rapidly growing commercial vegetable industry in the area. Handling and storage methods for fresh vegetables are of particular interest. Besides varietal testing of vegetables, breeding programs are carried on with potatoes and tomatoes. A screening study of herbicides in relation to horticultural crops is in progress. Propagation of trees for shelterbelts and roadside plantings, and the growing of ornamental trees, shrubs and flowers for demonstration purposes involves rootstock projects and specialized studies in stratification of seeds and methods of propagation. Rather ex-

tensive varietal collections of lilacs and native junipers, peonies, roses, gladioli, lilies and hardy chrysanthemums are maintained. Approximately one hundred acres are devoted to tree fruit breeding and selection, mainly *Malus* and *Prunus*. Raspberries, strawberries and shrubby *Prunus* hybrids also receive attention.

The Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario, was established in 1922 for the purpose of demonstrating the production of cash crops grown in the area. Later a research program was developed around the production of field and processing crops.

The Horticultural Experiment Station, Vine-land Station, Ontario was established in 1906. It has had a long history of research and extension on varieties of fruits, vegetables and ornamentals and on cultural practices for horticultural crops in this region of Ontario. More recently the Horticultural Products Laboratory and a Grape Substation were established to assist in the performance of this work, and a new associated Horticultural Experiment Station was established at Simcoe. Particular attention has been given recently to research in plant nutrition, fumigation of tree-fruit nursery soils, chemical weed control in the vineyard, breeding and introduction of a number of new horticultural crop varieties, production of 'elite stock' as part of the Ontario Strawberry Certification Program, fresh fruit marketing, and quality of processed fruit products.

The Provincial Farm, Deschambault, Quebec, was established by the Quebec Department of Agriculture in 1918. Its horticultural work has been directed towards the improvement of varieties and cultural practices in fruit and vegetable crop production in the Province. An important aspect of its work at present is the propagation of stock, particularly bean and tomato seed and virus-free raspberry and strawberry plants. Research in horticulture consists principally of varietal trials and breeding of blueberries, grapes, strawberries, peppers, potatoes and tomatoes. Cultural practices are also investigated with several crops including medicinal plants.

Private and Commercial Institutions

A few private and commercial institutions conduct independent horticultural research for specific purposes in such fields as ornamental displays and nursery stocks, fruit and vegetable crops for processing, and chemicals for pest control. Others cooperate with or participate in work conducted at Canadian universities and government institutions or at centres outside Canada. In addition, a small number of amateur and professional horticulturists conduct specialized breeding work with certain ornamental species.

Regional Problems

In the future, research attention will be concentrated on a number of horticultural problems that are of particular importance to different regions and different crops in relation to market requirements. In the Atlantic Provinces' region these problems include: the development of potato varieties resistant to disease (e.g., late blight and scab), with superior handling characteristics, and suitable for processing. Vegetable production for canning and freezing (especially peas and beans) is becoming of increasing importance, with a need for determining the most suitable cultural conditions for these crops under chemical weed control. Fruit production problems (principally apples and strawberries) range from the isolation and propagation of virus-free clonal stocks to breeding for resistance to disease and studies on the biological control of fruit insects.

In Ontario and Quebec there is a great variety of problems in a diversified horticultural area. These include management and variety improvement of vegetable crops for production on organic soils, increased hardiness of tree fruits (peaches, apple rootstocks), better chemical control of insects and diseases (e.g., oriental fruit moth, bacterial canker of peaches, 'dead arm' in grapes), control of viruses (especially fruits) and better storage and utilization (radiation for improving fruit storage, new potato-protein instant foods, etc.).

In the Prairie region the major problems of horticultural production centre around improved varieties for the short growing season and greater hardiness in perennial crops. Also important is the development of varieties tolerant to high alkaline soils and resistant to lime-induced chlorosis. Increasing production of potatoes and canning vegetables under irrigation has introduced a number of cultural problems.

Horticulture in the western province of British Columbia varies greatly from the dry, irrigated interior where fruit production is important, to the coastal area, where vegetable canning crops, small fruits, and frost-tender ornamentals are grown. Research with tree fruits is on improved varieties (hardier cherries and apricots, crack resistance in cherries, radiation-induced compact sports in apples), virus identification and characterization (apples, peaches, cherries, apricots), improved chemical control of pests (sprayers), non-chemical control of codling moth of apples (radiation-induced sterilization), and extensive research in processing and fruit development (juice blends, continuous vacuum processing, fruit wines). Small fruit research problems include greater hardiness and productivity in raspberries and resistance in strawberries to red stele (red core) disease. Vegetable research is on im-

proving culture, management and nutrition of processing crops (peas, corn, beans) and a study of the leaf-roll virus complex in potatoes.

Scientific Societies and Research Co-ordination

The *Agricultural Institute of Canada* is a professional society, with approximately 3500 members, which provides a special co-ordinating service for those engaged in all aspects of agriculture in Canada. Affiliated with it (among others) are the following specialized scientific societies whose members may be concerned with horticultural crops:

- a. Canadian Society for Horticultural Science
- b. Canadian Society for Agronomy
- c. Canadian Society for Soil Science
- d. Canadian Society of Agricultural Engineering
- e. Canadian Phytopathological Society
- f. Canadian Pesticide Technical Society.

The Institute has a national secretary and service office in Ottawa to assist the affiliated societies, and arranges facilities for separate and combined technical sessions at the time of the Institute's annual meeting.

The *Canadian Society for Horticultural Science* is a society of professional horticulturists which exists to promote and foster the science of horticulture in Canada. The present membership is 259. Three regional groups have been organized: (1) the Pacific Regional Group in British Columbia, (2) the Western Canadian Society for Horticulture in Alberta, Saskatchewan, Manitoba, Yukon and North West Territories, and (3) the Eastern Regional Group in Ontario and Quebec. Annual and regional meetings are held each year. The Western Canadian Society for Horticulture maintains committees on fruits, vegetables, ornamentals and for extension work. Both the Canadian Society for Horticultural Science and the Western Canadian Society for Horticulture mimeograph proceedings of annual meetings; these are distributed to members giving preliminary, up-to-date findings on much of the current horticultural research.

The *Canadian Institute of Food Technology* is a professional society the principal object of which is to promote the application of science "to the production, storage, processing, packaging, distribution, preparation, and utilization of food". The Institute has approximately 900 members with Sections in British Columbia, Alberta, Manitoba, Ontario (Western Ontario, Toronto, Ottawa) and Quebec. Many of its members are actively interested in the quality, preservation and processing of horticultural crops.

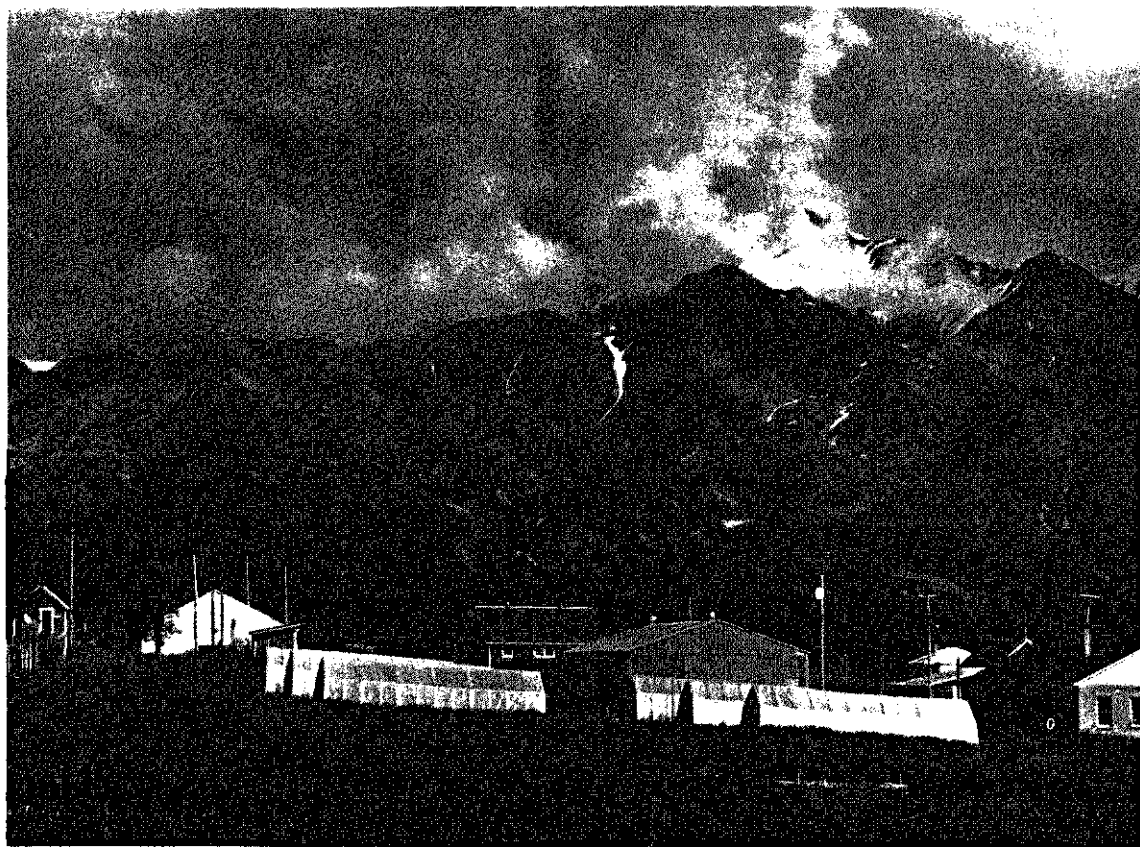
The *Canadian Horticultural Council* is an industry-based organization supported by associations of growers, shippers, wholesalers and processors, by marketing boards and by

provincial government departments of agriculture. The Council comprises approximately 75 representatives and includes almost that number of member organizations. Its *Committee on Horticultural Research* compiles an annual report for the information of Council members and collaborating research laboratories (federal, provincial and university). This informal report provides to those engaged in horticultural research in Canada a convenient guide to most of the work in progress across the country each year.

Publications

Two journals of the Agricultural Institute of Canada publish in English or French, the results of original scientific research including those related to horticulture: The Canadian Journal of Plant Science is published bimonthly and the Canadian Journal of Soil Science three times a year. Other journals of original research papers, including the Canadian Journal of Botany, published monthly by the National Research Council of Canada, and the Canadian Journal of Genetics and Cytology, published quarterly by the Genetics Society of Canada, also frequently include research with horticultural plants.

Periodicals of an extension or news type which might be of interest to horticulturists include: Agriculture (Corporation des Agronomes de la Province de Quebec); Agricultural Institute Review (Agricultural Institute of Canada); Alberta Horticulturalist (Alberta Horticultural Association); Annual Proceedings of the Nova Scotia Fruit Growers Association; BCFGA Quarterly Report (British Columbia Fruit Growers Association); British Columbia Orchardist; Bulletin des Agriculteurs (Coopération Centrale des Agriculteurs de Québec, Montreal); Canadian Florist, Greenhouse and Nursery; Canadian Food Industries; Canadian Fruitgrower; Canadian Plant Disease Survey (Canada Department of Agriculture); Country Guide; Family Herald; Food in Canada; Gardner's Bulletin (Extension Division, University of Saskatchewan); La Ferme; La Terre de Chez Nous; Maritime Farmer and Cooperative Dairyman; Prairie Garden (Winnipeg Horticultural Society); Québec Horticole (Province of Quebec); Revue Canadienne de Biologie (University of Montreal) (includes original research papers); The Grower (Ontario Fruit and Vegetable Growers' Association); Western Producer.



Alaska Highway (Yukon Territory). Part of the Experimental Farm

Seat/Nature of program	Institution and projects	Address and staff
NEW FOUNDLAND		
1. Avondale	Substation Avondale - Branch station of St. John's West Experimental Farm (see 3.1)	Avondale, Newfoundland
1.1 <i>Small fruit</i>	Lowbush blueberry	
2. Colinet	Peat Soil Substation - Branch station of St. John's West Experimental Farm (see 3.1)	Colinet, Newfoundland
2.1 <i>Vegetables</i>	Use of reclaimed peat soils for vegetable crops	
3. St. John's West	Experimental Farm - Regional research station (Canada Department of Agriculture)	P.O. Box 2068W, St. John's West Newfoundland
3.1 <i>General horticulture</i>	Use of reclaimed peat soils for vegetable crops; management of native blueberry stands; centre for breeding potatoes resistant to wart and golden nematodes. Vegetable insects Potato diseases Potato breeding Blueberry management Vegetable crops	Superintend.: H. W. R. Chancey R. F. Morris Dr. G. A. Nelson Dr. O. A. Olsen A. F. Rayment N. Rosa
.	Substations: see 1.1 and 2.1	
PRINCE EDWARD ISLAND		
4. Charlotte-town	Experimental Farm	P.O. Box 1210, Charlottetown, Prince Edward Island
4.1 <i>Vegetables</i>	Regional research station (Department of Agriculture) Several aspects of the culture and nutrition of potatoes for seed and tablestock and vegetable crops for processing (peas, snap beans, spinach, cauliflower, broccoli and Brussels sprouts) - Entomology and Plant Pathology Section Clubroot of crucifers, storage rot of potatoes Evaluation of fungicides for late blight control Blackleg of potatoes Potato insects Root maggots of crucifers Vegetable insects - Soils Section Soil fertility: plant nutrition Plant nutrition (cole crops), general horticulture Minor elements Soil fertility	Superintend.: R. C. Parent Head: G. W. Ayers L. C. Callbeck J. E. Campbell F. M. Cannon D. C. Read Drs. L. S. Thompson Head: Dr. D. C. MacKay J. A. Cutcliffe Dr. V. C. Gupta D. C. Munro
NOVA SCOTIA		
5. Acaciaville	Substation Acaciaville - Branch station of Kentville Research Station (see 6.1)	Acaciaville, Nova Scotia
5.1 <i>Fruit</i>	Evaluation of grapes, peaches, cherries and highbush blueberries	
6. Kentville	Research Station	Kentville, Nova Scotia
6.1 <i>General horticulture</i>	Regional research station (Canada Department of Agriculture) Equipment: Cold storage rooms; facilities for controlled atmosphere studies; laboratories for fruit and vegetable processing and plant nutrition.	Dir.: Fr. J. R. Wright

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kentville (6.1)	Tree, small and native fruits, vegetables and ornamentals; ecology of orchard arthropods; development of an integrated pest control program; pesticide usage and fruit and vegetable storage and processing. - Chemistry Section Soil fertility Plant nutrition Insecticide chemistry Soil chemistry Fungicide chemistry Plant chemistry - Entomology Section Ecology of insects Field and vegetable crop insects Mite investigations Ecology of insect predators Insect pathology Ecology of codling moth Orchard insects Fruit insects Integrated pest control in orchards Tree nutrition and susceptibility to insects Bionomics of fruit insects - Plant Pathology Section Tree fruit diseases Vegetable and small fruit diseases Vegetable diseases Fruit and vegetable storage diseases - Small Fruit and Ornamental Section Small fruits Cytology and genetics Ecology and cytogenetics of small fruits Ornamentals - Storage and Processing Section Plant physiology: controlled-atmosphere storage of fruit Plant physiology: biochemical changes in fruit during storage Food technology - Tree Fruit Section Tree fruits - Weeds, Vegetables and Project Farms Section Weed control Vegetables Experimental project farm Substation Acaciaville see 5.1	Head: Dr. R. F. Bishop Dr. C. R. Blatt D. Chisholm C. R. MacEachern Dr. D. K. R. Stewart L. R. Townsend Head: Dr. A. W. MacPhee C. J. S. Fox Miss H. J. Herbert F. T. Lord Dr. R. P. Jaques C. R. MacLellan N. A. Patterson Dr. A. D. Pickett K. H. Sanford Dr. H. B. Specht H. T. Stultz Head: Dr. R. G. Ross C. O. Gourley K. A. Harrison C. L. Lockhart Head: Dr. D. L. Craig Dr. L. E. Aalders Dr. I. V. Hall G. S. Swain Head: C. A. Eaves Dr. F. R. Forsyth G. W. Hope/T. Fuleki Head: R. P. Longley/Dr. A. C. Crowe Head: J. S. Leefe E. W. Chipman G. G. Smeltzer
7. Truro 7.1 General horticulture	Nova Scotia Agricultural College Provincial Government institution, located on a 300 acres farm and administered by the Nova Scotia Department of Agriculture. Diploma courses are offered, the first two years of which lead to a degree in agriculture; research in cultural practices, weed control, crop nutrition for fruits (especially blueberries), vegetables and greenhouse ornamentals in the region - Horticulture and Biological Services Small fruits Greenhouse crops Landscaping and floriculture Tree fruits	Truro, Nova Scotia Princ.: Dr. W. A. Jenkins Dir.: G. B. Kinsman H. A. L. McLaughlin R. S. Morton R. A. Murray

Seat/Nature of program	Institution and projects	Address and staff
NEW BRUNSWICK		
8. Alma 8.1 Potatoes	Substation Alma - Branch station of Fredericton Research Station (see 9.1)	Alma, New Brunswick
9. Fredericton 9.1 General horticulture	Research Station Regional research station (Canada Department of Agriculture) Equipment: New research laboratory, 5 new greenhouses. Major emphasis on breeding, entomology, pathology, nutrition and management of potatoes; apples, native blueberries, strawberries, fiddlehead ferns, several vegetables and ornamentals. - Entomology and Plant Pathology Section Potato viruses: spindle tuber Aphid-plant relationships, virus transmission Insect vectors: aphid-nonpersistent virus relationships Aphid bio systematics and ecology Virus transmission: aphid-persistent virus relationships - Field Crop Section Potato nutrition and management Herbicide studies: potatoes, vegetables, small fruits - Horticultural Crops Section Physiology (strawberries, blueberries) Tree fruit insects: apple maggot control Small fruit insects and nematodes Apple maggot biology Vegetable insects: systemic insecticide studies General horticulture: variety evaluation, fiddlehead ferns Blueberry insects: biology and control - Potato Breeding Section Potato Breeding Cytogenetics: haploid studies Potato quality and evaluation Species hybridization Resistance to potato late blight Potato scab Physiology and biochemistry Resistance to potato viruses Potato physiology, host-parasite relationship: late blight Potato genetics - Soils Section Soil chemistry: nitrogen and magnesium status Soil physics: effect of stone removal on potato yields Substation Alma (see 8.1) and Tower Hill (see 10.1)	P.O. Box 280, Fredericton, New Brunswick Dir.: S. A. Hilton Head: Dr. R. H. Ragnall J. B. Adams Dr. R. H. E. Bradley Dr. M. Ellen/R. H. E. MacGillivray J. P. MacKinnon J. E. Comeau Dr. C. F. Everett Head: Dr. W. R. Collins C. W. B. Maxwell G. T. Morgan W. T. A. Neilson D. D. Pond R. G. White G. W. Wood Head: L. C. Young M. S. Cipar H. T. Davies L. A. Dionne W. A. Hodgson C. H. Lawrence Dr. J. W. McAllan J. Munro Dr. O. T. Page Dr. D. A. Young Dr. A. A. MacLean Dr. G. R. Saini
10. Tower Hill 10.1 Small fruit	Substation Tower Hill - Branch station of Fredericton Research Station Blueberry studies	Tower Hill, New Brunswick

Seat/Nature of program	Institution and projects	Address and staff
QUEBEC		
11. 1' Acadie	Substation 1' Acadie	1' Acadie, Quebec
11.1 <i>Plant protection</i>	Branch station of St. Jean Research Station (see 22.1). Management of vegetable crops with regard to production and protection (pesticides) on mineral soils.	
12. 1' Assomption	Experimental Farm	1' Assomption, Quebec
12.1 <i>General horticulture</i>	Regional research station (Canada Department of Agriculture). Trials of fruit and vegetable varieties for the region; studies on irrigation and cultural practices for small fruits; particular attention to asparagus, beans, potatoes, sweet corn, tomatoes, raspberries and strawberries. Horticultural crops	Superintend.: J. J. Richard J. Genest
13. Deschambault	Provincial Farm	Deschambault, Quebec
13.1 <i>General horticulture</i>	This farm, administered by the Quebec Department of Agriculture, carries on a program of breeding, variety trials and studies in cultural practices related to various fruit, vegetable and medicinal plants suited to the region. Most of the personnel are members of the staff of the Quebec Department of Agriculture or the Faculty of Agriculture of Laval University in Quebec City (See 18.1) - Horticulture Section Breeding and variety trials (pepper, potato, tomato) Strawberry breeding Cultural trials (medicinal plants) Cultural trials (compost) Breeding and variety trials (blueberry, grape, pepper)	Dir.: A. St-Pierre R. Rushby R. Bedard ¹ N. Chabot ² E. Chamberland ² /A. Scott ² J. O. Vandal ¹
14. Fort Chimo	Northern Substation (Canada Department of Agriculture)	Fort Chimo, Quebec
14.1 <i>General horticulture</i>	Variety evaluation; cultural practices	
15. Montreal	Green Cross Products	2875 Centre Street, Montreal, Quebec
15.1 <i>Plant protection</i>	Private Institution; division of Sherwin-Williams Company of Canada. Research and development of fungicides, insecticides and herbicides. A new research building with expanded facilities is proposed for completion in 1965. Entomology, research planning (insecticides, fungicides, herbicides) Herbicides (cereals, potatoes, soybeans, peas, beans, corn, strawberries, turf, etc) Chemistry, seed treatment (wheat, oats, barley, flax, legumes) Plant pathology, fungicides (ales, potato, etc.) Substations Rougemont and Winnipeg (42.1)	Dir. of res.: H. A. Pass Techn. supervisor: B. J. Watt T. Hryshko M. Nurse

¹ Laval University; ² Quebec Department of Agriculture

Seat/Nature of program	Institution and projects	Address and staff
16. Norman- din 16.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture). Variety evaluation; studies on cultural practices	Normandin, Quebec
17. La Pocatiere 17.1 <i>Potatoes</i>	Research Station Regional research station (Canada Department of Agriculture). Studies in cultural practices and limited variety trials for the region; particular attention to potatoes. Potato diseases Resistance to potato diseases	P.O. Box 400, La Pocatiere, Quebec Dir.: Dr. C. Perrault H. G��n��reux/J. Santerre Dr. R. Paquin
18. Quebec 18.1 <i>General horticulture</i>	Phytotechnical Department, Agricultural College, Laval University Equipment: New pavilion housing cold storage, a growing chamber and two large glasshouses; trial fields (50 acres). The department is concerned with the teaching of plant production sciences and relevant research (plant physiology, agriculture, horticulture, ornamental plant growing and plant protection); cooperation with Agrobiological Department in matters relating to plant genetics and plant protection. Plant breeding Horticulture, fruit growing, genetics, improvement of strawberries Chemistry of foodstuffs, properties of pectin and protopectin in strawberries in relation to the quality of preserves, protein fractions and pea quality Horticulture, vegetable growing Biochemistry of products, fermentation of apple juice Plant pathology, bacterial wilting of potatoes, grey mould of strawberry Plant physiology: biochemical methods for evaluation hardness of strawberries; effect of growth substances on the development of suckers Ornamental plant growing: acclimatization of species Substation at St Augustin de Portneuf (see 20.1)	Cit�� Universitaire, Quebec, Dir.: Dr. J. E. Chevreton R. B��dard Dr. M. Boulet Dr. L. Bourque J. P. Julien Dr. R. O. Lachance Dr. H. Therrien R. van den Hende
19. Ste Anne de Bellevue 19.1 <i>General horticulture</i>	Macdonald College, McGill University Control of diseases and insect pests; production and preservation of fruit and vegetable crops. - Department of Entomology Soil micro-arthropods Resistance to chemical and biological insecticides Population dynamics of orchard pests (apple) - Department of Horticulture Vegetable crops (potato, tomato) Fruit and vegetable storage and processing Fruit crops, rootstock vigour (apple)	Macdonald College, P.O. Quebec Chairman: Dr. D. K. F. McKevan Dr. F. O. Morrison Dr. E. J. LeRoux Chairman: H. R. Murray Dr. J. David Dr. C. D. Taper

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ste Anne de Bellevue (19.1)	- Department of Plant Pathology Epidemiology and biology of plant diseases Archaeological botany, studies on earliest use and domestication of food plants by Indians of Central and South America Relationship between nematode-trapping fungi and nematodes as plant pathogens Physiology of host-parasite systems - Department of Woodlot Management Maples and sap yields Species differentiations in birches	Chairman: Dr. W. E. Sackston Dr. E. O. Callen Dr. S. H. Estey Dr. R. L. Pelletier
20. St Augustin de Portneuf 20.1 General horticulture	Agricultural Station Substation of Phytotechnical Department of Laval University (650 acres) (see 18.1)	St Augustin de Portneuf, Quebec Dir.: G. Provencher
21. Ste Clothilde 21.1 Plant protection	Substation Ste Clothilde - Branch station of St Jean Research Station (22.1) Production and protection of vegetable crops on organic (black mud) soils	Ste Clothilde, Quebec
22. St Jean 22.1 Plant protection	Research Station Regional Research station (Canada Department of Agriculture) Located in an important agricultural region. Problems affecting the production of fruit and vegetable crops (apples, beans, sweet corn, onions and peas), especially their diseases and insect pests. Management of horticultural crops Pea aphid biology in relation to plant resistance Crop diseases Vegetable crop diseases Fruit breeding Soil fertility European corn borer ecology Wireworm ecology and control Ecology of apple orchard fauna Ecology and control of mites, tree fruit breeding Onion maggot ecology and control Management of apple orchards Substations at l'Acadie (11.1) and Ste. Clothilde (21.1)	P.O. Box 457, St Jean, Quebec Dir.: A. A. Beaulieu R. Bernier Dr. J. J. Cartier Dr. L. J. Coulombe R. Crete R. Granger Dr. H. A. Hamilton M. Hudon J. Lafrance Dr. R. O. Paradis/M. I. Rivard B. Parent J. B. Perron P. O. Roy
ONTARIO		
23. Belleville 23.1 Plant protection	Research Institute National research institute (Department of Agriculture) Equipment: 30 controlled environment rooms, radioactive tracer laboratory and field station. Successor to an entomology laboratory for biological control studies established in 1928. The two main functions are now (a) to obtain from abroad all biological control material and information required for use in Canada and (b) to find and develop ways of controlling pest insects and other	P.O. Box 367, Belleville, Ontario Dir.: Dr. B. P. Beirne

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Belle-ville (23.1)	arthropods and noxious weeds otherwise than by use of chemical pesticides. Studies of population ecology and principles of integrated controls. Quantitative biological control studies. Food ecology of ants Entomophilic nematodes Diseases of insects Experimental population ecology Predation by spiders Larvae of parasitic insects Biological control of weeds Parasites of adult insects Parasites of aphids Insect damage to plants Food ecology of coccinellids Population ecology	G.L. Ayre L. J. Briand/Dr. W. E. Nickle/ Dr. H. E. Welch Dr. G. E. Bucher Dr. T. Burnett/Dr. H. G. Wylie Dr. C. D. Dondale Mrs. T. Finlayson Dr. P. Harris Dr. C. C. Loan Dr. J. M. Mackauer Dr. D. Peschken R. C. Smith Dr. A. L. Turnbull
24. Burlington 24.1 Plant protection	Niagara Brand Division of FMC Machinery and Chemicals Limited Commercial institution Technical department conducts research and development in agricultural chemicals Technical service Coordination of research Substation Regina Saskatchewan (see 45.1)	1274 Plains Road East, Burlington, Ontario Dir.: Dr. D. A. Dever Man.: W. E. A. Brandts R. E. Moore
25. Chatham 25.1 General horticulture	Libby, McNeill and Libby of Canada Limited Private institution In the Agriculture Research Department research is conducted on breeding and evaluation of new varieties and hybrids of vegetable and fruit crops for processing, crop nutrition, raw product quality control and crop pest control.	330 Richmond Street, Chatham, Ontario Agr. Res. Man.: R. J. Hall
26. Guelph 26.1 General horticulture	Ontario Agricultural College, University of Guelph - Department of Horticulture Equipment: New horticultural storage laboratory with six 30 x 30 ft. refrigerated storages designed and equipped to permit flexibility in arranging specific temperatures, humidities and atmospheres for various stored products (fruits, vegetables, flowers and nursery stock). All aspects of horticulture as related to this region of Canada, including landscaping, floriculture and ornamentals, fruit and vegetable crops and storage and processing of fruit and vegetables. Physiology of dormancy, growth regulators (strawberries), grafting techniques Products analysis Pathology (lettuce, potato) Landscape architecture, regional planning Fruit crops (strawberries) Landscape design and construction Products and storage (apple, potato) Floriculture, greenhouse practices, turf-grass nutrition Vegetable breeding (tomato)	Guelph, Ontario Head: Dr. R. J. Hilton B. Barabas Dr. L. V. Busch V. Chanasyk Dr. W. D. Evans R. P. Podchuk E. W. Franklin R. Goodwin-Wilson T. O. Graham

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Guelph (26.1)	Greenhouse flower breeding (Geraniaceae) Potato regional trials Products and storage (sprout inhibitors) Vegetable crops (pepper, tomato) Vegetable production (organic soils) Potato culture Floriculture, landscape plant materials Vegetable nutrition (trace elements) Fruit crops (apples) Vegetable crops (nutrition, growth regulators, peas, tomatoes) Herbicides (apple, small fruits, beans, carrots, onion, potato, tomato, gladiolus) Products and storage (potato glyco-alkaloids)	Miss dr. P. M. Harney G. R. Johnston (seconded from Can. Dept. Agr.) Dr. E. C. Loughheed B. A. Rieger Dr. J. W. Riekels R. G. Rowberry J. C. Taylor Dr. E. Terasmae B. J. E. Teskey Dr. H. Tiesen C. G. Waywell Dr. A. Zitnak
27. Hamilton 27.1 Botany	Royal Botanical Gardens Private institution; 1800 acres arboretum, herbarium (cultivated plants), library (horticulture, taxonomy, natural history and nature interpretation), new headquarters (facilities for work in cyto-taxonomy, rose garden, trial gardens for annuals and perennials). Horticulture: hardiness of woody ornamentals Plant breeding, development of new cultivars (Aster, Iris, Hemerocallis), annual trials Taxonomy (Genetiana), cyto-taxonomy (cultivated plants, Clematis), breeding behaviour on phylogeny of Phyllodoce and related genera	P. O. Box 399, Hamilton, Ontario Dir.: L. Laking Superintend.: J. Redman Dr. J. S. Pringle
28. Harrow 28.1 Plant protection	Research Station Regional station (Canada Department of Agriculture) Equipment: Cesium ¹³⁷ gamma radiation facility for mutation research. Studies on many horticultural crops grown in this region with particular attention to soil borne diseases; breeding of peaches, nectarines, apricots, pears, melons and field and greenhouse tomatoes with special attention to the genetics of disease resistance and peach hardiness; vegetable production studies are concerned with both early and canning crops as well as greenhouse crops (cucumber, tomato) - Entomology Section Fruit insects Orchard fauna Root knot nematodes - Horticultural Crops Section Tree fruit breeding Vegetable breeding Weed research - Plant Pathology Section Vegetable diseases, virus studies Corn diseases Soil microbiology - Plant Physiology Section Plant physiology, plant nutrition - Soil Science Section Soil moisture Soil fertility Substation Woodslee (see 38.1)	P. O. Box 370, Harrow, Ontario Dir.: Dr. L. W. Koch Head: H. R. Boyce Dr. W. H. Foott Dr. R. M. Sayre Head: Dr. G. M. Weaver/Dr. R. E. C. Layne L. F. Ounsworth Dr. W. J. Saidak Head: Dr. C. D. McKeen Dr. R. E. Wall Dr. R. N. Wensley Head: Dr. G. M. Ward Head: Dr. J. M. Fulton Dr. W. J. Findlay

Seat/Nature of program	Institution and projects	Address and staff
29. Kapuskasing 29.1 <i>General horticulture</i>	Experimental Farm Substation of Ottawa Research Station (32.4) Variety evaluation, cultural practices	Kapuskasing, Ontario
30. London 30.1 <i>Plant protection</i>	Research Institute National Institution (Canada Department of Agriculture). Established in 1951 to meet the problems created by the introduction of synthetic organic pesticides and to provide a possibility for cooperation of chemists, plant pathologists, plant physiologists, entomologists and bacteriologists. Studies on the action of naturally occurring biological active chemicals as well as the several groups of synthetic compounds. Equipment: a.o. electron microscope - Bacteriology Section Electron microscopy and cell cytology Microbiology and virology - Plant Pathology Section Plant pathology Plant biochemistry - Plant Physiology Section Plant physiology Translocation and selective activity	University Sub Post Office, London, Ontario Dir.: Dr. E. Y. Spencer Head: Dr. C. L. Hannay Dr. E. B. Roslycky Head: Dr. E. W. B. Ward/ Dr. L. T. Richardson Dr. G. A. White Head: Dr. W. A. Andreae/ Dr. W. H. Minshall Dr. M. A. Venis
31. Oakville 31.1 <i>Ornamentals</i>	Sheridan Nurseries Limited Commercial institution. Commercial propagation and growing of ornamental shrubs, trees, evergreens and perennials; breeding and selective trials especially with Berberis, Buxus and Tilia cordata.	P.O. Box 1, R.R. 1, Oakville, Ontario Prop.: C. de Groot
32. Ottawa 32.1 <i>Entomology</i>	Entomology Research Institute National research institute (Canada Department of Agriculture). Primarily working on basic and ecological studies of insects; a small part of these studies is related to horticulture. - Experimental Biology Section Vegetable crop insects Ecology of white grubs Ecology vegetable crop insects	Central Experimental Farm, Ottawa, Ontario Dir.: Dr. G. P. Holland Chief: J. A. Downes W. G. Matthewman J. C. Guppy Dr. D. G. Harcourt
32.2 <i>Preservation</i>	Food Research Institute National research institute (Canada Department of Agriculture). Equipment: A suite of 19 temperature controlled rooms, principally for studies on storage of apples; the processing area, now being rebuilt, will provide facilities for a wide range of studies on fresh and processed products. Research on storage and processing of fruits and vegetables. - Microbiology Section Fruit and vegetable organisms Ecology	Central Experimental Farm, Ottawa, Ontario Dir.: Dr. R. P. A. Sims Head: Dr. J. A. Elliot W. E. Ferguson A. R. Yates

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ottawa (32.2)	- Processing Section - Processing and products - Special projects - Quality evaluation - Sensory evaluation - Storage section - Biochemistry	Head: Dr. N. W. Tape Dr. E. A. M. Asselbergs A. C. Nunes Mrs. M. E. Larmond
32.3 General horticulture	Plant physiology Plant Research Institute National research institute (Canada Department of Agriculture). The institute is concerned particularly with the application of botany to economic problems facing Canadian agriculture, responsible for the development and maintenance of the Dominion Arboretum and Botanical Garden, the National Mycological Herbarium and the Departmental Herbarium of flowering plants. Plant taxonomy, phytopathology, ornamental horticulture and environmental physics, including plant physiology and agrometeorology. Equipment: Extensive greenhouse facilities, an up-to-date phytotron, a data logging instrument for the rapid processing of climatic information and well equipped laboratories.	Head: Dr. F. B. Johnston/ A. B. Durkee W. R. Phillips/P. A. Poapst Central Experimental Farm, Ottawa, Ontario Dir.: Dr. R. A. Ludwig
	- Agrometeorology Section - Environmental Physiology Section - Ornamentals and Greenhouse Crops Section Floriculture	Head: G. W. Robertson Head: V. A. Nelson
	Ornamentals Turf research Plant nutrition Native plants Diseases of ornamental plants Landscape architecture Frost-hardiness	Head: Dr. A. P. Chan/Dr. E. Schneider A. R. Buckley W. E. Cordukes E. T. McEvoy L. C. Sherk Dr. H. S. Thompson E. J. Walker Dr. J. Wilner
	- Phanerogamic Taxonomy Section - Phytopathology Section - Plant Biochemistry Section - Virology Section	Head: Dr. C. Frankton Head: Dr. V. R. Wallen Head: Dr. R. A. Ludwig Head: Dr. J. T. Shykhuis
32.4 General horticulture	Research Station Regional research station (Canada Department of Agriculture). The station continues the plant breeding work of the former Horticulture Division, established in 1887 and the Genetics and Plant Breeding Research Institute, established in 1959. Equipment: Portable low temperature chamber for studying winter hardiness of woody plants. Breeding of apples, strawberries, tomatoes and cucumbers; basic studies in genetics (apple, strawberry and Brassica species); in association with the Experimental Farm at Smithfield (35.1); evaluation of breeding selections and management research (apples, strawberries, peas and canning tomatoes).	Central Experimental Farm, Ottawa, Ontario Dir.: Dr. A. W. S. Hunter

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ottawa (32.4)	- Horticultural Crops Section Breeding and genetics: vegetable crops (tomato, pea) Plant pathology: vegetable and small fruit diseases, strawberry and raspberry viruses Plant pathology: tree fruit diseases Breeding and genetics: vegetable crops (cucumber, pea, <i>Solanum melongena</i>) Cytogenetics: linkage studies in Brassica species, incompatibility Breeding and genetics: fruit crops (apple scab, apple rootstocks, strawberry, raspberry) Breeding and genetics: rose, winter hardiness Genetics: heritability and breeding methods in strawberry and raspberry	Head: L.H. Lyall Dr. A. T. Bolton Dr. J. B. Julien V. W. Nuttall Dr. D. R. Sampson Dr. L. P. S. Spangelo Dr. F. J. Svejda Dr. R. Watkins
33. Ridgetown 33.1 <i>General horticulture</i>	Western Ontario Agricultural School and Experimental Farm Provincial institution, administered by the Ontario Department of Agriculture: research, teaching and extension. Processing of crops, variety trials, studies in crop protection (insect, disease and weed control). - Division of Biology and Horticulture Variety trials (strawberry, potato), weed control (asparagus, lawns, cucumbers, tomatoes, snap beans, lima beans, potatoes, sweet corn)	Ridgetown, Ontario Dir.: E. L. Woodley Head: R. Frank R. H. Brown
34. Simcoe 34.1 <i>General horticulture</i> 34.2 <i>Plant protection</i>	Horticultural Experiment Station Substation of Vineland Horticultural Experiment Station, (see 37.1) Laboratory Simcoe Substation of Vineland Research Station, (see 37.2) Apple insect problems.	Simcoe, Ontario Simcoe, Ontario
35. Smithfield 35.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture) Equipment: Cold storages for apples; laboratories for plant and soil analyses; well-equipped food processing laboratory. Management, nutrition, physiology, breeding, storage and processing of fruit (apples, strawberries) and vegetable crops (peas, tomatoes). Plant nutrition, irrigation (tomatoes, strawberries, apples) Plant physiology, dwarfing rootstocks, micronutrient elements (apples, canning crops) Fruit and vegetable processing	R. R. 4, Trenton, Ontario Superintend.: H. B. Heeney S. R. Miller W. P. Mohr
36. St. Catharines 36.1 <i>Viticulture</i>	Bright's Wines Limited Private institution. - Vineyard Research Division with recently established experimental plots of <i>Vitis vinifera</i>. Research on all aspects of grape vine culture.	R. R. 4, St. Catharines, Ontario

CDN 36.1 - 37.2

Seat/Nature of program	Institution and projects	Address and staff
Continuation of St. Catharines (36.1)	Grape breeding, nutrition and rootstocks Viticulture: grape pruning, rooting of cuttings, insect and disease control, herbicides, trellising	Dir.: G.W.B. Hostetter A.E. Neff
37. Vineland Station	Horticultural Experiment Station	Vineland Station, Ontario
37.1 General horticulture	Provincial institution (217 acres), administered as a branch of the Ontario Department of Agriculture. Determination of new and more valuable varieties best adapted for growing in the tender fruit belt of the province; cultural problems, (pollination, soil management, pruning, propagation, weed control, etc.) of vegetable crops, ornamentals and fruit. Propagation and rootstocks (tree fruits) Plant breeding (sweet corn, tomato) Soils and fertilizers Culture and breeding (grapes, peaches, apricots) Plant nutrition Vegetable crops: culture, breeding (sweet potato), herbicide trials Ornamentals, propagation and rootstocks, floriculture Tree fruits, grape: propagation and rootstocks Statistics, marketing and weather records Plant nutrition Small fruit culture and breeding, weed control Vegetable crops: breeding and culture (asparagus, rhubarb, peppers) - Horticultural Products Laboratory Fruit and vegetable processing, wine making, cold and controlled atmosphere storage Food microbiology (yeasts and wine starters) Wine chemistry and procedures Fruit products: processing and utilization Chemistry, composition of fruits and fruit products Grape Substation (35 acres) and Horticultural Experiment Station Simcoe (165 acres) (see 34.1 and 34.2)	Dir.: Dr. W.H. Upshall Chief: Dr. E.A. Kerr Chief: Dr. J.A. Archibald C.A. Bradt Dr. R.A. Cline G.H. Collin R.A. Fleming Dr. A. Hutchinson R.G. Mercier H.J. Reissmann C.L. Ricketson Dr. J. Wiebe Chief: Dr. J.H.L. Truscott Dr. A.M. Adams R.F. Crowther Miss H.E. Morrison/Miss M.A. Syer Dr. E. Zubeckis
37.2 Plant protection	Research Station Regional research institution (Canada Department of Agriculture) Formed in 1960 by combining the Fruit Insect Laboratory and the Plant Pathology Laboratory (at Vineland Station and St. Catharines since 1911 and 1912 respectively). Located in the principal region in Canada for growing grapes and stone fruits. Control of fruit diseases and insects. Nematology: host-parasite relations, interactions with other organisms - Entomology Section Insect ecology: behaviour and habits Chemistry: pesticide residues Pesticides: environmental effects, toxicology	P.O. Box 506, St. Catharines, Ontario Dir.: Dr. W.B. Mountain Head: G.G. Dustan Dr. M. Chiba Dr. R.W. Fisher

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Vineland Station (37.2)	Mating and reproduction of insects: radiation sterilization, chemosterilants Orchard mites: physiology of resistance to pesticides Apple insects: ecology and control Insects ecology: population dynamics Ecology of orchard fauna Grape pests: insects and birds - Pesticide Testing Group Fungicides Insecticides - Plant Pathology Section Fruit diseases: peach canker, virology Virus diseases of fruit: virus characterisation, immunology Diseases of vegetables: verticillium wilt Virus diseases of fruit: transmission, etiology Diseases of grape: virology Diseases of ornamental crops, virology Nematology: nematodes of tobacco, nematophagous fungi Nematology: host-parasite relationships, ecology Branch Laboratory at Simcoe (see 34.2)	J. A. George D. H. C. Herne A. Hikichi Dr. J. H. H. Phillips W. L. Putman Dr. A. B. Stevenson J. H. de Ronde C. M. Simpson/H. W. Wagner Head: Dr. R. S. Willison Dr. W. R. Allen Dr. J. F. Bradbury T. R. Davidson Dr. H. Dias W. G. Kemp Dr. T. H. A. Olthof J. L. Townshend
38. Woodslee 38.1 Vegetables	Substation Woodslee - Branch station of Harrow Research Station (see 28.1) Canning crop tomato culture. Crop management Soil physics	Woodslee, Ontario J. W. Aylesworth (in charge) E. F. Bolton
MANITOBA		
39. Brandon 39.1 General horticulture	Experimental Farm Regional research station (Canada Department of Agriculture) Variety evaluation and studies of cultural practices Substation Wabowden (see 41.1)	Brandon, Manitoba Superintend.: Dr. J. E. Andrews
40. Morden 40.1 General horticulture	Experimental Farm Regional research station (Canada Department of Agriculture) Equipment: a well-equipped food processing laboratory to conduct quality studies on fruits and vegetables; 50 acres arboretum of hardy trees and shrubs. Varietal improvement of horticultural crops for the Prairie Provinces (apples, crab-apples, raspberries, tomatoes, sweet corn, peas, cucumbers, beans, ornamental crab-apples, mock oranges, roses, chrysanthemums); physiological investigation of hardiness, dormancy and rooting ability; plant nutrition and fertilizing horticultural crops; herbicides for weed control; determining optimum methods for propagation. Vegetable crops Herbicides Vegetable nutrition	Morden, Manitoba Dir.: Dr. J. W. Morrison Head: Dr. C. Walkof/D. G. Dorrell W. O. Chubb B. B. Chubey

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Morden (40.1)	Ornamentals Plant physiology Fruit crops	W. A. Cumming Dr. M. Kawase H. A. Quamme
41. Wabowden 41.1 <i>General horticulture</i>	Soils and Crops Substation - Branch station of Brandon Experimental Farm (see 39.1) Variety evaluation; studies on cultural practices.	Wabowden, Manitoba
42. Winnipeg 42.1 <i>Plant protection</i>	Green Cross Products Substation Substation of Green Cross Products, Montreal (see 15.1) Cereal herbicides	Winnipeg, Manitoba Western techn. adv.: M. A. Ashraff
42.2 <i>General horticulture</i>	University of Manitoba, Faculty of Agriculture, Department of Plant Science Equipment: New laboratory to study quality of vegetable crops; a 55 acres test arboretum for woody species is being developed. Plant breeding - Division of Horticulture Plant breeding (tomatoes, red sweet peppers), lawn and turf research Vegetable nutrition and quality studies, variety trials (onions, sweet corn, tomatoes) Plant physiology, seed dormancy, lighting, nutrition Ornamentals Vegetable herbicides (white beans, celery, onions) Pomology (apples, apricots, plums), small fruits, potato (breeding and cultural practices) Ornamentals (propagation studies in woody species)	Winnipeg, Manitoba Head: Dr. L. H. I. Shebeski Dr. A. C. Ferguson Dr. J. D. Campbell Dr. L. J. LaCroix L. Lenz B. McConnell J. A. Menzies J. Walker
SASKATCHEWAN		
43. Indian Head 43.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture) Horticulture on the prairies: cultural techniques and testing of varieties for farm growers; potato nutrition. Vegetable crops (potato, tomato)	Indian Head, Saskatchewan Superintend.: J. R. Foster G. S. Emmond
43.2 <i>Tree breeding</i>	Tree Nursery Farm Administered by the Prairie Farm Rehabilitation Administration. Production and distribution of trees for farm shelterbelts; research in entomology, tree breeding, herbicides, propagation and nursery practices. Genetics: breeding, compatibility, nursery problems (caragana, spruce) Entomology: borers, scales (poplar, elm) Nursery management: irrigation (deciduous conifers) Substation Sutherland (see 48.1)	Indian Head, Saskatchewan Superintend.: Dr. W. H. Cram L. O. T. Peterson A. C. Patterson

Seat/Nature of program	Institution and projects	Address and staff
44. Melfort 44.1 <i>General horticulture</i>	Experimental Farm Regional institution (Canada Department of Agriculture). The climate in this region is generally favourable for horticultural crops but low winter temperatures and a short though rapid growing season make the choice of varieties highly important. Selection, breeding and culture of suitable varieties of fruits and vegetables. Fruit and vegetable crops, selection, breeding, culture (apples, tomatoes, potatoes)	Melfort, Saskatchewan Superintend.: Dr. W. N. MacNaughton R. H. Anderson
45. Regina 45.1 <i>Plant protection</i>	Niagara Brand Division of FMC Machinery and Chemicals Limited, Substation Regina (see 24.1) Research	Regina, Saskatchewan R. E. Laurin
46. Saskatoon 46.1 <i>General horticulture</i>	University of Saskatchewan, Department of Horticulture Equipment: complete new physical unit, including offices, laboratories, greenhouses, growth chambers and controlled storages is planned for the near future; a 65 acres experimental plot area, which can be completely irrigated, is under development. Plant breeding and plant physiology, varietal improvement of Malus, Prunus, Pyrus and Rubus and juvenility in Malus, propagation of fruits and ornamentals Plant breeding and culture: potato variety improvement and irrigation, fertilizer and variety trials with vegetables Plant breeding, culture and extension: ornamentals and floriculture crops Extension Departmental research projects in general Substation Scott (see 47.1)	Saskatoon, Saskatchewan Head: Dr. S. H. Nelson D. H. Dabbs Dr. E. A. Maginnes D. R. Robinson K. C. Turner
47. Scott 47.1 <i>General horticulture</i>	Experimental Farm - Substation of Department of Horticulture of University of Saskatchewan, Saskatoon (46.1), established in 1911. Investigations of appropriate management practices and types and varieties of vegetables and fruits suited to the region: potato variety trials; Potato Isolation Station multiplies seedling potato selections for evaluation in the prairie area.	Scott, Saskatchewan Superintend.: C. H. Keys
48. Sutherland 48.1 <i>Tree breeding</i>	Tree Nursery Sutherland - Substation of the Tree Nursery Farm at Indian Head (see 43.2)	Sutherland, Saskatchewan Superintend.: W. L. Kerr
49. Swift Current 49.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture). Variety evaluation; studies on cultural practices	Swift Current, Saskatchewan Superintend.: G. N. Denike

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Agassiz (58.1)	Vegetable processing (Brussels sprouts, beans, sweet corn, peas, potatoes), relation of environment to vegetable production and quality Substation for strawberry and raspberry research Substation for potato studies	A.R. Maurer Abbotsford Boundary Bay
59. Creston 59.1 Fruit	Substation Creston - Branch station of Summerland Research Station (see 63.1) Little Cherry Virus Disease of sweet cherries.	Creston, British Columbia F.M. Chapman (in charge)
60. Kelowna 60.1 Fruit	Tree Fruit Substation - Branch station of Summerland Research Station (Canada Department of Agriculture) (see 63.1) Cultural and nutritional studies on tree fruits.	Kelowna, British Columbia Dr. J.C. Wilcox (in charge)
61. Prince George 61.1 General horticulture	Experimental Farm - Branch station of Beaverlodge Research Station, Alberta (see 50.1). Variety evaluation; studies on cultural practices.	R.R.1, Prince George British Columbia
62. Saanichton 62.1 Ornamentals	Experimental Farm Regional research station (Canada Department of Agriculture), established in 1912. Plant and soil science as related to ornamentals including nursery and greenhouse crops important for the coastal areas of British Columbia. Weed control (ornamental shrubs, vegetables, fruits and turfgrass), greenhouse tomato culture Plant pathology, mycology, ornamentals Growth regulators, ornamental trees and shrubs, culture of holly, bulbs and greenhouse plants Organic soils for vegetable and root crops Plant pathology; nematology Entomology: insects attacking ornamentals and small fruit crops Culture of turfgrass Mineral soils, nutrition of horticultural crops	R.R.1, Saanichton, British Columbia Superintendent: H. Andison R. M. Adamson Dr. R. G. Atkinson J. H. Crossley E. F. Maas W. R. Orchard N. V. Tonks R. H. Turley Dr. G. T. Gillingham
63. Summerland 63.1 General horticulture	Research Station Regional research station (Canada Department of Agriculture) Equipment: A 7 acres isolation orchard with special greenhouse for studies of virus diseases of fruit trees; Gammacell 220' with a 1200 Curie source of Co ⁶⁰ ; freezing unit for hardiness testing of fruit tree stock; well-equipped fruit and vegetable processing laboratory; gas-liquid chromatographic equipment for analyses. Producing and processing of tree fruits and certain vegetable crops. Of 173 acres under sprinkler irrigation, 104 are planted with tree fruits (apples, apricots, cherries, peaches, pears and prunes). Fruit and vegetable processing	Summerland, British Columbia Dir.: Dr. C. C. Strachan

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Fort Vermilion (53.1)	Area with extreme minimum winter temperatures (January mean: -10°F). Variety evaluation; cultural practices.	
54. Lacombe 54.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture). Selection of new varieties of potatoes, tomatoes and apples; testing and evaluation of strains and species of vegetables, fruits and ornamentals for the region of central Alberta. Vegetable crops (potatoes, tomatoes) apples	Lacombe, Alberta Superintend.: J. G. Stothart H. Allen
55. Lethbridge 55.1 <i>General horticulture</i>	Research Station Regional institution (Canada Department of Agriculture). Variety breeding, testing and processing studies on vegetable crops suited to the region; development of tomato varieties setting fruit at low night temperatures. Fruit and vegetable breeding (tomato) Plant pathology (peas, potatoes) Vegetable culture	Lethbridge, Alberta Dir.: Dr. T. H. Anstey Dr. G. A. Kemp Dr. F. R. Harper W. E. Torfason

NORTHWEST TERRITORIES

56. Fort Simpson 56.1 <i>Vegetables and ornamentals</i>	Experimental Farm Administered as a branch station of Beaverlodge Research Station, Alberta (50.1) (Canada Department of Agriculture). This farm, located at 61°52' north latitude and having interests which extend to the Inuvik test area at 68°21', conducts the most northerly horticultural research in Canada. Vegetable and ornamental variety testing; cultural practices suited to the region. The cyclical annual extremes of day lengths and the presence of permafrost are of special interest.	Fort Simpson, Northwest Territories Superintend.: W. A. Russell
57. Inuvik 57.1 <i>General horticulture</i>	Inuvik Test Area - Substation of Fort Simpson Experimental Farm (see 56.1)	Inuvik, Northwest Territories

BRITISH COLUMBIA

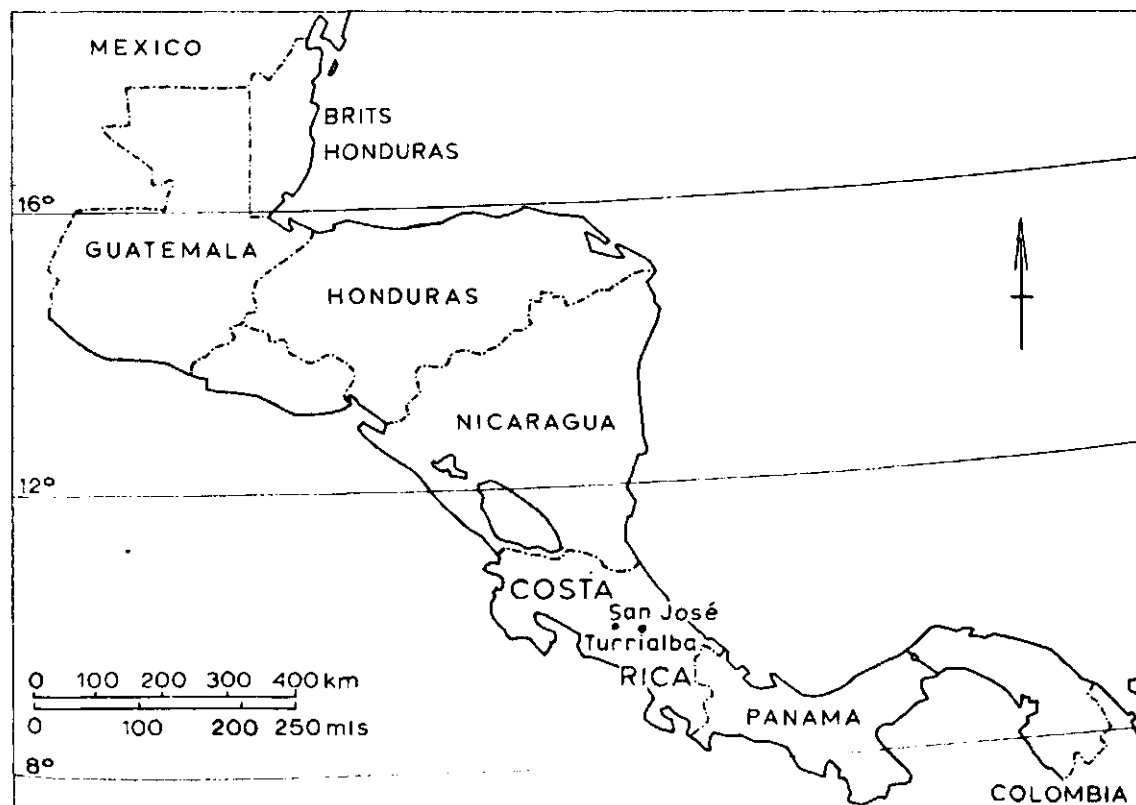
58. Agassiz 58.1 <i>General horticulture</i>	Experimental Farm Regional research station (Canada Department of Agriculture). Development of management practices and varieties of small fruit and vegetables suitable for this region. Crop fertility requirements Small fruit breeding (strawberries, raspberries) Plant nutrition, relation of environment to quality characteristics in peas Small fruit physiology (raspberries, strawberries), chemical weed control (small fruit and vegetables)	Agassiz, British Columbia Superintend.: Dr. M. F. Clarke V. W. Case Dr. H. A. Daubeney Dr. H. F. Fletcher Dr. J. A. Freeman

Seat/Nature of program	Institution and projects	Address and staff
ALBERTA		
50. Beaverlodge 50.1 <i>General horticulture</i>	Research Station Regional main station (Canada Department of Agriculture) From the founding in 1916 until about 1957 horticultural research emphasized the testing and developing of new plants and the study of home garden problems. Attention has now shifted to fundamental aspects of hardiness and problems in commercial production in central and northwest British Columbia, Northern Alberta and the Northwest territories. Fruit and vegetable breeding (strawberry, Amelanchier and tomato) Fruit and vegetable crop management Substations Prince George, British Columbia (61.1), Fort Vermilion, Alberta (53.1) and Fort Simpson, Northwest Territories (56.1)	P.O.Box 29, Beaverlodge, Alberta Dir.: Dr. A. A. Gutard
51. Brooks 51.1 <i>General horticulture</i>	Provincial Horticultural Station Administered as a division of the Field Crops Branch of the Alberta Department of Agriculture. Equipment for studies on methods of harvesting, storing and marketing vegetable crops including a portable onion drier; cold room and cellar storage facilities. Adaptation of fruits, vegetables, trees, shrubs and ornamentals to the area. The station has recently constructed a machine to shape beds, fertilize and sow in one operation. Fruit and vegetable breeding and selection, vegetable storage Ornamentals, extension Pilot vegetable storage and processing plant, extension Vegetable breeding and selection, vegetable harvesting and storage	Dr. R. E. Harris D. W. Smith Brooks, Alberta
52. Edmonton 52.1 <i>Vegetables and ornamentals</i>	University of Alberta, Faculty of Agriculture, Department of Plant Science - Horticultural Division Physiology of field-grown vegetables (onion, carrot, potato, sweet corn), glasshouse vegetables (tomato); physiology of earliness, growth regulators Landscape architecture, woody ornamentals, turfgrasses: propagation (<i>Shepherdia argentea</i>), winterhardiness (<i>Agrostis</i> sp., <i>Poa annua</i>) Physiology of herbaceous ornamentals under glass: quality of carnations, chrysanthemums, poinsettias	Superintend.: P. D. Hargrave Ass. superintend.: T. Kilduff L. G. Jorgenson S. A. Molnar
53. Fort Vermilion 53.1 <i>General horticulture</i>	Experimental Farm Administered as a branch station of Beaverlodge Research Station, Alberta (see 50.1) - Canada Department of Agriculture.	Edmonton, Alberta Head: Dr. W. G. Corns Head: Dr. W. T. Andrew R. H. Knowles Dr. E. W. Toop Fort Vermilion, Alberta

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Summer-land (63.1)	- Agricultural Engineering Section Spraying and fruit handling equipment - Entomology Section Mites and miticides San José scale and eriophyid mites Codling moth control Chemical analysis of spray-deposits - Fruit and Vegetable Processing Section Food processing generally Home economics Microbiology Process development Biochemistry and microbiology Fruit and vegetable processing Chemistry - Plant Nutrition, Soils and Irrigation Section Irrigation and soils Plant nutrition - Plant Pathology Section Virus diseases (apples, pears) - Parasitic fruit diseases Stone fruit virus diseases Plant physiology Vegetable diseases - Pomology Section Varieties, pruning and thinning Agrometeorology and propagation Breeding and hardiness Harvesting and storage - Vegetables and Ornamentals Section Breeding and cultural studies Nutrition and physiology - Substation at Creston (see 59.1) and Kelowna (see 60.1)	Head: A.D. McMechan Head: Dr. H. F. Madsen R. S. Downing C. V. G. Morgan Dr. M. D. Proverbs K. Williams Head: F. E. Atkinson Miss D. Britton Dr. J. F. Rowen J. A. Kitson Dr. D. R. MacGregor A. W. Moyls J. A. Ruck Head: Dr. J. C. Wilcox Dr. J. L. Mason Head: Dr. M. F. Welsh/ Dr. J. M. Wilks Dr. L. E. Lopatecki/Dr. K. K. McIntosh T. B. Lott Dr. J. A. Stewart G. E. Woolliams Head: Dr. D. V. Fisher Dr. D. R. Heinicke K. O. Lapins Dr. S. W. Porritt Head: L. G. Denby Dr. J. S. Matthews
64. Vancouver	Research Station	6660 North West Marine Drive, Vancouver 8, British Columbia
64.1 Plant protection	Regional research station (Canada Department of Agriculture) Equipment: Electron microscope, ultracentrifuges, flowbirefringence apparatus, light scattering photometer. Center for basic research on plant viruses, insects and diseases of agricultural crops in the coastal area of British Columbia. - Entomology Section Virus vectors Strawberry insects Root maggots, insecticides Aphids Vegetable insects Cane fruit insects, leafhoppers Soil insects, biological control - Plant Pathology Section Potato diseases, serology Strawberry viruses Root rots Legume viruses Raspberry viruses Mycology, potato diseases	Dir.: Dr. R. E. Fitzpatrick Head: Dr. H. R. MacCarthy W. T. Cram D. G. Finlayson A. R. Forbes H. G. Fulton J. Raine A. T. S. Wilkinson Head: Dr. N. S. Wright F. C. Mellor Dr. H. S. Pepin Dr. M. J. Pratt Dr. R. Stace-Smith H. N. W. Toms

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Vancouver (64.1)	- Virus Chemistry and Physiology Organic chemistry, virology Virology Plant physiology, virology	Dr. H. W. Ragetti Dr. H. W. Tremaine Dr. M. Weintraub
64.2 <i>General horticulture</i>	University of British Columbia, Faculty of Agriculture - Division of Plant Science. Tree fruits, small fruits, vegetables and ornamentals. Reproductive physiology and nutrition of fruit crops Vegetable genetics Pathology Landscaping and floriculture Growth of plants in controlled environments, fruit and vegetable processing	Vancouver 8, British Columbia Chairman: Dr. V. C. Brink Dr. G. W. Eaton Dr. C. A. Hornby Dr. N. A. MacLean Dr. J. W. Neill Dr. D. P. Ormrod
YUKON		
65. Mile 1019 Alaska Highway	Experimental Farm Regional research station (Canada Department of Agriculture)	Mile 1019, Alaska Highway, Yukon Act. superintend.: J. Y. Tsukamoto
65.1 <i>General horticulture</i>	Located at 60°45' north latitude and at 1965 feet above sea level. Variety testing and special cultural practices needed in this cool dry climate where frosts are frequent. Vegetable crops	 G. Gubbels

Costa Rica



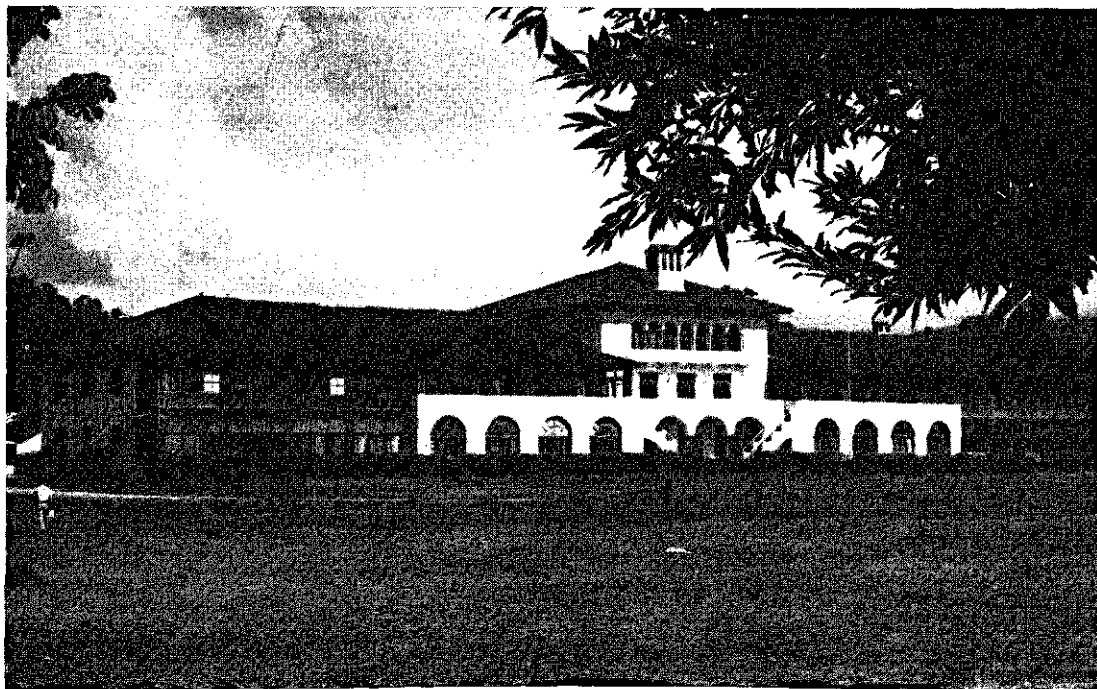
America Central

General Survey

Instituto Interamericano de Ciencias Agrícolas (IICA)/Inter-American Institute of Agricultural Sciences (IAIAS). - Specialized agricultural agency of the Organization of the American States (OAS), established in 1944. - The Institute has: a. its Executive Offices in Costa Rica (Apartado 4359, San José, Costa Rica), b. three Regional Offices for the Andean Zone (Apartado 478, Lima, Peru), the Northern Zone (c/o IAIAS of the OAS, Apartado 4359, San José, Costa Rica) and the Southern Zone (Casilla de Correos 1217, Montevideo, Uruguay), c. a Graduate School with headquarters in the Tropical Center for Research and Graduate Training of IAIAS in Turrialba, Costa Rica, d. a Research and Training Center for the Temperate Zone, which operates in the 'Alberto Boerger' Agri-

cultural Research Center of the Ministry of Livestock and Agriculture, in La Estanzuela, Uruguay, e. an Agrarian Reform Center with headquarters in the National University of Colombia, in Bogotá, and f. technical nuclei in institutions of higher agricultural education and research in the Member States. The Regional Office for the Andean Zone is located at the Escuela Nacional de Agricultura 'La Molina', whose department of horticulture is one of the most important in Latin America, with good facilities for studies on nutrition, breeding and cultural practices in general.

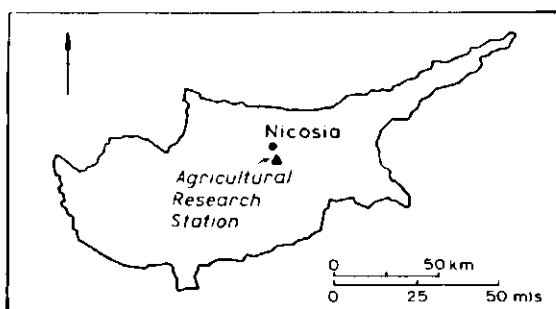
The Institute has Official Representatives in Brazil (ad interim), Chile, the United States and Mexico, in which countries IAIAS operates special programs.



Turrialba. Main building of the Inter-American Institute of Agricultural Sciences of the Organization of American States

Seat/Nature of program	Institution and projects	Address and staff
1. Turrialba 1.1 General horticulture	Centro de Enseñanza e Investigación, Instituto interamericano de Ciencias Agrícolas de la OEA/Centre for Research and Graduate Training, Inter-American Institute of Agricultural Sciences of the OAS Horticultural research is undertaken by the section Plant Industry and Soils, which covers the fields of Plant Pathology, Plant Psychology, Entomology, Soils and Plant Breeding. Equipment: Laboratories and facilities for the study of the application of the peaceful use of nuclear energy to agriculture. Publ.: Extensión en las Américas; Materiales de Enseñanza en Ciencias Sociales; Informes de Consulta; Cacao; Publicaciones Misceláneas; Turrialba; Impresos; Boletines Técnicos; Materiales de Enseñanza en Comunicaciones; Bibliografías; Bibliotecología y Documentación; Boletín Bibliográfico Agrícola. Biochemistry, cacao Botany, tropical crops Cytogenetics, Nuclear Energy Program Cytogenetics (beans) Ecology Entomology Genetics, cacao Genetics, corn Genetics Horticulture Plant pathology, bean diseases Plant pathology Plant physiology Plant physiology (cacao) Plant physiology (coffee) Soil sciences	Turrialba, Box 74 Dir.: Dr. G. Havard Dean and principal adv.: Dr. D. Boynton Ir. I. Casas/Dr. M. Ibánñez Ir. A. Taylor Dr. C. C. Moh (Head) Ir. J. J. Alán Dr. J. M. Maquín L. Bonnefil/F. Ferrer/ Dr. K. Katyar/Dr. J. Knoke/ Dr. J. Saunders Ir. G. Enríquez/Ir. O. Esquivel/Dr. J. Soria Ir. H. Miranda Dr. O. Pinchinat/J. Valerio Ir. E. Camacho/Dr. P. G. Sylvain Dr. E. Echandi/Ir. A. Salas Dr. L. M. Hutchins/Dr. A. G. Newhall/F. Díaz F. Balerdi Dr. E. Jiménez Dr. L. Müller R. Razan/Prof. F. Hardy/Dr. F. Bornemisza/K. Ique/R. Díaz-Romeu

Cyprus



General Survey

All the agricultural research work in Cyprus, formerly carried out by the Departments of Agriculture and of Animal Husbandry of the Ministry of Agriculture and Natural Resources, is done by the Agricultural Research Institute.

This Institute has been established by the Government in 1962 and is accommodated in its own new buildings at Athalassa in the outskirts of Nicosia. It has well equipped laboratories, greenhouses, a central experimental farm next to its Headquarters and an establishment of 21 research officers and 20 technicians and assistants.

The Horticulture Section, one of the seven Sections of the Institute, carries out all research work in tree crops, vines and vegetables. There are four horticultural stations where research is carried out by staff members of the section. There is also land under lease on which relatively long term experiments are in progress.

Citrus. To foster the citrus industry by the production of better quality fruit and more rational production techniques, a Citrus Experimental Station has been established at Morphou, in an area where the citrus industry is rapidly expanding. The Horticulture Section is conducting experiments of vital importance to the citrus industry. In one of the main experiments the effects of nitrogen, phosphorus, potassium and manure on the growth, yield and fruit quality are being studied.

An ultimate aim is to obtain as much information as possible on the aspects of the use of water and, by using instruments and other devices, to enable growers to utilize this information to greater advantage. Studies on the water requirements of citrus, on the effect of rate and frequency of irrigation on growth, yield and quality of oranges are under way.

Studies are being made of different methods of cultural practices and soil management.

1. Nicosia

Herbicide trials in citrus are also under way.

Increasing attention is being given to orange varieties in the search for varieties of high quality with other good marketability characteristics, which produce good crops, annually and earlier than the Shamouti variety. Nucellar strains of navel oranges are being tested to evaluate their merits under Cyprus soil and climatic conditions. Nucellar strains of lemon varieties and varieties known to be resistant or immune to malsecco fungus disease are also being tested.

Rootstock studies with the commercial orange and grapefruit varieties are also included in the research program of the Horticulture Research Section. Several imported rootstocks which are resistant to "tristeza" virus, together with local rootstocks are at present under field investigation.

Deciduous and other tree crops. New varieties of apples, pears, cherries and peaches have been introduced and are being evaluated under the conditions of the island. Varieties of peaches, pears and apples with low winter chilling requirements were needed. Already many varieties have been introduced from other countries for testing in various areas where the winters are warm.

Extensive consideration is being given to pear rootstock work. Imported rootstocks are now being tried with the objective of improving vigour. Apple rootstocks, including East Malling and the new series of Merton-Malling stocks are under trial. Trials with virus free cherry rootstocks and virus free peach varieties as well as nematode resistant peach rootstocks will commence soon.

Observations are being made on the flowering and cropping of the various strains of Pistachio nut. The unproductiveness of the pistachio trees in Cyprus, due to defective pollination or inadequate winter chilling, necessitated the importation and testing of varieties of low winter chilling requirements.

A variety collection of different strains of carobs has been established to facilitate comparison and classification of varieties and to serve as source of propagation material.

Soft fruits. Strawberry varieties are needed of better quality and of earlier maturity than the local variety. Three varieties imported from California are now under trial. The fertilizer requirements of strawberries are also under study.

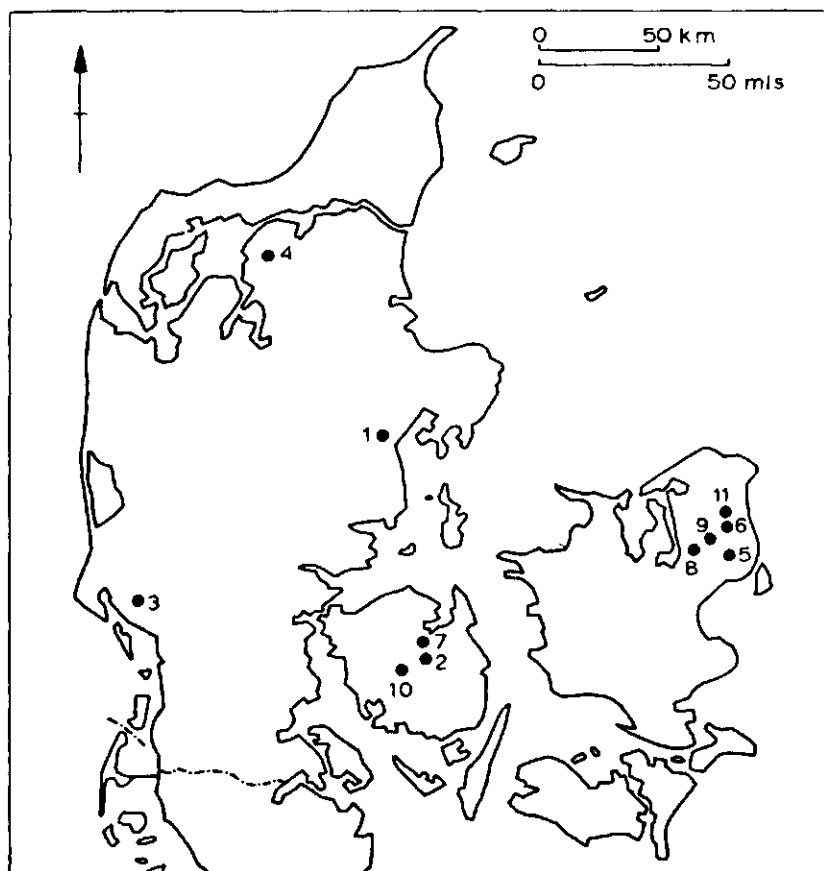
The Institute will begin a series of new projects concerned with the improvement of table grapes, of the quality of raisins and with cultural practices; particular attention will be paid to the production of flor sherries.

Publications. Results on horticultural research in Cyprus appear in the Annual Report of the Agricultural Research Institute and are published in journals abroad or as technical bulletins.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

[illegible]

Denmark



1. Aabyhøj, 2. Aarslev,
3. Esbjerg, 4. Hornum,
5. København, 6. Lyng-
- by, 7. Odense, 8. Risø,
9. Skovlunde, 10. Vejle,
11. Virum.

General Survey

The centre of agricultural and horticultural research is the Royal Veterinary and Agricultural College of Copenhagen, founded in 1858, where students may follow courses in horticulture at university level and graduate with the degree of B.Sc. in Horticulture. This first degree may be followed by a Master's degree called "Licentiat" and, later, after submitting a thesis the degree of "Dr. Agro." may be conferred.

Research work is carried out at the institutes of the College by staff members and graduate students. The institutions under the Department of Horticulture have not in the past had many facilities for research, except collections of plants of horticultural importance, but new laboratories are now being installed and a development of the research centre is planned. During 1963-1964 nine small greenhouses for experiments and research were built. A laboratory for mushroom research and experiments was founded in 1954. Research is carried out in cooperation with other de-

partments of the College e.g. in plant physiology, plant pathology, hydrology, taxonomy, genetics and atomic energy, etc. In the Departments of Biological Science of the Universities of Copenhagen and Aarhus, some biological research connected with horticulture is also carried out. The Laboratory for Industrial utilization of Horticultural Products functions as a sub-division of the Biochemical Department of the Technical College of Denmark.

Decentralization and specialization. The management of research and experimental work is rather decentralized in Denmark. Field experiments have been conducted since 1870, but in 1886 governmental activity concerning agricultural experiments began to be organized. However, in 1915 a reorganization took place and the resulting structure still exists. The Ministry of Agriculture appoints the main body, called *Statens Planteavlsvulg/* State Board for Agricultural Experiments, which organizes the agricultural ex-

perimental stations and the 4 horticultural stations, situated in different regions of the country, - each with a special interest and furthermore, it also organizes the institutes for Herbicide Research, Plant Pathology, Soil Testing and Beekeeping. The object in spreading out the horticultural experiment stations was initially to get experimental results applicable to different localities and also to encourage horticulture in those districts, but there is now a strong tendency to specialize, so that Blangstedgaard, Odense is mainly carrying out experiments in fruit growing; Spangsbjerg, Esbjerg, is working with vegetables, Hornum with nursery stock, and Virum is concerned with glasshouse experiments. A new Glasshouse Experiment Station is also planned.

Directly under the Ministry of Agriculture is the State Seed Control Laboratory and the *Institute for Agricultural Engineering/Statens Redskabsprøver*, where experiments concerned with horticultural engineering (implements, tractors etc.) also take place.

Joint Committees. In order to supplement activities such as listed above a number of joint committees have been formed. The first one, founded in 1919, is the Joint Committee for Trials of Vegetable Crops/*Faellesudvalget for Prøvedyrkning af KØkkenurter*, where official and private enterprise co-operate. The purpose of the variety trials with vegetables is to select the most suitable varieties and strains thereof for different growing conditions and purposes. Testings are repeated after a period of 10 years. Tested varieties and strains are then classified, and the best ones approved, this being indicated by adding to the variety-name the owner's trade mark together with the year of

the trial and an S, which indicates that it is approved after trials at the State Experiment Stations, or the letter P, which indicates that it is approved after trials organized by the Joint Committee. Similar joint committees for Ornamental Plants followed, namely '*Prydplanteudvalget*' and a joint committee, authorized to carry out official sanitary inspection of plants for inland trade and export as well as to establish disease-free nuclear stocks called '*Faellesudvalget for Fremavl og Sundhedskontrol med Havebrugsplanter*'.

Extension. Advisory work and extension service is mostly carried out by associations such as the Danish Market Growers Association/*Almindelig dansk Gartnerforening*, the Association of Producers of Nursery Stocks/*Dansk Planteskoleejerforening* and the Association of Commercial Fruit Growers of Denmark/*Danmarks Frhvervsfrugtavlerforening*. Although advisory service is the main purpose of these associations a great number of experiments are carried out on specialized subjects.

Publications. Reports and results of research and experiments are published in '*Tidsskrift for Planteavl*'/Journal of Plant Culture, and - every third year - in '*Nordisk Havebrugsforsøg*'/Nordic Horticultural Experiments, which is a survey of all kinds of horticultural researches and experiments in Denmark, Finland, Norway and Sweden. Volume II will be ready in May 1965 and can be obtained from the Royal Veterinary and Agricultural College, Horticultural Department, Rolighedsvej 23, Copenhagen V, Denmark.

Asger Klougart

Seat/Nature of program	Institution and projects	Address and staff
1. Aabyhøj 1.1 Propagation	Faellesudvalget for Fremavl og Sundhedskontrol med Havebrugplanter/ <i>The National Committee for the Propagation and Sanitary Inspection of Horticultural Plants</i> Faellesudvalget is a joint committee representing horticultural societies, state experiment stations and plant quarantine authorities; it is authorized to carry out official sanitary inspection of plants for inland trade and export and to organize selection of disease-free material for propagation purposes Selection work and inspection	Haslevej 46b, Aabyhøj Dir.: H.Christensen Secr.: H.Rønde Kristensen P.Jacobsen
2. Aarslev 2.1 General horticulture	State Experiment Station Aarslev Industrial plants, seed crops and flowering bulbs. Tulipa, Narcissus, Crocus and Hyacinthus	Aarslev Dir.: H.Bagge E.Rasmussen
3. Esbjerg 3.1 General horticulture	Statens Forsøgsstation Spangsbjerg/ <i>State Experiment Station Spangsbjerg</i> Variety trials with vegetables Canning and freezing Plant pathology Biometry Breeding of vegetables and small fruit	Spangsbjerg, Kirkevej 41, Esbjerg Dir.: M.Blangstrup Jørgensen, Lic. J.Jensen, Lic. A.Christoffersen, Lic. A.Madsen, Lic. T.N.Steen, Lic. A.Thuesen, Lic.
4. Hornum 4.1 General horticulture	Statens Forsøgsstation/ <i>State Experiment Station</i> Belongs to the Plant Research Council of the Ministry of Agriculture. Field and laboratory experiments with fruit trees, bush fruits, nursery crops, vegetables, ornamental trees and shrubs, production and maintenance of nuclear stocks of several horticultural plant species. Ornamental plants Vegetables Propagation Pomology, nursery crops Soil chemistry Nuclear stocks Soil microbiology	Hornum, North Jutland Dir.: H.Christensen P.E.Brander, Lic. O.Bøvre E.N.Eriksen I.Groven, Lic. F.Knoblauch, Lic. E.C.Larsen, Lic. E.Sønderhausen, Lic.
5. København 5.1 General horticulture	Den kgl. Veterinær- og Landbohøjskoles Havebrugsafdeling/ <i>Horticultural Department of the Royal Veterinary and Agricultural College</i> a. Department of Floriculture and Greenhouse Crops Mushroom laboratory b. Department of Fruit Growing and Pomology c. Department of Garden Design and Landscape Planning Chairs: Economics Geography Horticultural botany Plant materials Technics and construction Vegetable growing Arboretum	Rolighedsvej 23, København V Head: Prof.A.Klougart/A.Andersen/B.Farestveit Head: C.Riber Rasmussen Head: Prof.S.Dalbro/F.Larsen Head: Prof.G.Boye/Jette Abel A.Stauning J.H.Wanscher Prof.J.Lange I.Ingewersen V.Nielsen R.Kristensen Hørsholm, Sjælland Head: C.Syrach Larsen/E.Hartmann/P.C.Nielsen

Seat/Nature of program	Institution and projects	Address and staff
5.2 <i>Plant pathology</i>	Den kgl. Veterinær- og Landbohøjskoles Plan- tepatologiske Afdeling/ <i>Department of Plant Pathology of the Royal Veterinary and Agri- cultural College</i> Laboratories for plant virus research (1953) and for research of rust diseases on grass and cereals (1957). General plant pathology, Sclerotiniaceae, Po- lyporaceae, Fungi imperfecti, timber destruc- ting fungi General plant virology, virus-diseases on <i>Solanum tuberosum</i> and <i>Nicotiana tabacum</i> Diseases of horticultural plants, plant- pathogene bacteria, diseases of carnation	Rolighedsvej 23, København V Prof. N. Fabritius-Buchwald Dr. H. P. Hansen Dr. F. Hellmers
5.3 <i>Botany</i>	Den kgl. Veterinær- og Landbohøjskoles, Af- deling for Systematisk Botanik/ <i>Department of Systematic Botany of the Royal Veterinary and Agricultural College</i> Silvicultural botany, dendrology Agricultural taxonomy, plant ecology Horticultural taxonomy, plant names Plant ecology, silvicultural taxonomy Lichenology Dendrology	Rolighedsvej 23, København V Prof. dr. K. Gram Prof. dr. V. Mikkelsen Prof. J. Lange H. Vedel K. Hansen
5.4 <i>Plant physiology</i>	Den kgl. Veterinær- og Landbohøjskoles Plan- tefysiologiske Afdeling/ <i>Department of Plant Physiology of the Royal Veterinary and Agri- cultural College</i>	Rolighedsvej 23, København V Dir.: Prof. dr. F. K. Gabrielsen Dr. E. Bach; K. Vejlbj; R. Jensen
5.5 <i>Produc- tion planning</i>	Produktivitetsudvalget for Gartneri og Frugtavl/ <i>The Horticultural Committee of Productivity</i> The work is financed by the Ministry of Agri- culture and administered by Erhvervsraadet for Gartneri og Frugtavl/ <i>Danish Horticultural Council</i> Investigations of technical and economical production planning; technical experiments in horticulture. The results are published in special reports.	Anker Heegaardsgade 2, København V Leader: S. Aa. Christensen
5.6 <i>Vege- tables</i>	Faellesudvalget for Prøvedyrkning af Køkke- nurter/ <i>Joint Committee for Trials of Vege- table Crops</i> Field and glasshouse trials of vegetables Publ.: Annual reports in "Aarbog for Gart- neri"/ <i>Yearbook of "Alm. dansk Gartnerforening"</i>	Anker Heegaardsgade 2 København V Chairman: H. Christensen E. Blankholm
5.7 <i>Ornamen- tal plants</i>	Faellesudvalget for Bedømmelse og Prøvedyrk- ning af Prydplanter/ <i>Joint Committee for Trials of Ornamental crops</i> Variety trials of ornamental plants Publ.: Annual reports in "Aarbog for Gart- neri"/ <i>Yearbook of "Alm. dansk Gartnerfore- ning"</i>	Anker Heegaardsgade 2, København V Chairman: Prof. A. Klougart Lise Tillge Avelen
5.8 <i>General horticulture</i>	Almindelig dansk Gartnerforenings Konsulent- virksomhed/ <i>Advisory Service of the Danish Market Growers Association</i> Carnations Glasshouse crops Glasshouse crops, flowerbulbs Mushrooms	Anker Heegaardsgade 2, København V A. Bjerggaard N. P. Holmenlund Chr. Fich K. Bech

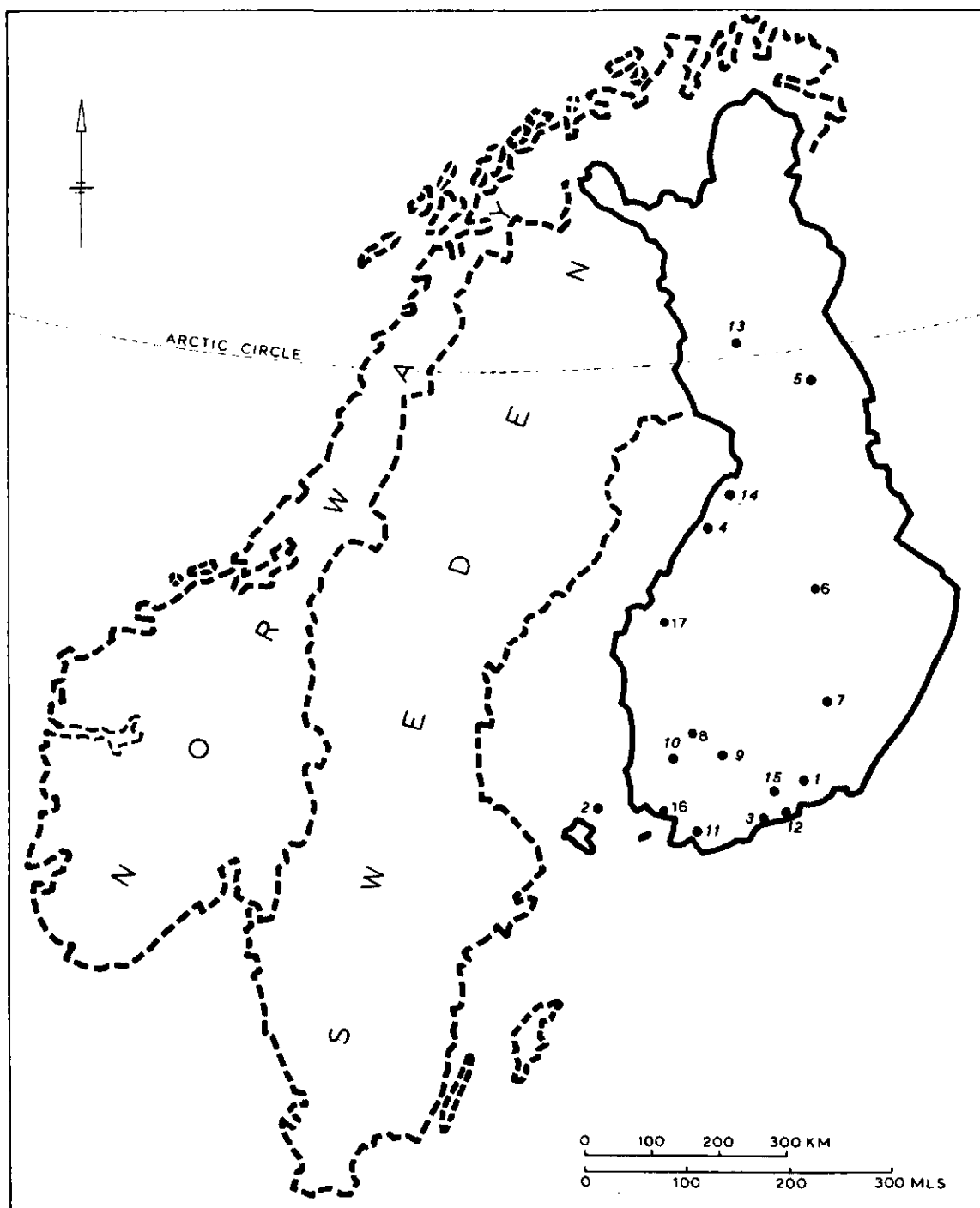
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DK 8.1 - 11.1

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Finland



1. Anjala, 2. Godby, 3. Helsinki, 4. Kannus, 5. Kuusa, 6. Maaninka, 7. Mikkeli, 8. Mouhijärvi, 9. Pälkäne, 10. Peipohja, 11. Piikkiö, 12. Pihlajamäki, Viik, 13. Rovaniemi, 14. Ruukki, 15. Tikkurila, 16. Turku, 17. Ylistaro.

General Survey

In earlier days horticultural research work and experiments were carried out by private persons and societies. In the 17th century the Academy of Turku had an experimental garden in Inkoo in South-Western Finland, where numerous species and varieties from abroad were tested. In 1837 an experimental garden was founded by the Finnish Gardeners Society in Turku, and late in the 1850s the garden named 'Huvitus' of Professor C.R. Sahlberg was a remarkable institution.

In Huvitus more than 1200 apple trees, of 120 varieties, were planted and numerous strawberry varieties and dahlias from America were cultivated. Late in the 19th century, in the province Häme, in Central Finland, a famous statesman, senator A.O. Kairamo, tested the hardiness of numerous Canadian apple varieties. Finally the Mustila arboretum should be mentioned, started in 1901 by A.F. Tigerstedt, where hundreds of tree species from North America and from Asia were planted for experimental purposes. At present this arboretum in Elimäki is one of the horticultural attractions in Finland.

In 1918 the first governmental horticultural experiment station was started in Lepaa, in the province Häme, where the horticulture high school has been established 9 years before. This experiment station, however, was soon connected to the high school for educational purposes. Outstanding results from this experiment station are the mildew resistant gooseberry varieties (Pellervo, K.F. Packalen, Hinnomäen keltainen) and the strawberry variety Kasper.

In 1924 a governmental act was made in order to start agricultural research work in Finland, and several local experiment stations were then built. One of them was the agriculture and horticulture experiment station of South-Western Finland in Piikkiö, near Turku city. In 1935 this became an Institute

doing only horticultural research work, and the head of the Institute was given the title of professor. The Institute has worked mainly on the winter hardiness and pruning problems of fruit trees and on methods of mulching in apple orchards but appreciable breeding work has also been done on berries. From crossings of raspberry and arctic berry (*Rubus arcticus*) a new cultural plant, the 'honey-raspberry', has been developed. Greenhouse experiments have been limited so far to variety tests and to research on plant forcing. In earlier days there was a cytology laboratory at this Institute. From 1927 to 1960 Professor O. Meurman was head of this Institute; after his retirement Professor J. Säkö was appointed.

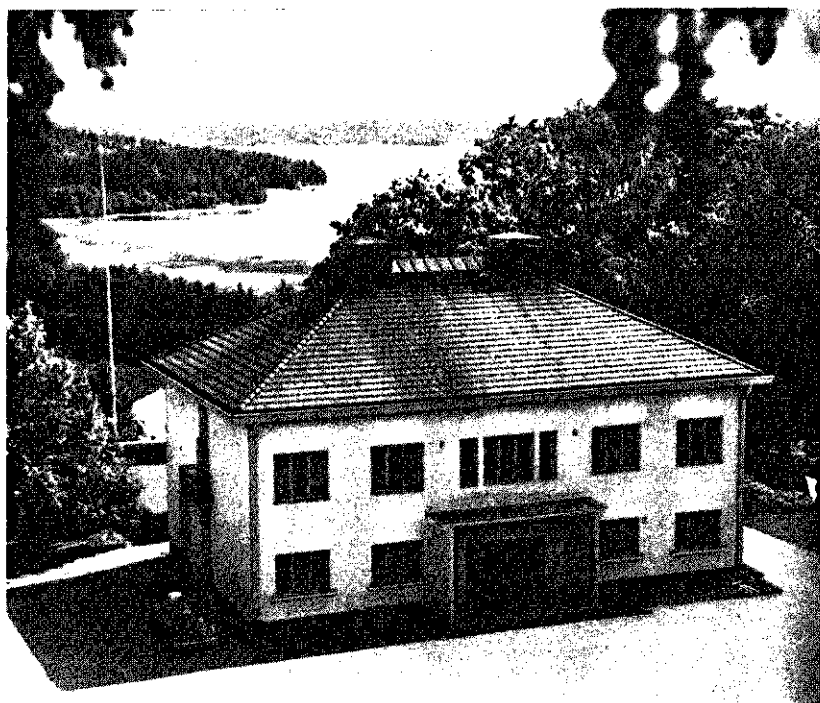
In 1956, the Institute of Horticulture at the University of Helsinki was founded and is under the direction of Professor Dr. J.E. Härdh. The program of this Institute consists of basic research and of academic education in horticultural fields. Despite limited facilities investigations on the effects of fertilizers and the influence of light and daylength on the growth and development of some berries and vegetables have been carried out.

Numerous horticultural experiments have been initiated by these two Institutes and are being carried out at most of the local agricultural experiment stations and at local home economic schools.

The most important research work at both Institutes at present is done on berries and on glasshouse culture of vegetables and ornamentals. The most important commercial berries are black and red currants and strawberry, on which cultural experiments and investigations on the influence of fertilization and environment on the vitamin C content of the berries are being done. At both Institutes breeding work is also done in order to develop new black currant and 'honey-raspberry'



Institute of Horticulture (left) of the University of Helsinki; Viik



Piikkiö. Main laboratory, Department of Horticulture. Agricultural Research Centre

types. Overwintering apple trees is the most serious problem in fruit culture in Finland, and some work is being done by using test methods on varieties and stocks.

The work on vegetables is mainly concentrated on variety tests, on plant forcing and storage problems. Forcing of rhubarb and planting of asparagus are also important.

The main problems in ornamental culture are methods of illumination and regulating day-length. Growth retardants on chrysanthemums and poinsettias are being investigated. The

overwintering of ornamental trees, bushes and perennials is one of the problems raised by the nurseries, and extensive trials have been started in several parts of the country.

Publications. The most important periodicals containing publications from horticultural research in Finland are *Annales Agriculturae Fenniae*, Journal of the Scientific Agricultural Society of Finland, *Maatalous ja Koe-toiminta*, Publications of the Soc. Bot. Zool. 'Vanamo', *Acta Agriculturae Scandinavica*, and the newspaper *Puutarhauutiset*. - J.E. Hårdh

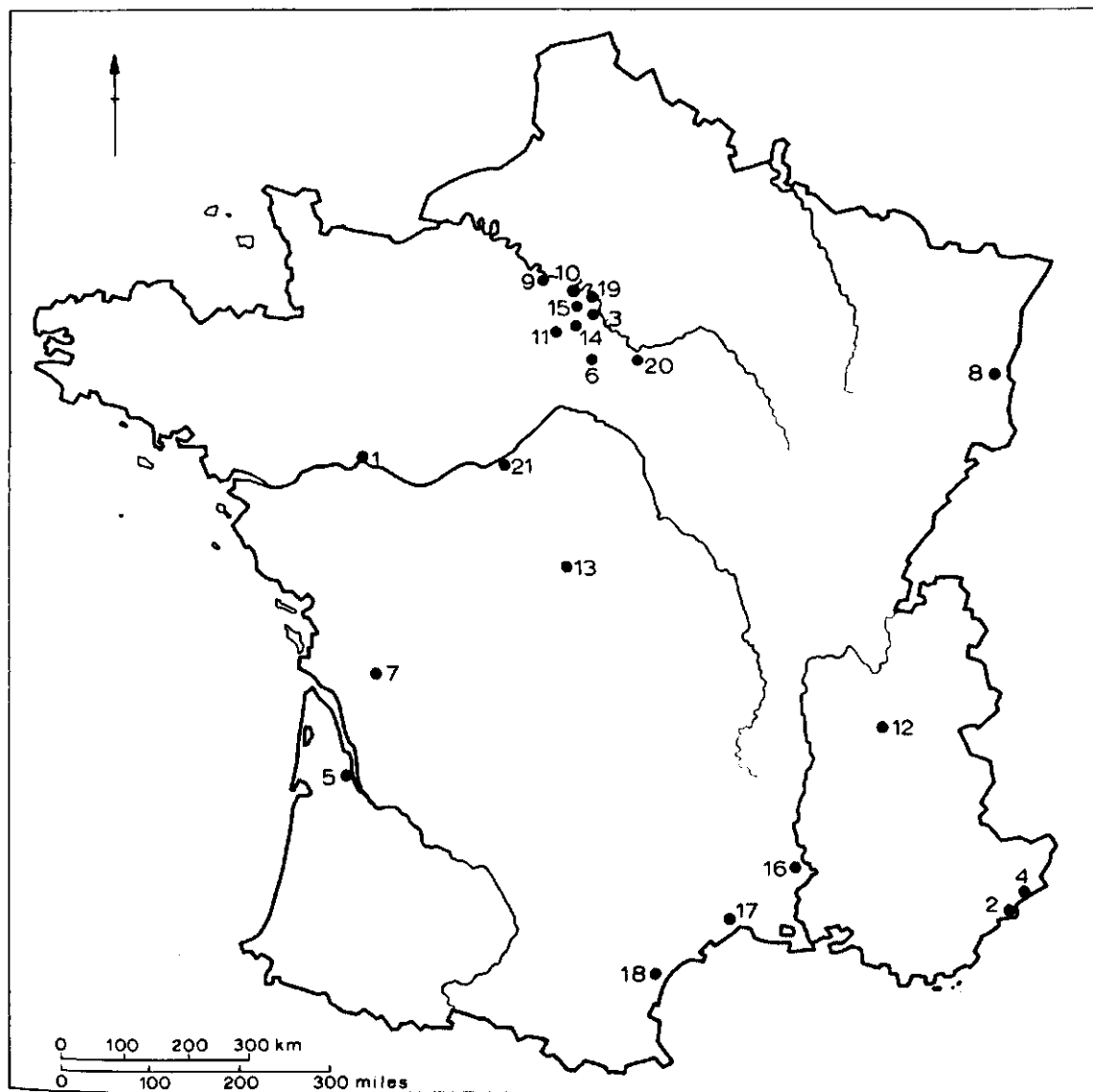
Seat/Nature of program	Institution and projects	Address and staff
1. Anjala 1.1 Small fruits	*Karjalan koeasema/ <i>Carelia Agricultural Experiment Station</i>	Anjala Dir.: H. Meurman, M.Sc.
2. Godby 2.1 Fruit trees, small fruit	*Ahvenanmaan maakuntahallinnon koekenttä/ <i>Åland Experiment Field</i>	Godby
3. Helsinki 3.1 Botany 3.2 Soil Science	Helsingin Yliopisto/ <i>Botanic Gardens</i> Institute of Soil Science	Unioninkatu 44, Helsinki Mertullinnkatu 8, Helsinki
4. Kannus 4.1 Vegetables	*Keski-Pohjanmaan koeasema/ <i>Central Ostrobothnia Agricultural Experiment Station</i>	Kannus Dir.: O. Perttula, M.Sc.
5. Kuusa 5.1 Small fruit, vegetables	*Keski-Suomen koeasema/ <i>Central Finland Agricultural Experiment Station</i>	Kuusa Dir.: Dr. agr. for. P. Hänninen
6. Maaninka 6.1 Apples, small fruit, vegetables	*Pohjois-Savon koeasema/ <i>North Savo Agricultural Experiment Station</i> Especially: <i>Rubus arcticus</i>	Maaninka Dir.: O. Pohjanheimo, Lic.
7. Mikkeli 7.1 Small fruit, vegetables	*Etelä-Savon koeasema/ <i>South Savo Agricultural Experiment Station</i>	Mikkeli Dir.: Dr. agr., for. E. Huokuna
8. Mouhijärvi 8.1 Small fruit	*Laidunkoeasema/ <i>Pasture Experiment Station</i> Black and red currants	Mouhijärvi Dir.: T. Laine, M.Sc.
9. Pälkäne 9.1 Apples, small fruit, vegetables	*Hämeen koeasema/ <i>Häme Agricultural Experiment Station</i>	Pälkäne Dir. M. Takala, M.Sc.
10. Peipohja 10.1 Small fruit, vegetables	*Satakunnan koeasema/ <i>Satakunta Agricultural Experiment Station</i>	Peipohja Dir.: P. Teittinen, M.Sc.
11. Piikkiö 11.1 General horticulture	Maatalouden Tutkimuskeskus, Puutarhaosasto/ <i>Department of Horticulture, Agricultural Research Centre</i> Pomology, fruit and berry growing, apple breeding, winter hardiness of fruit trees Breeding and cytogenetics of small fruit Vegetables, cultivar trials, weed control, raising young vegetable plants (CO ₂) Nursery propagation, propagation of trees and shrubs, growing of outdoor ornamentals Light and post harvest physiology of commercial flower crops and vegetables	Piikkiö Dir.: Prof. dr. agr., for. J. S. Säkö Prof. dr. agr., for. J. S. Säkö A. H. Rousi, Ph.D. Miss K. H. Salokangas, M.Sc. T. K. Kallio, M.Sc. Miss L. M. Kurki, M.Sc.
12. Pihlajamäki 12.1 General horticulture	Helsingin Yliopiston Puutarhatieteen Laitos/ <i>Institute of Horticulture at the University of Helsinki</i>	Viik, Pihlajamäki Dir.: Prof. dr. J. E. Härdh

*Local experiment stations collaborating with the Department of Horticulture, Agricultural Research Centre at Piikkiö

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Pihlajamäki (12.1)	Experimental farm. Teaching and general research activity. Plant physiology: cultural disorders of greenhouse crops, environmental conditions of berries Physiology of flowering Phytochrome Storage of vegetables	Prof. dr. J. E. Hårdh Assistants: K. Osara, M. Sc. E. Kaukovirta, M. Sc. I. Voipio, M. Sc.
12.2 Agricultural chemistry	Helsingin Yliopiston Maanviljelyskemian Laitos/ <i>Institute of Agricultural Chemistry</i>	Pihlajamäki
13. Rovaniemi 13.1 Small fruit, vegetables	*Perä-Pohjolan koeasema/ <i>Polar Circle Agricultural Experiment Station</i>	Rovaniemi Dir.: Dr. agr., for. A. Isotalo
14. Ruukki 14.1 Small fruit	*Pohjois-Pohjanmaan koeasema/ <i>North Ostrobothnia Agricultural Experiment Station</i>	Ruukki Dir.: O. Anttinen, M. Sc.
15. Tikkurila 15.1 Entomology	Institute of Economic Entomology Pests on horticultural crops	Tikkurila
15.2 Plant pathology	Institute of Plant Pathology Diseases on horticultural crops	Tikkurila
16. Turku 16.1 Botany	Turun Yliopiston Kasvitieteen laitos ja Kasvitieteellinen Puutarha/ <i>Department of Botany and Botanical Garden of the University of Turku</i> The University of Turku is a private institution subsidized by the Finnish Government; the garden lies on the island of Ruissalo Cytogenetics, breeding (Rubus), Bryophytes Taxonomy Physiology and morphogenesis of algae, arctic plant ecology, mycology Mycology, ecology Experimental taxonomy and cytology, immunogenetics, mycology, biostatistics Physiology of Bryophytes Experimental taxonomy Cytology and sexual reproduction of fungi Physiology of fungi Biocoenotics, ecology Physiology of plant metabolism and growth Plant ecology, taxonomy Taxonomy and ecology of lichens	Kasvitieteen laitos, Turun Yliopisto, Turku 2 Dir.: Prof. dr. A. Vaarama Curator of the garden: Dr. R. Alava Prof. dr. A. Vaarama Dr. R. Alava Prof. dr. P. Kallio Act. assoc. prof.: Dr. I. Kukkonen Ass. prof.: Dr. Y. Mäkinen Mrs. N. Valanne, Lic. H. Hiirsalmi, M. Sc. Mrs. M. Raudaskoski, Lic. Mrs. P. Karunen, M. Sc. S. Hinneri, M. Sc. M. Karunen, M. Sc. U. Laine, M. Sc. L. Kärenlampi, M. Sc.
Viik, see 12, Pihlajamäki		
17. Ylistaro 17.1 Apples, small fruit, vegetables	*Etelä-Pohjanmaan koeasema/ <i>South Ostrobothnia Agricultural Experiment Station</i>	Ylistaro Dir.: T. Honkavaara, M. Sc.

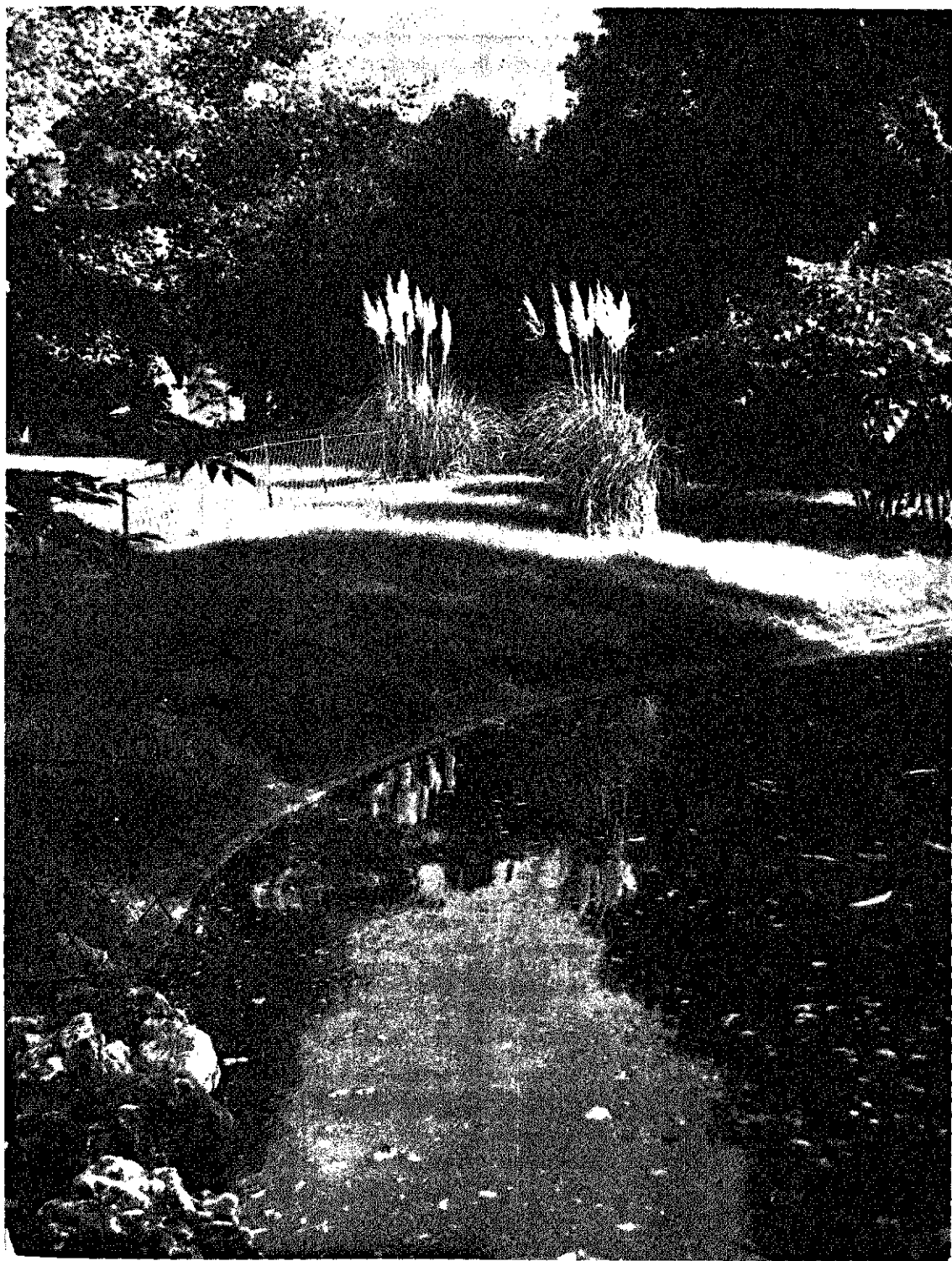
* Local experiment stations collaborating with the Department of Horticulture, Agricultural Research Centre at Piikkiö

France — La France



1. Angers, 2. Antibes, 3. Antony, 4. Reaulieu-sur-mer, 5. Bordeaux, 6. Brétigny sur Orge, 7. Cognac, 8. Colmar, 9. Gargenville, 10. St.Germain-en-Laye, 11. Gif-sur-Yvette, 12. Grenoble, 13. Malicorne, 14. Massy-Palaiseau (S.et O.), 15. Meudon, 16. Montfavet, 17. Montpellier, 18. Narbonne, 19. Paris, 20. Vernou-en-Sologne.

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
1. Angers	Station de Recherches d'Arboriculture Fruitière	Belle-Beille, Angers, (M. et L.)
1.1. Fruits	Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture. Amélioration génétique des espèces fruitières à pépins (variétés et porte-greffes) Coordination des travaux, amélioration génétique des variétés de poirier, physiologie de l'induction florale Amélioration des porte-greffes du poirier, expérimentation des porte-greffes du pommier Amélioration génétique des variétés de pommier (résistance à la tavelure, recherche de géniteurs de résistance à l'oïdium et au chancre à Nectria), mutations Sélection des variétés de pommier, étude de la loi d'action des températures sur les phénomènes de croissance et la levée de dormance des bourgeons Sélection des variétés de poirier, multiplication végétative par bouturage Eclaircissage chimique, étude variétale du cassissier (<i>Ribes nigrum</i>) et du grosseillier (<i>Ribes rubrum</i>)	Dir.: J. Huet J. Huet J. Brossier/C. Brian L. Decourtye B. Bidabe B. Thibault B. Lantin
2. Antibes	Station d'Agronomie et de Physiologie Végétale, Centre de Recherches Agronomiques de Provence	45, Boulevard du Cap Antibes (Alpes Maritimes)
2.1 Pédologie, physiologie végétale	Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture. Etude des sols du Sud-Est de la France; fertilisation des cultures maraîchères et florales en plein air et sous serre; étude de la nutrition minérale des plantes; cultures sans sol. Chimie du sol; fertilisation; nutrition minérale des plantes cultivées Fertilisation Chimie du sol Nutrition minérale Chimie analytique Jardin d'essai de Grasse Essais de fertilisation de longue durée; humus dans les sols méditerranéens; plantes à parfum.	Dir.: D. Blanc D. Blanc H. Moulinier (maître de recherches) J. Muller A. Champeroux Ir. R. Mazoyer Quartier du Moulin de Brun
2.2 Botanique, phytopathologie	Station de Botanique et de Pathologie Végétale, Centre de Recherches Agronomiques de Provence Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture. Acclimatation de végétaux exotiques (Jardin Botanique Thuret); pathologie végétale; maladies des cultures horticoles méditerranéennes, surtout cultures florales. Acclimatation Pathologie végétale Publ.: Catalogue échange graines (Index seminum)	Villa Thuret, Boulevard du Cap, Antibes (Alpes Maritimes) Dir.: J. Barthelet J. Barthelet J. Ponchet (maître de recherches)/R. Tramier



Vue du Jardin Botanique de Metz.

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
3. Antony 3.1 Pesticides etc.	Produits Chimiques Pechiney Saint Gobain, Centre de Recherches de la Croix de Berny, Station de Piologie Agricole Organisme privé. Recherche de pesticides nouveaux et sur l'emploi des matières plastiques en agriculture, horticulture, maraîchage.	182-184, Avenue A. Briano, Antony (Seine) Chef: Ir. F. d'Ogny
4. Beaulieu-sur-mer 4.1 Plantes tropicales	Station Expérimentale "La Leonina" Station Expérimentale du Centre de Recherches Botaniques Institution privée. Acclimatation et amélioration des plantes tropicales en France. Systématique, croissance, croisement, sélection, amélioration.	22, Boulevard des Moulins, Monte Carlo Dir.: P. Gossot
5. Bordeaux 5.1 Phytopathologie	Station de Pathologie Végétale, Centre de Recherches Agronomiques du Sud-Ouest Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture. Maladies cryptogamiques des arbres fruitiers, de la vigne, du maïs, de certaines cultures maraîchères, extension en cours aux maladies cryptogamiques du fraisier et des asperges, à la virologie des cultures pérennes, projet d'extension en bactériologie. Vigne, arbres fruitiers et maïs Arbres fruitiers (plomb) Vigne (virologie) Maïs Tomate, ail, oignon Vigne et cultures maraîchères Publ.: dans les "Annales des Epiphyties" (éditées par l'Institut National de la Recherche Agronomique), les Comptes-rendus de l'Académie d'Agriculture etc.	Domaine de la Grande Ferrade, Pont de-la-Maye (Gironde) Dir.: Mlle Ir. M. Gaudineau Mlle Ir. M. Gaudineau Ir. C. Grosclaude Ir. A. Caudwell/ir. G. Détienne/ J. C. Bachelier Ir. P. M. Molot/J. Simone/J. Nourisseau Ir. R. Lafon Y. Bugaret
6. Brétigny sur Orge 6.1 Amélioration des plantes	Station d'Amélioration des Plantes, Société Anonyme L. Clause pour la culture des graines d'élite Institution privée. Amélioration des plantes potagères, florales; sélection conservatrice; sélection créatrice, spécialement orientée vers la création de variétés résistantes; sélection de porte-graines de laitues sans virus; germination et conservation des semences. Laitue, chicorée frisée et scarole, mâche, poireau, essais de semences Pois, haricot, épinard, endive: pathologie végétale, conservation des semences Pomme de terre Aubergine, piment, tomate, melon, Dianthus caryophyllus, Portulaca grandiflora, Pelargonium zonale, Limonium à la Sous-Station du Mas Saint-Pierre à Saint-Rémy de Provence (Bouches du Rhône) Chou cabus, chou de Bruxelles, génétique générale	Brétigny sur Orge (Seine et Oise) Dir.: Ir. L. Friedberg R. Friedberg Ir. J. Touzard Ir. F. Levieil Ir. Y. Durand Ir. J. Y. Blanchet

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation Brétigny sur Orge (6.1)	Concombre, courge, maïs sucré, choufleur Betterave potagère, carotte, navet, radis Callistephus, Dianthus sinensis, D. caryo- phyllus, D. barbatus, plantes de serres (Pri- mula, Cyclamen), Amygdalus persica, Prunus cerasifera Ageratum, Bellis perennis, Callistephus, Cheiranthus, Matthiola, Myosotis, Dianthus sinensis, Petunia, Salvia, Viola tricolor Antirrhinum, Begonia, Pelargonium, Petunia, Salvia, plantes de serres	Ir. P. Garçon M. Moreau Ir. R. Gérard Ir. J. P. Mestre Ir. G. Godard
7. Cognac 7.1 Viti- culture	Station Viticole du Bureau National Inter- professionnel du Cognac Dépend de l'Interprofession, sous contrôle du Ministère de l'Agriculture. Spécialisée dans la viticulture et l'Oenologie charentaises.	45, Rue de Bellefonds, Cognac (Charente) Dir.: Ir. J. Lafon Ir. P. Couillaud/ir. F. Gay- Bellile/J. Lacouture
8. Colmar 8.1 Viti- culture	Station de Recherches Viticoles et Oenologi- ques Appartient à l'Institut National de la Recher- che Agronomique (INRA), Ministère de l'Agric- ulture. Génétique et physiologie de la vigne, viticul- ture générale Génétique et biométrie Physiologie appliquée Laboratoire d'oenologie Viticulture générale, sélection, ampélogra- phie à la Station Expérimentale Viticole de Cours-les-Cosne (Nièvre)	8, Rue Kleber, Colmar 68 (Haut-Rhin) Dir.: Dr. ir. P. Huglin Dr. Ir. P. Huglin Ir. R. Wagner Ir. B. Julliard Ir. A. Schaeffer (chef) Ir. J. Bisson (chef)
9. Gargen- ville 9.1 Améliora- tion des sols et des cul- tures	Laboratoire agronomique du Syndicat pour l'Amé- lioration des Sols et des Cultures (SAS) Syndicat des exploitants. Nutrition minérale du sol, des plantes et des animaux en général, arboriculture, viticul- ture et maraîchage en spécial. Station Expérimentale et de Démonstration pour Culture de Serre à Rennes L'équipe des cadres du SAS se distingue en 2 catégories: (1) ingénieurs avec fonctions générales et spécialisées, stationnés à Gargenville, (2) ingénieurs conseils, stationnés dans de différentes régions de France. Publ.: "Agronomie Appliquée"	1, Avenue Victor Hugo, Gargenville (Seine-et-Oise) Dir.: Dr. Ir. G. C. Redlich
10. St. Ger- main-en-Laye 10.1 Ferti- sation(bore)	Borax Français, Département Agricole Institution privée. Expérimentation, recherches des moyens de dé- velopper la connaissance de la fertilisation boratée, des problèmes de déficience en bore et de la symptomatologie de bore, mode d'appli- cation de bore en agriculture et horticulture. La Société Borax Consolidated Lim. à Londres (à laquelle la Société française est apparentée) centralise différents éléments bibliographi- ques et édite un bulletin traitant du rôle du bore en agriculture et physiologie végétale.	8, Rue de Lorraine, Boîte Postale 5, St. Germain-en-Laye (Seine et Oise) Prés.-Dir.-gén.: G. Denby Wilkes Dir. agronomique: P. J. Quillon

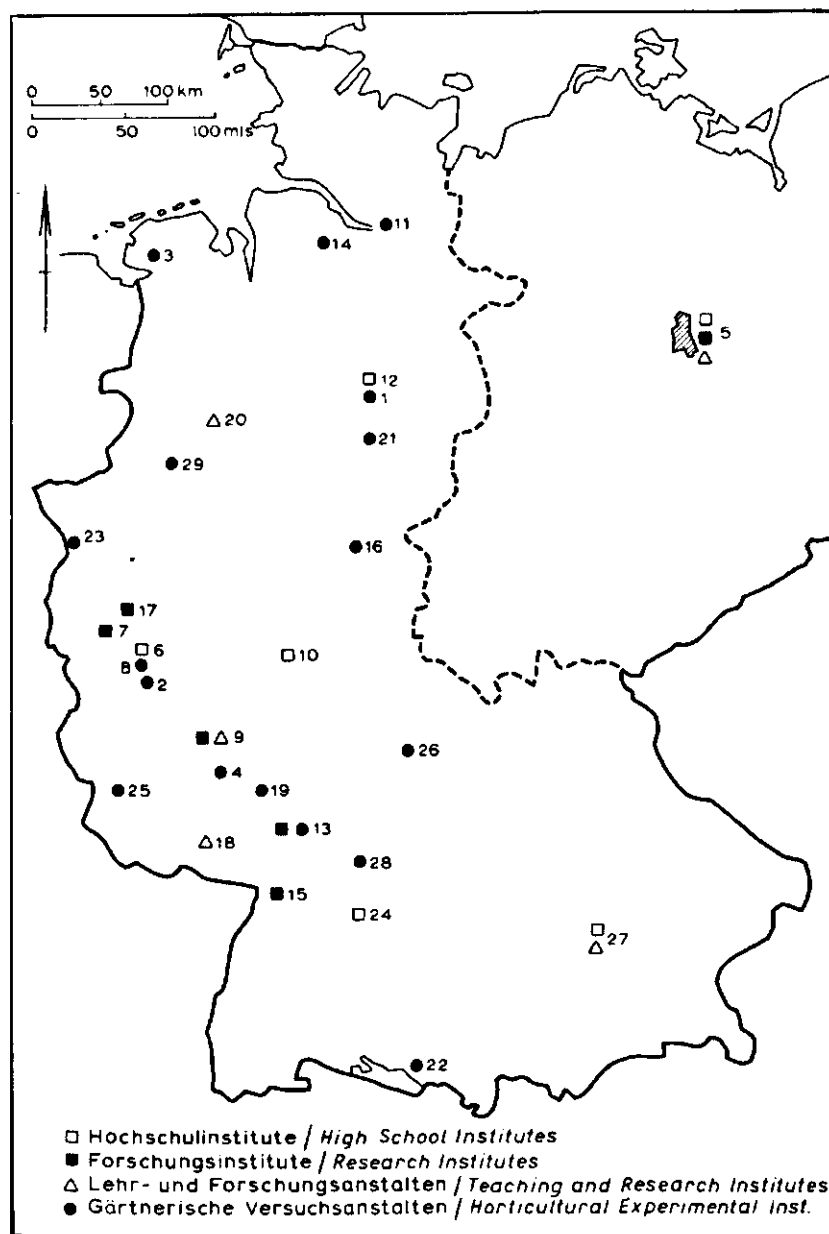
Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation St.Germain- en-Laye	L'activité du Département Agricole français concerne l'étude de la fertilisation en micro-éléments, du désherbage et des problèmes de lutte contre les parasites, incidence des carences en bore sur la qualité et la productivité des cultures horticoles, recherche générale sur le bore dans le sol et la plante. Publ.: Brochures, notices techniques, documents diffusant les résultats et observations.	
11. Gif-sur- Yvette	Laboratoire du Phytotron Ressort au Centre National de la Recherche Scientifique (CNRS), Ministère de l'Education Nationale.	Gif-sur-Yvette (Seine et Oise) Dir.: Prof. P. Chouard Dir. adj.: Dr. J. P. Nitsch
11.1 <i>Physiologie</i>	Etude de l'influence du climat (lumière, température, hygrométrie) sur le développement des plantes, étude des agents internes réglant les diverses phases du développement (multiplication cellulaire, croissance, floraison). Equipement: (a) des laboratoires, (b) des super-serres (lumière naturelle), occultation automatique permettant de régler la durée du jour, conditionnement de l'air, culture sans sol de toutes les plantes sur bierre de verre arrosée automatiquement par une solution nutritive, (c) le phytotron comprenant 12 chambres à lumière artificielle et 8 chambres à lumière du jour; les possibilités de variation de température vont de -10° à +40°C, (d) des champs extérieurs d'expérience. Un grand spectrographe à réseaux permet de soumettre des plantes et parties des plantes aux diverses longueurs d'onde du spectre visible. Photopériodisme, vernalisation, écologie Substances de croissance, culture in vitro de tissus et organes végétaux, physiologie et biochimie de la croissance, de la dormance, de la floraison et de la fructification Tests et extractions de substances de croissance, physiologie de l'action des gibbérellines Substances de floraison Extraction de substances de croissance Physiologie de la floraison des graminées Métabolisme du CO ₂ en relation avec le photopériodisme Réversion végétative du méristème floral Physiologie de la néoformation des bourgeons végétatifs et floraux Physiologie de la réaction rouge claire, rouge sombre Néoformation de boutons floraux Etude des phytoalexines naturelles	Prof. P. Chouard Dr. J. P. Nitsch Mme C. Nitsch H. Harada J. C. Gandar F. Blondon A. S. Queiroz Mme J. Brulfert P. Paulet M. Sandmeier Mme D. Aghion Mme Rui
12. Grenoble 12.1 <i>Botanique</i>	Institut de Botanique et de Physiologie végétale de la Faculté de Grenoble Rio-géographie et cartographie de la végétation, physiologie des organismes inférieurs, anatomie et histologie des dicotylédones, physiologie et acclimatation des plantes de montagne Annexe en haute montagne au col du Lautaret (2100 m) avec jardin alpin et laboratoire	9, Place Bir-Hakeim, Grenoble (Isère) Dir.: Prof. Dr. P. Ozenda Dr. L. Kofler/dr. G. Pottier- Alapetite/A. Labbe/P. Ro- chette/J. Desmet/C. Rozier/ J. Roux/J. Gilot/G. Cadel/A. Tonnel/R. Ruffier-Lanche

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
15. Meudon 15.1 <i>Phy- siologie</i>	Laboratoire de Biologie Végétale de la Station Expérimentale du Froid Ressort au Centre National de la Recherche Scientifique (CNRS), Ministère de l'Éducation Nationale. Physiologie des fruits et des fleurs; action du froid sur les végétaux; entreposage frigorifique des organes végétaux; conservation en emballages plastiques. Principales variétés de fruits étudiés: poires "Williams" et "Passe Crassane"; pommes "Calville Blanc", "Golden Delicious" et "Stayman Winesap"; fleurs: Iris, tulipes et roses; végétaux: choux (résistance au gel). Équipement: Chambres froides, chromatographes, spectographes, enregistreurs de gaz, radioéléments. Physiologie des fruits et des fleurs et les effets du froid Mécanismes physiques des échanges gazeux à travers les fruits; théorie et pratique de la conservation des fruits en emballages clos de matière plastique; échangeurs de matière plastique pour réglage du taux d'oxygène et de gaz carbonique des chambres froides; échaudure des fruits Respiration des organes végétaux sur pied et après récolte; conservation des fruits en récipients de grandes dimensions à parois formées de films plastiques Action du froid sur les fruits; entreposage frigorifique; physiologie des fleurs Production d'éthylène et d'autres produits organiques volatils par les fruits et les fleurs; expérimentation avec les radioéléments Métabolisme glucidique des feuilles étudié avec les méthodes d'infiltration sous vide Respiration des feuilles maintenues en place sur la plante (pommier, Pelargonium), influence de divers facteurs Voies et mécanismes des oxydations cellulaires dans les fruits Résistance du chou à la gelée; étude chimique Lipides des pommes; origine des constituants de la cire Respirations des tulipes Mécanismes physiques des échanges gazeux des graines; rapports avec la dormance Analyse des produits volatils émis par les pommes; origine de ces produits Lipides et cire des fruits Mécanismes physiques des échanges gazeux des feuilles Utilisation des films plastiques et conservation des fruits Congélation des produits végétaux; évolution chimique et structures des légumes surgelés Diffusion des gaz dans les tissus des fruits Acides organiques des fruits Publ.: R.Ulrich: "La conservation par le froid des denrées d'origine végétale" 1954 Thèses de doctorats: M.Phan-Chon-Ton: "Contribution à l'étude de la production d'éthylène par le <i>Penicillium digitatum</i> Sacc" 1961; P.Mazliak: "La cire cuticu-	4 ter, Route des Gardes, Meudon (Seine et Oise) Dir.: Prof.R.Ulrich Prof.R.Ulrich P.Marcellin (sous-dir.) Ir.C.Leblond Ir.A.Paulin Dr.Phan-Chon-Ton J.L.Bomsel Dr.G.Carlier C.Hartmann Mme A.M.Le Saint Dr.P.Mazliak Mme N.Carfantan D.Come Mlle N.Paillard M.Grosbois Ph.Louguet Ir.J.Leteinturier J.Philippon/Nguyen Vinh Xuan P.Soudain J.J.Macheix

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation Meudon (15.1)	laire des pommes (<i>Pirus Malus L.</i>)" 1963; G. Carlier: "Emission de gaz carbonique par les feuilles sur pied" 1964.	
16. Montfavet 16.1 Plantes maraîchères	Station d'Amélioration des Plantes Maraîchères. Centre de Recherches Agronomiques du Sud-Est Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture, Etude de la biologie, de la génétique, des méthodes de sélection des espèces maraîchères. Etudes des variétés. Sélection et expérimentation de nouvelles variétés et sélection pour la résistance aux maladies. Les travaux de sélection sont orientés vers la création de nouvelles variétés pour les cultures en plein champ et pour les cultures sous serre. Equipement: serres, pièces à température contrôlée, domaines expérimentaux dans des conditions qui exigent l'utilisation de l'irrigation et la protection par des haies brise-vent. Tomate Piment, aubergine, artichaut Fraisier, melon Radis, carotte Publ.: Outre les publications dans les revues spécialisées, un rapport annuel d'activité est édité.	Domaine St-Maurice Montfavet (Vaucluse) Dir.: P. Pécaut P. Pécaut/J. Philouze/ H. Laterrot E. Pochard/C. Foury G. Risser A. Bonnet
17. Montpellier 17.1 Fruits	Laboratoire d'Arboriculture Fruitière de l'Ecole Nationale Supérieure Agronomique de Montpellier, Centre de Recherches Agronomiques du Midi Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture, Recherches de génétique, sélection, techniques culturales en arboriculture fruitière (amandier, pommier, abricotier, pêcher; ultérieurement le figuier et le poirier seront également étudiés). Génétique, physiologie des arbres fruitiers (pêcher, amandier), technique culturales (éclaircissage) Porte-greffes et technique de pépinière Publ.: dans les "Annales de l'INRA", section: Amélioration des Plantes.	Montpellier (Hérault) Dir.: J. Hugard J. Hugard M. Picoud
18. Narbonne 18.1 Viti-culture	Station Centrale de Technologie des Produits Végétaux, Centre de Recherches Agronomiques du Midi Appartient à l'Institut National de la Recherche Agronomique (INRA), Ministère de l'Agriculture Etude du raisin et de ses dérivés (jus, vin, sous-produits, etc.) Chimie des anthocyanes et des substances tanniques, potentiel oxydoréducteur Maturation du raisin Vitamines, ascorbinoxidase	Boulevard du Général de Gaulle, Narbonne (Aude) Dir.: Dr. M. Flanzky Dr. M. Flanzky Dr. L. Deibner Ch. Poux Mlle A. Ournac

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation Narbonne (18.1)	Substances colorantes Vignes des terrains salés Culture et sélection de la vigne Substances pectiques	M. Bourzeix C. Jouret Ir. P. Bernard Mme Ir. Y. Collon
19. Paris 19.1 <i>Génétique, amélioration</i>	Chaire de Génétique et d'Amélioration des Plantes de l'Institut National Agronomique Etablissement public relevant du Ministère de l'Agriculture. Génétique, mutations provoquées Précisions pratiques sur les recherches mu- tagéniques entreprises, en substance, à la ferme expérimentale à Paliseau près de Paris	16, Rue Claude Bernard, Paris 5e Dir.: Dr. H. Heslot Dr. H. Heslot Dr. R. Ferrari
19.2 <i>Fertili- sation</i>	Services Agronomiques de la Société commer- ciale des Potasses d'Alsace Services privés. Laboratoires et Station de Recherches Etude de la fertilisation de toutes les es- pèces végétales	11, Avenue de Friedland, Paris 82 Dir.: Ir. L. Audidier Dir. adj.: Ir. J. Garaudeaux Aspach-le-Bas près Mul- house (Haut-Rhin) Ir. Chevalier/ir. Quemener
Verneuil l'Etang	Voir: 14	
20. Vernou- en-Sologne 20.1 <i>Fruits</i>	Station de Recherches Fruitières de Sologne Institution privée, fonctionnant sous la forme juridique d'une Société Civile a. Procédés de lutte contre les parasites; nouveaux produits de traitements b. Etude économique et technique des procédés de production fruitière (fumures, méthodes d'entretien du sol, etc.) c. Sélection des variétés fruitières et adap- tation de ces variétés au milieu Etudes économiques sur les différentes métho- des de cultures fruitières et sur l'ensemble des problèmes fruitiers Rôle des oligo-éléments, certains parasites (plus spécialement tavelure, araignée rouge), biologie du Carpocapse Etude du sol Publ.: Traité de la fumure des arbres fruitiers (1956, en collaboration avec la Compagnie de Saint-Gobain); charte de comptabilité; pu- blications scientifiques.	Vernou-en-Sologne (Loir-et-Cher) Dir.: Ir. F. Robin Ir. F. Robin Ir. R. Bouhier de l'Ecluse M. Rousselon

German Federal Republic



1. Ahlem, 2. Ahrweiler, 3. Aurich, 4. Bad Kreuznach, 5. Berlin, 6. Bonn, 7. Fischenich, 8. Friesdorf, 9. Geisenheim, 10. Giessen, 11. Hamburg, 12. Hannover, 13. Heidelberg, 14. Jork, 15. Karlsruhe, 16. Kassel, 17. Köln-Vogelsang, 18. Neustadt, 19. Oppenheim, 20. Osnabrück, 21. Sarstedt, 22. Schlachters, 23. Straelen, 24. Stuttgart, 25. Trier, 26. Veitshöchheim, 27. Weihenstephan, 28. Weinsberg, 29. Wolbeck.

General Survey

Research in the Deutsche Bundesrepublik (DBR)/German Federal Republic is decentralized and is financed chiefly by the individual Bundesländer/Federal Lands. This is particularly true for universities and Hochschulen/High Schools (viz. Technical Universities). There are also Federal Research Institutes, Institutes of the Max-Planck-

Society and special institutes of the individual lands.

The subdivision of research in the agricultural and horticultural sciences conforms to this pattern. Whereas in Universities and Technical Universities the principle of the unity of teaching and research is safeguarded through the combination in one person of the offices of professor and director of a research institute, the Federal Research In-

stitutes and the Institute of the Max-Planck-Society are purely places of research. However, scientists working there frequently have teaching commitments in neighbouring Technical Universities.

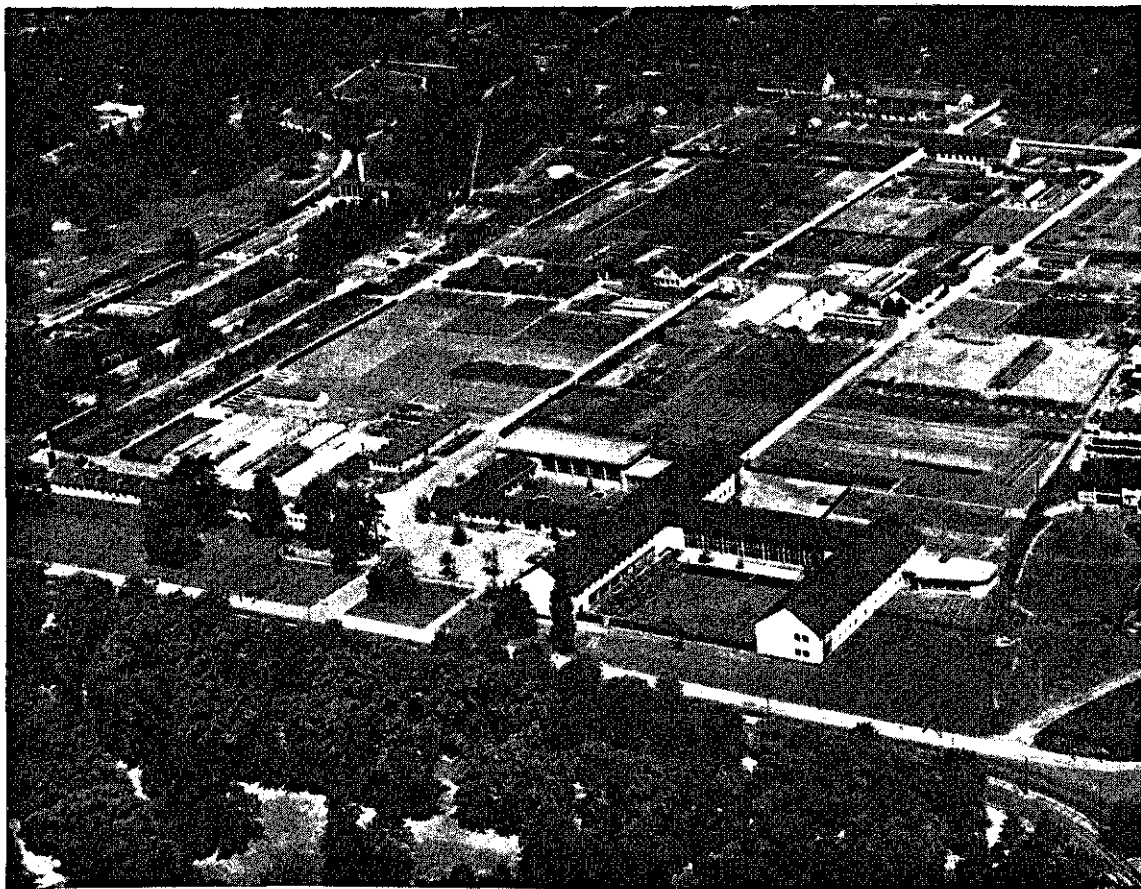
In addition, a well developed secondary school organization exists in horticulture in the so-called Teaching and Research Institutes (Higher Horticultural Schools), one of which is financed by each Federal Land. A further group is formed by the Teaching and Experimental Institutes and the purely experimental institutes which are not tied to a school. These are generally regionally orientated and are run by the Boards or Ministries of Agriculture of the Federal Lands.

There is no organized or administrative connection of these groups with one another. All the institutes are conveniently distributed over the total area of the DBR and the regional experimental institutes particularly are concentrated in the predominant areas of horticultural production (see map).

Academic studies in horticultural science

take place in three Technical Universities of the DBR. These places are the Department of Horticulture in the Faculty of Agriculture of the Technical University of Berlin, the Faculty of Horticulture and Landscape Planning of the Technical University of Hannover and the Faculty of Agriculture and Horticulture at Freising near Weihenstephan of the Technical University of München.

Furthermore, as supplements to the study and research in agriculture, there exist the Institute for Fruit Growing of the Agricultural Faculty of the University of Bonn and the Institute for Fruit and Vegetable Culture of the Agricultural College of Hohenheim near Stuttgart. A new Institute of Fruit Growing was founded at the University of Giessen in 1962. The Federal Biological Institute of Agriculture and Forestry participates with many institutes in work on those parts of their problems which are concerned with research in horticultural science. Institutes with which there is pronounced cooperation of this type have been listed individually. A Federal Research Institute of particular



Aerial view of the campus of the Faculty of Horticulture and Landscape Planning of the Technological University of Hannover

interest is the Federal Institute for Quality Research in Plant Products at Geisenheim a. Rhein. Certain institutes, although gravitating towards research into agricultural problems, have made considerable contributions to horticulture, e.g. the Max-Planck Institute for Breeding Research at Köln-Vogelsang and the Research Institute for Agriculture at Völkenrode near Braunschweig. Private research organizations too, e.g. of various industrial concerns, are making valuable contributions to horticultural research.

Bibliography

Griesau, H.D. und Tenwinkel, Ellen: Forschungsstätten der Land-, Forst- und Ernährungswirtschaft in der Bundesrepublik Deutschland, Landwirtschaftsverlag GmbH, Hiltrup bei Münster (Westf.), 2. Aufl. 1961, pp 243, DM 4,80.

Publications

Results of horticultural research and experimentation are chiefly published in:

Scientific journals

Die Gartenbauwissenschaft, Bayerischer Land-

wirtschaftsverlag GmbH, München
Angewandte Botanik, Vertrieb durch den Verlag Paul Parey, Berlin und Hamburg
Zeitschrift für Pflanzenernährung, Düngung, Bodenkunde, Verlag Chemie GmbH, Weinheim/Bergstr.

Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, Verlag Eugen Ulmer, Stuttgart

Der Züchter, Springer-Verlag, Berlin-Göttingen-Heidelberg

Zeitschrift für Pflanzenzüchtung, Verlag Paul Parey, Berlin und Hamburg

Supra-regional professional journals

Deutsche Baumschule, Verlag Deutsche Gärtnerbörse, Aachen

Die Deutsche Gartenbauwirtschaft, Bayerischer Landwirtschaftsverlag GmbH, München

Der Erwerbsobstbau, Verlag Paul Parey, Berlin und Hamburg

Gartenwelt, Verlag Paul Parey, Berlin und Hamburg

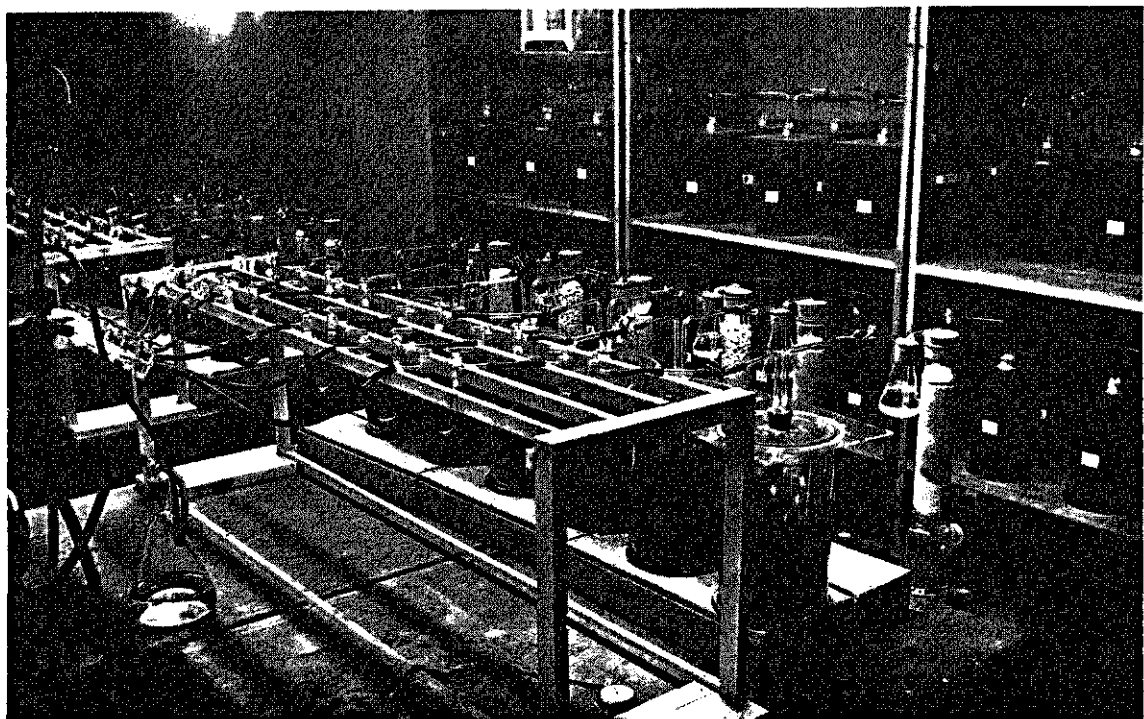
Regional papers of supra-regional importance

Mitteilungen des Obstbauversuchsrings des Alten Landes, Jork, Krs.Stade

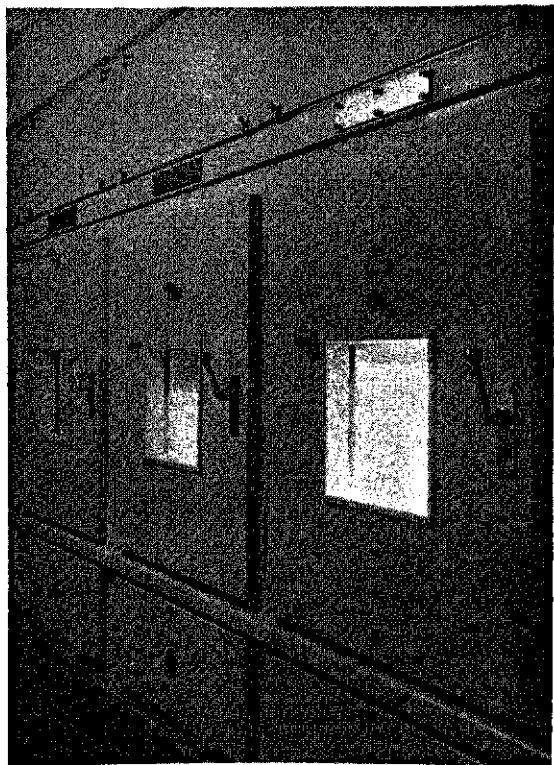
Süddeutscher Erwerbsgärtner, Verlag Eugen Ulmer, Stuttgart.



Institute of Vegetable Growing of the Technological University of Hannover



Laboratory of the Institute of Vegetable growing at Hannover. Determination of the CO_2 production by converting of different kinds of organic matter in the soil



Phytotron at the Institute of Ornamental Plants, Technical College Hannover

Seat/Nature of program	Institution and projects	Address and staff
1. Ahlem 1.1 General horticulture	Lehr- und Versuchsanstalt für Gartenbau/ <i>Horticultural Teaching and Experiment Station</i>	Harenberger Landstrasse 2, Ahlem/Hann. (Niedersachsen) Head: Dr. H. Piper
2. Ahrweiler 2.1 General horticulture	Landes-Lehr- und Versuchsanstalt für Weinbau, Gartenbau und Landwirtschaft/ <i>Land Teaching and Experiment Station for Viticulture, Horticulture and Agriculture</i>	Walporzheimerstrasse 48, Ahrweiler (Rheinland-Pfalz) Dir.: K. Broicher
3. Aurich 3.1 General horticulture	Lehr- und Versuchsanstalt für Gartenbau der Landwirtschaftskammer Weser-Ems/ <i>Horticultural Teaching and Experiment Station of the Chamber of Agriculture Weser-Ems</i>	Haxtum 29, 296 Aurich (Ostfr.) (Niedersachsen) Head: Dr. H. Rademacher
4. Bad Kreuznach 4.1 General horticulture	Landes-Lehr- und Versuchsanstalt für Weinbau, Gartenbau und Landwirtschaft/ <i>Land Teaching and Experiment Station for Viticulture, Horticulture and Agriculture</i>	Rüdesheimerstrasse 60-68, Bad Kreuznach (Rheinland-Pfalz) Dir.: Dr. K. Roeder
5. Berlin 5.1 General horticulture 5.2 Horticultural management 5.3 Garden art and landscape design 5.4 Vegetables	Fakultät für Landbau der Technischen Universität Berlin-Dahlem/ <i>Faculty of Agriculture of the Technological University, Berlin-Dahlem</i> a. Abteilung für Gärtnerische Betriebslehre am Institut für Landwirtschaftliche Betriebslehre/ <i>Division of Horticultural Management of the Institute of Agricultural Management</i> b. Institut für Gartenkunst und Landschaftsgestaltung/ <i>Institute of Garden Art and Landscape Design</i> c. Institut für Gemüsebau/ <i>Institute of Vegetable Growing</i> Mushroom nutrition; conditions and production in a tower glasshouse Relationships between CO ₂ concentration and growth under different environmental and nutritional conditions; CO ₂ supply in glass-houses; artificial illumination; hydroculture; rotation problems Water, soil and space as growth factors in forced crops; packing and marketing of vegetables; economy of various vegetable crops Investigations about tropical and non-tropical fruit and vegetable crops Effects of organic and green manure on yield and soil properties Tomato fruit composition as influenced by culture, harvest time and storage	Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem) In Dol 27-29, 1 Berlin 33 (Dahlem) Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem) Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem) Dir.: Prof. dr. H. Riethus Prof. dr. H. Riethus Dr. H. J. Daunicht Dr. K. H. Dunkel Dr. A. Schmidt E. O. Beckmann M. El Shal
5.5 Fruit	d. Institut für Obstbau/ <i>Institute of Fruit Growing</i> Principal research work: nutrition as related to quality; transportation; quality maintenance; parthenocarp development; management studies; irrigation problems	Kiebitzweg 18-20, 1 Berlin 33 (Dahlem) Dir.: Prof. G. Rünemann Dr. W. Mante/Dr. Annemarie Karnatz/Dr. F. Lenz
5.6 Processing	e. Institut für Obst- und Gemüseverwertung/ <i>Institute of Fruit and Vegetable Processing</i>	Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem)
5.7 Ornamental plants	f. Institut für Zierpflanzenbau/ <i>Institute of Ornamental Plant Growing</i> Temperature and light problems. Manuring, watering Germination	Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem) Dir.: Prof. dr. W. Rünger Prof. dr. W. Rünger/B. Wehr Dr. W. U. von Hentig J. Rohde

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Berlin (5)	Biologische Bundesanstalt für Land- und Forstwirtschaft/ <i>Federal Biological Institution of Agriculture and Forestry</i>	Königin-Luise-Strasse 19, 1 Berlin 33 (Dahlem)
5.8 Horticultural Virology	a. Institut für Gärtnerische Virusforschung/ <i>Institute of Horticultural Virology</i> Phytopathology; virus diseases of horticultural crops and ornamental plants (tomatoes, dahlias, cacti, orchids) Entomology: insect vectors of virus diseases	Dr. H. A. Uschdraweit (Head)
5.9 Phytopathology	b. Institut für Nichtparasitäre Pflanzenkrankheiten/ <i>Institute of Non-parasitic Plant Diseases</i>	Dr. K. G. Heinze Königin-Luise-Strasse 19, 1 Berlin 33 (Dahlem) Head: Dr. A. Kloeke Deputy head: Dr. H. O. Leh
5.10 Phytopathology	c. Laboratorium für Zierpflanzenkrankheiten/ <i>Laboratory of Diseases of Ornamental Plants</i> Horticultural science; mycology; plant protection: parasitic and non-parasitic diseases of ornamental plants Commercial horticulture; pest control; animal pests of ornamental plants	Königin-Luise-Strasse 19, 1 Berlin 33 (Dahlem) Dr. W. H. F. Sauthoff (Head)
5.11 General horticulture	Lehr- und Forschungsanstalt für Gartenbau/ <i>Horticultural Teaching and Research Establishment</i>	Dr. H. H. W. Pag Königin-Luise-Strasse 22, 1 Berlin 33 (Dahlem) Dir.: Prof. dr. H. Baetge
6. Bonn	Institut für Obstbau der Rheinischen Friedrich-Wilhelm-Universität/ <i>Institute of Fruit Growing of the Rhenish Friedrich-Wilhelm-University</i>	Auf dem Hügel 6, Bonn Dir.: Prof. dr. F. Hilkenbäumer
6.1 Fruit	Fruit growing, cultivation, management problems of fruit growing, humus and nutrient supply, pruning; rootstocks, irrigation; storage, photosynthesis, transpiration Management, market analysis, calculations, programming Physiology, cultivation: frost resistance, problems of storage engineering Physiology of fruits, storage, physiological storage diseases Physiology of fruits, bitter pit, mineral composition Physiology of fruits: metabolism of carbohydrates Affiliated institutions: a. Meckenheim, Obst-Versuchsanlage Klein Altendorf/ <i>Meckenheim, Fruit Experiment Farm Klein Altendorf</i> Cultivation, management: soil mulching and soil management, varietal problems b. Wesseling, Versuchswirtschaft für Obst und Gemüse, Marhof/ <i>Wesseling, Experimental Farm (Fruit and Vegetables) Marhof</i> Vegetable growing, irrigation; requirements and supply of nutrients, humus and water; assimilation	Prof. dr. F. Hilkenbäumer K. G. Dantz Dr. J. Henze Dr. A. Zachariae W. Kohl U. Stoll Dr. Engel Dr. G. Hohmann
7. Fischenich	Institut für Gemüsekrankheiten und Unkrautforschung der Biologischen Bundesanstalt für Land- und Forstwirtschaft/ <i>Institute of Vegetable Pathology and Weed Research of the Federal Biological Institution of Agriculture and Forestry</i>	Kölnerstrasse 60, Fischenich (Krs. Köln)
7.1 Vegetables	Phytopathology, plant physiology: diseases of	Dr. P. H. G. Orth (Head)

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Fischenich (7.1)	vegetables, chemical weed control Plant diseases and pests (cucumbers, tomatoes and celeriac)	Dr. G. E. G. Crüger
8. Friesdorf	Lehr- und Versuchsanstalt für Gartenbau/ <i>Horticultural Teaching and Experiment Station</i>	Max-Löbnerstrasse 51, Bad Godesberg (Nordrhein-Westfalen)
8.1 General horticulture	Attached to the Chamber of Agriculture, Rheinland.	Dir.: H. K. Möhring Manager: Dr. G. Bosse
9. Geisenheim	Hessische Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau/ <i>Hessian Establishment for Teaching and Research in Viticulture, Fruit Growing and Horticulture</i>	6222 Geisenheim (Rheingau) Dir.: Prof. dr. K. Hennig
9.1 General horticulture	Publ.: Annual reports	
9.2 Sociology of plants	a. Abteilung für Experimentelle Soziologie der Kulturpflanzen/ <i>Department of Experimental Sociology of Cultivated Plants</i>	6222 Geisenheim (Rheingau) Dr. H. R. Bode
9.3 Economy	b. Institut für Betriebs- und Wirtschaftslehre/ <i>Institute of Management and Economics</i> Economic investigations into operation and costings in horticulture and viticulture, marketing problems Costings in viticulture, investigations into the structure of viticultural enterprises Calculation of costs in horticulture, investigations into economy of labor and structure of capital in horticulture	Rüdesheimerstrasse 8, 6222 Geisenheim (Rheingau) Prof. dr. H. Kalinke (Head) Dr. K. Adams Dr. J. Schröder
9.4 Biochemistry, wine chemistry	c. Institut für Biochemie und Weinchemie/ <i>Institute of Biochemistry and Wine Chemistry</i> Wine research, biochemistry, wine chemistry Paper chromatographic studies of rare components of wine such as polyphenols	Beinstrasse 15, 6222 Geisenheim (Rheingau) Prof. dr. K. Hennig (Head) Dr. R. Burkhard/A. Lay
9.5 Soil science, plant nutrition	d. Institut für Bodenkunde und Pflanzenernährung/ <i>Institute of Soil Science and Plant Nutrition</i> Investigations of the soil with kinetic methods (ion exchange method). Redox measurements of plants and soils, composting of town refuse, irrigation Water and nutrients requirements, electrons economy of plant and soil	Rüdesheimerstr. 20, 6222 Geisenheim (Rheingau) Prof. dr. W. Tepe (Head) Dr. E. Leidenfrost
9.6 Botany, microbiology	e. Institut für Botanik, Gärungsphysiologie und Hefereinzucht/ <i>Institute of Botany, Physiology of Fermentation and Pure Culture of Yeast</i> Botany, microbiology, biology of fertilization Genetics, breeding of irises Physiology of fermentation	6222 Geisenheim (Rheingau) Head (till 1-3-1966): Prof. dr. H. Schanderl Prof. dr. H. Schanderl Dr. P. Werckmeister Dr. H. Wienhaus/Dr. Th. Staudenmayer
9.7 Garden art and Landscape Design	f. Institut für Gartenarchitektur und Landschaftspflege/ <i>Institute of Garden Architecture and Landscape Maintenance</i> Landsurveying and sportsground construction Technique of garden construction Landscape planning	6222 Geisenheim (Rheingau) Head: Prof. dr. G. Däumel Ir. S. Brodjanac M. Gruhler G. Kuder
9.8 Horticultural plant production	g. Institut für Gärtnerischen Pflanzenbau/ <i>Institute of Horticultural Plant Production</i> Dendrology	6222 Geisenheim (Rheingau) W. Rauth

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Geisenheim 9.9 Vegetables	Testing of varieties of ornamental plants h. Institut für Gemüsebau/ <i>Institute of Vegetable Growing</i>	K. H. Möhrs 6222 Geisenheim (Rheingau) Head: Prof. dr. H. D. Hartmann
9.10 Oenology	i. Institut für Kellerwirtschaft/ <i>Institute of Oenological Management</i>	6222 Geisenheim (Rheingau) G. Troost/K. Vetter
9.11 Fruit	j. Institut für Obstbau/ <i>Institute of Fruit Growing</i> Rootstocks for fruit, variety testing, pruning of fruit trees Diseases, enemies and cultivation of fruit crops	6222 Geisenheim (Rheingau) K. J. Maurer Dr. M. Bauckmann
9.12 Processing	k. Institut für Obst- und Gemüseverwertung/ <i>Institute for Processing of Fruits and Vegetables</i>	6222 Geisenheim (Rheingau) Head: Prof. dr. K. Wucherpfennig Ass.: Dr. G. Bretthauer/ dr. I. Franke
9.13 Phytopathology	l. Institute für Pflanzenkrankheiten/ <i>Institute of Plant Diseases</i> Pests of fruit trees and ornamental plants Silver leaf disease of fruit, diseases of Azalea and Erica	6222 Geisenheim (Rheingau) Prof. dr. F. Stellwaag-Kittler (Head) Dr. M. Heimann/Ir. G. Haub
9.14 Viticulture	m. Institut für Rebenzüchtung und Rebenveredlung/ <i>Institute of Grape Vine Breeding and Grafting</i> Breeding of grape vines in general, of grape vine rootstocks and vine varieties, technical installations and techniques of grape vine grafting Ampelography, physiology and anatomy of grafted grape vines in general, techniques of grafting, use of growth regulators in grape vine grafting Selection of grape vines, statistic methods, viticultural physiology in general	Eibingerweg, 6222 Geisenheim (Rheingau) Head: Prof. dr. H. Becker Dep. Head: Dr. W. Schenk Prof. dr. H. Becker Dr. W. Schenk Dr. E. Sievers
9.15 Engineering	n. Institut für Technik/ <i>Institute of Engineering</i> Teaching, research, testing of machinery and equipment, advice and information, assistance	6222 Geisenheim (Rheingau) Prof. ir. F. Flehr
9.16 Viticulture	o. Institut für Weinbau/ <i>Institute of Viticulture</i>	6222 Geisenheim (Rheingau) Prof. dr. W. Kiefer/Dr. E. L. Hofmann
9.17 Agricultural meteorology	Agrarmeteorologische Forschungsstelle des Deutschen Wetterdienstes/ <i>Research Station for Agricultural Meteorology of the German Weather Service</i> Climate of vineyards, orchards and wine cellars, local- and microclimate, forecast of blossoming time	6222 Geisenheim (Rheingau) Dr. W. Bauer
9.18 Quality research	Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse/ <i>Federal Institution for Quality Research of Plant Products</i>	Rüdesheimerstr. 12-14, 6222 Geisenheim (Rheingau) Dir.: Prof. dr. W. Schuphan Dr. H. Schlottmann
9.19 Quality research	Confoederatio internationalis ad qualitates plantarum edulium perquirendas (CIQ)/ <i>International Association for Quality Research on Food-plants</i>	Rüdesheimerstr. 12-14, Geisenheim (Rheingau)

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Geisenheim	Publ.: <i>Qualitas plantarum et materiae vegetabilis</i> (Ed. dr. W. Junk, The Hague)	Chairman: Prof. dr. W. Schuphan
10. Giessen 10.1 Fruit	Institut für Obstbau der Landwirtschaftlichen Fakultät der Universität Giessen/ <i>Institute of Fruit Growing of the Agricultural Faculty of the University Giessen</i>	Giessen Dir.: Prof. dr. W. Gruppe Ass. Dr. G. Drude/ Miss H. Schmidt
11. Hamburg 11.1 General horticulture	Hamburgische Gartenbau-Versuchsanstalt Fünfhausen/ <i>Hamburg's Experimental Horticultural Station Fünfhausen</i>	Kirchwerder 3, 2052 Hamburg Dir.: Dr. A. Lindemann
12. Hannover 12.1 General horticulture, landscape design	Fakultät für Gartenbau und Landeskultur der Technischen Hochschule Hannover/ <i>Faculty of Horticulture and Landscape Planning of the Technological University Hannover</i>	Herrenhäuserstr. 2, 3 Hannover-Herrenhausen
12.2 Genetics	Experimental farm at Ruthe nr. Sarstedt/Hannover a. Institut für Angewandte Genetik/ <i>Institute of Applied Genetics</i> Cytogenetical and breeding research on vegetable, flower and cereal crops. Genetical techniques in horticultural plant breeding, phylogeny of cultivated wheat Breeding and introduction of ornamental plants Rye breeding, biometrics Breeding of onions, chives, carrots and radishes Breeding of cucumbers Publ.: "Zeitschrift für Pflanzenzüchtung"	Herrenhäuserstr. 2, 3 Hannover Dir.: Prof. dr. H. Kuckuck Prof. dr. H. Kuckuck Dr. W. Horn Dr. G. Wricke Dr. G. Kobabe Dr. H. K. Schulte
12.3 Soil science	b. Institut für Bodenkunde/ <i>Institute of Soil Science</i>	Herrenhäuserstr. 2, 3 Hannover
12.4 Botany	c. Institut für Botanik/ <i>Institute of Botany</i>	Herrenhäuserstr. 2, 3 Hannover
12.5 Management, market research	d. Institut für Gärtnerische Betriebslehre und Marktforschung/ <i>Institute of Horticultural Management and Market Research</i> Systems of management; cost analysis in horticultural enterprises; preparation of material for advice in horticultural management; economic and technical investigations of work problems in 'model' enterprises; application of mathematical techniques in the planning of horticultural enterprises; comparative studies of the structure and economic efficiency of horticulture in West European countries; time and work study in horticulture; catalogue of 'standard times' for works in horticulture.	Herrenhäuserstr. 2, 3 Hannover Dir.: Prof. dr. W. Busch Dr. G. Stoffert/Dr. H. D. Ostendorf/E. W. Schenk/ M. Rahner/D. Link
12.6 Vegetables	e. Institut für Gemüsebau/ <i>Institute of Vegetable Growing</i> Sites for vegetable growing; growth factors; organic matter; its importance and manurial effect; accumulation and depletion of humus; importance of water, light, plant nutrients for yield and quality; problems of amino- and oxalic acids; storage of vegetables; utilization and processing; improved efficiency in the cultivation of tomatoes, cucumbers, brassicas, salad crops, spinach. Publ.: in "Die Gartenbauwissenschaft" and in growers journals.	Herrenhäuserstr. 2, 3 Hannover Dir.: Prof. dr. W. Nicolaisen/Dr. E. Fölster/ Dr. Helena Zimmermann/ Dr. H. J. Wiebe

Seat/Nature of program	Institution and projects	Address and staff
12.7 Land-scape design	f. Institut für Landespflege und Landschaftsgestaltung/ <i>Institute for Conservation of Nature and Natural Resources</i>	Herrenhäuserstr. 2, 3 Hannover
12.8 Meteorology	g. Institut für Meteorologie und Klimatologie/ <i>Institute of Meteorology and Climatology</i>	Herrenhäuserstr. 2, 3 Hannover
12.9 Fruit, arboriculture	h. Institut für Obstbau und Baumschule/ <i>Institute of Fruit Growing and Arboriculture</i> (See 21.1)	Haus Steinberg, 3203 Sarstedt bei Hannover
12.10 Garden art and recreation	i. Institut für Öffentliche Grünplanung und Gartengestaltung/ <i>Institute of Garden Architecture and Recreation</i>	Herrenhäuserstr. 2, 3 Hannover
12.11 Plant nutrition	j. Institut für Pflanzenernährung/ <i>Institute of Plant Nutrition</i>	Herrenhäuserstr. 2, 3 Hannover
12.12 Phytopathology	k. Institut für Pflanzenkrankheiten und Pflanzenschutz/ <i>Institute of Plant Diseases and Plant Protection</i>	Herrenhäuserstr. 2, 3 Hannover
12.13 Radiation biology	l. Institut für Strahlenbiologie/ <i>Institute of Radiation Biology</i>	Herrenhäuserstr. 2, 3 Hannover
12.14 Engineering	m. Institut für Technik in Gartenbau und Landwirtschaft/ <i>Institute of Horticultural and Agricultural Engineering</i> Equipment: boiler house, workshops, exhibition hall, laboratories and workrooms. Glasshouse construction, heating mechanization Heating-engineering	Haltenhoffstr. 101 3 Hannover Dir.: Prof. ir. W. Renard Prof. ir. W. Renard
12.15 Floriculture	n. Institut für Zierpflanzenbau/ <i>Institute of Floriculture</i> Equipment: greenhouses, growth rooms, refrigeration compartments. Influence of environmental factors on development (flower-bud initiation, etc.), physiology of germination of ornamental plants, dormancy problems, cultivation techniques, testing and classification of cultivars, nomenclature of cultivated plants. Publ.: (edited by Paul Parey, Berlin): Maatsch: Blumenzweibeltreiberei; Cyclamen; Marktpflanzen; Pareys Gartenbaulexicon. Rünger: Licht und Temperatur im Zierpflanzenbau.	Herrenhäuserstr. 2, 3 Hannover Dir.: Prof. R. Maatsch Ass.: Dr. A. Herklotz/dr. K. Zimmer/E. Bachthaler
12.16 Agriculture, land planning	Lehrstuhl für Landbau und Landesplanung/ <i>Chair of Agriculture and Land Planning</i>	Herrenhäuserstr. 2, 3 Hannover
13. Heidelberg	Institut für Obstkrankheiten der Biologischen Bundesanstalt für Land- und Forstwirtschaft/ <i>Institute of Fruit Pathology of the Federal Biological Institution of Agriculture and Forestry</i>	Tiergartenstr. 100 (Postfach 269) Heidelberg Head: Dr. A. Schmidle
13.1 Fruit pathology	Mycology, phytopathology: fungus diseases of fruit crops Acarology, entomology; virus diseases of berry fruit and their vectors Virus diseases of fruit trees Pest control: insecticides in fruit growing	Dr. A. Schmidle/Dr. K. H. Willer Dr. K. Krczal Dr. L. Kunze Dr. Gertrud Singer
13.2 General horticulture	Staatliche Lehr- und Versuchsanstalt für Gartenbau Heidelberg-Pfaffengrund/ <i>State Teaching and Experiment Station of Horticulture Heidelberg-Pfaffengrund</i>	Diebsweg 2, Heidelberg Head: F. Schupp

Seat /Nature of program	Institution and projects	Address and staff
14. Jork 14.1 Fruit	Obstbauversuchsanstalt Jork der Landwirtschaftskammer Hannover/ <i>Experimental Fruit Growing Station Jork of the Chamber of Agriculture Hannover</i> Fruit tree rootstocks, frost protection, herbicides Insecticides, fungicides Fungicides, storage diseases, use of growth regulators Soil and manuring Management, marketing statistics Virus diseases Breeding (pome fruit) Oecological problems of site, thinning out Breeding cherries Fruit storage and preparation Publ.: "Mitt. des Obstbauversuchsrings des Alten Landes" (monthly)	Jork, Krs. Stade, Bez. Hamburg Dir.: Prof. dr. E. L. Loewel Dr. H. Karnatz Dr. H. Reich Dr. H. Bömeke Dr. K. Weissenborn Dr. A. Löhden Dr. G. Hamdorf Dr. M. Saure Dr. K. Roemer E. von Vahl H. G. Blank
15. Karlsruhe 15.1 Food preservation	Bundesforschungsanstalt für Lebensmittel-frischhaltung/ <i>Federal Research Centre for Food Preservation</i> a. Labor für Obst und Gemüse/ <i>Laboratory of Fruit and Vegetables</i> b. Labor für Pflanzenphysiologie/ <i>Laboratory of Plant Physiology</i>	Engesserstrasse 20, Karlsruhe Head: H. Hansen Head: Dr. J. Wolf
16. Kassel 16.1 General horticulture	Lehr- und Versuchsanstalt für Gartenbau der Landwirtschaftskammer Kurhessen/ <i>Horticultural Teaching and Experiment Station of the Chamber of Agriculture Kurhessen</i>	Oberzwehrenerstr. 103, Kassel-Oberzwehren (Hessen) Head: Dr. S. Wilke H. Dersch
17. Köln-Vogelsang 17.1 Breeding research	Max-Planck-Institut für Züchtungsforschung der Max-Planck-Gesellschaft für Förderung der Wissenschaften e.V./ <i>Max-Planck-Institute for Breeding Research of the Max-Planck-Society for the Advancement of Science</i>	Köln-Vogelsang Dir.: Prof. dr. J. Straub
18. Neustadt 18.1 Viticulture, horticulture	Landes-Lehr- und Versuchsanstalt für Wein- und Gartenbau/ <i>Teaching and Research Establishment of Viticulture and Horticulture</i> Sections: 1. Botany 2. Wine chemistry 3. Phytopathology 4. Land Institute of Phylloxera control and re-establishment 5. Viticulture 6. Horticulture	Maximilianstrasse 43/45, Neustadt/Weinstrasse (Rheinland/Pfalz) Dir.: Dr. H. Ehrenhardt Dr. G. Bosian Dr. L. Jakob Dr. H. Ehrenhardt Dr. H. Ehrenhardt J. Faust Dr. K. G. Schwarz
19. Oppenheim 19.1 Viticulture, horticulture	Landes-Lehr- und Versuchsanstalt für Weinbau und Gartenbau/ <i>Land Teaching and Experiment Station of Viticulture and Horticulture</i>	Zuckerberg 19, 6504 Oppenheim Dir.: R. Hasselbach
20. Osnabrück 20.1 General horticulture	Höhere Gartenbauschule Osnabrück, Ingenieurschule und Versuchsanstalt für Gartenbau/ <i>Higher Horticultural School of Osnabrück, School for Engineers and Horticultural Experiment Station</i> Large-scale experimental holdings.	Am Krümpel 33, Osnabrück-Haste Dir.: J. Luckan Dep.dir.: Dr. J. Niemann

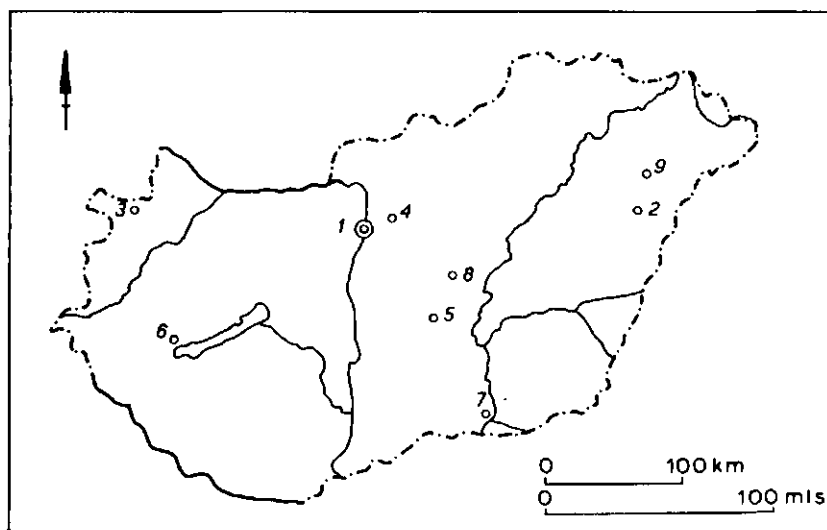
Seat/Nature of program	Institution and projects	Address and staff
Continuation of Osnabrück (20.1)	a. Special school course (6 semestres) including the subjects garden and landscape design, ornamental horticulture, fruit and vegetable growing, arboriculture, seed growing. b. Experimentation in the cultivation of tree and berry fruit, vegetables and ornamental plants. Fruit growing, horticultural management Chemistry, soil science, plant nutrition, techniques of experimentation, plant breeding Garden and landscape design, history of garden art and history of art Botany, plant sociology, studies of woody plants, plant protection Vegetable growing, arboriculture, bee keeping Ornamental horticulture Fruit growing, preservation of fruit and vegetables Technique of garden and landscape design Economy, management of horticultural holdings Technique in horticulture, physics, mathematics Mathematics, utilization of plants, cropping plants Technique of garden and landscape design, technique of measurement Protection of nature and landscape, plant sociology Seed and plant growing, genetics Statics, constructions of reinforced concrete Drawing, painting Town building and settlement Bookkeeping, taxation law	J. Luckan Dr. J. Niemann Dr. H. Keller Ir. R. Adler A. Gerlach Dr. F. Escher H. Wirth R. Lehr Dr. K. H. Müller F. Müller H. Ehsen A. Niesel H. Peucker M. Maurer Dr. ir. Bach Hobein Nolte Wöhrmann
21. Sarstedt 21.1 Fruit, arboriculture See also 12.9	Institut für Obstbau und Baumschule der Fakultät für Gartenbau und Landeskultur der Technischen Hochschule Hannover/<i>Institute of Fruit Growing and Arboriculture of the Faculty of Horticulture and Landscape Planning of the Technological University Hannover</i> Experimental fields in Sarstedt, Ruthe and Braunschweig-Völkenrode. Problems of cultural systems and rootstocks, plant physiology Plant physiology, fruit nutrition, environmental factors Work planning and work methods in fruit growing Physiology of fruits, storage Cherries, library Mineral nutrition, small fruits Nutrition and propagation of woody ornamentals, Rhododendron Publications (published by Bayer. Landwirtschaftsverlag München): P.G. de Haas: "Markt-obstbau", 1957; "Obst aus unserem Garten", 1959; "Die Gartenbauwissenschaft".	Haus Steinberg, 3203 Sarstedt bei Hannover Dir.: Prof. dr. P. G. de Haas Prof. dr. P. G. de Haas Dr. W. D. Naumann Dr. E. Wilking Dr. K. - E. Kaether Elizabeth Schenk K. Keipert L. Heft
22. Schlachters 22.1 Fruit	Lehr- und Versuchsanstalt für Obstbau/<i>Teaching and Experiment Station of Fruit Growing</i>	Schlachters bei Lindau Head: E. Pflugfelder
23. Straelen 23.1 General horticulture	Rheinische Lehr- und Versuchsanstalt für Gemüse-, Obst- und Gartenbau der Landwirtschaftskammer Rheinland/<i>Rhenish Teaching and</i>	Hans-Tenhaeff-Str. 40-42, Straelen (Nordrhein-Westfalen)

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Straelen (23.1)	<i>and Experiment Station of Vegetable Growing, Fruit Growing and Horticulture of the Chamber of Agriculture Rheinland</i>	Head: L. Ehrle
24. Stuttgart	Institut für Obstbau und Gemüsebau der Landwirtschaftlichen Hochschule Hohenheim/ <i>Institute of Fruit and Vegetable Growing of the Agricultural University of Hohenheim</i>	Emil-Wolff-Strasse 27, Stuttgart-Hohenheim Dir.: Prof. dr. G. Buchloh
24.1 Fruit	Pomology, selection, testing and propagation of fruiting plants Physiology and nutrition of fruiting plants Fruit physiology Site analysis and mapping	Dr. G. Götz Dr. W. Liegel Dr. J. Neubeller Dr. K. F. Schreiber/Dr. F. Weller Dr. G. Schwerdtfeger
24.2 General horticulture	Anatomy and morphology of fruiting plants and fruits Yield capacity and evaluation of fruit varieties Genetics and breeding of vegetable plants Bavendorf, Aussenstelle des obengenannten Instituts/ <i>Bavendorf, Field Station of the above Institute</i>	Dr. R. Silbereisen Dr. F. Bangerth Bavendorf, Krs. Ravensburg
	Plantation layout, cultivation techniques Analysis of enterprises, market forecasts Diseases and protection of fruit trees Quality analysis and fruit storage Engineering in fruit growing	Dr. F. Winter (Head) Dr. H. Janssen Dr. W. Kennel Dr. H. Link Ir. A. Mauch
25. Trier	Landes-Lehr- und Versuchsanstalt für Weinbau, Gartenbau und Landwirtschaft/ <i>Land Teaching and Experiment Station of Viticulture, Horticulture and Agriculture</i>	Egbertstrasse 18-19, Trier (Rheinland-Pfalz) Dir.: Dr. Th. Schrader Dep. Dir.: A. Eberz
25.1 General agriculture/horticulture	Horticulture	Dr. W. Steckel
26. Veitshöchheim	Lehr- und Versuchsanstalt der Bayerischen Landesanstalt für Wein-, Obst- und Gartenbau/ <i>Teaching and Experiment Station of the Bavarian Institute of Viticulture, Fruit Growing and Horticulture</i>	Postfach 49 8702 Veitshöchheim (Bayern) Dir.: Dr. H. Breider
26.1 General horticulture		
27. Weihenstephan	Fakultät für Landwirtschaft und Gartenbau der Technischen Hochschule München/ <i>Faculty of the Technological University Munich</i>	805 Weihenstephan bei Freising (Bayern)
27.1 General horticulture	Horticultural chairs and institutes:	
27.2 Vegetables	a. Institut für Gemüsebau/ <i>Institute of Vegetable Growing</i>	805 Freising-Weihenstephan Dir.: Prof. dr. P. D. Fritz Ass.: Dr. F. Venter/D. Mappes
27.3 Fruit	b. Institut für Obstbau/ <i>Institute of Fruit Growing</i> Problems of plant protection in fruit plantations, pruning, planting systems, testing of rootstocks and varieties of pome and stone fruit, influence of interstock on the variety, general problems in fruit tree rearing, cultivated bilberries. Problems of berry culture Vegetative propagation of woody fruit plants (rootstocks and varieties), variety trends in German fruit growing, utilization of growth regulators Problems of plant nutrition of pome and stone fruit in connection with quality and suitability for storage.	805 Freising-Weihenstephan Dir.: Prof. dr. G. Liebster Dr. G. Pessler H. Schimmelpfeng Dr. F. Matzer

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Weißenstephan (27) 27.4 Economics	c. Institut für Wirtschaftslehre des Gartenbaues/ <i>Institute of Horticultural Economics</i> Application of modern planning and calculation methods on production and investment planning in horticultural enterprises; adjustment of bookkeeping methods in horticulture to the requirements of modern planning methods; changes of prices of production means and their influence on horticultural production; comparison of the economic results of horticultural enterprises in West European countries; risk and uncertainty as factors influencing horticultural economics.	805 Freising-Weißenstephan Dir.: Prof. dr. H. Storck Ass.: Dr. Chr. Herrmann
27.5 Ornamental plants	d. Institut für Zierpflanzenbau/ <i>Institute of Ornamental Plant Growing</i> Ornamental horticulture under glass (pot plants and cut flowers). Ecology Publ.: Vogelmann, A: "Chrysanthemen" (ed. by Eugen Ulmer, Stuttgart, 1963).	805 Freising-Weißenstephan Dir.: Prof. A. Vogelmann Prof. A. Vogelmann
27.6 Garden and landscape design	e. Lehrstuhl und Institut für Garten- und Landschaftsgestaltung und Landschaftspflege/ <i>Chair and Institute of Garden and Landscape Design and Landscape Maintenance</i>	805 Freising-Weißenstephan Dir.: Prof. L. Schreiber Ass.: Ir. A. Henze/R. Wernicke
27.7 General horticulture	Staatliche Lehr- und Forschungsanstalt für Gartenbau/ <i>State Teaching and Research Establishment of Horticulture</i> 1. Training up to engineer in horticulture 2. Research and experimentation in the institutes mentioned below (27.8 - 27.16). Publ.: Annual report; publication of completed scientific work in scientific and horticultural journals; Information service for fruit growing and horticulture (monthly).	805 Freising-Weißenstephan Dir.: F. Mappes Dep. dir.: W. Frerichmann
27.8 Soil science, plant nutrition	a. Institut für Bodenkunde und Pflanzenernährung/ <i>Institute of Soil Science and Plant Nutrition</i> Plant nutrition and manuring of pot plants, cut flowers, vegetables, fruit, woody plants, media for ornamental horticulture, hydroponics.	805 Freising-Weißenstephan Head: Dr. F. Penningsfeld
27.9 Botany, plant protection	b. Institut für Botanik und Pflanzenschutz/ <i>Institute of Botany and Plant Protection</i> Problems of plant protection; chemical weed control; virus; fertilization; ecology in fruit growing.	805 Freising-Weißenstephan Head: Dr. K. W. Müller Ass.: Dr. T. Barg/J. Urchs
27.10 Garden and landscape design	c. Institut für Garten- und Landschaftsgestaltung/ <i>Institute of Garden and Landscape Design</i> Testing of ornamental plantations under different conditions.	805 Freising-Weißenstephan Head: W. Frerichmann
27.11 Horticultural management	d. Institut für Gärtnerische Betriebslehre/ <i>Institute of Horticultural Management</i> Evaluation of enterprises; investigations into the economics of enterprises; marketing problems; mapping of horticultural production in European countries	805 Freising-Weißenstephan Dr. Th. Steib (Head)/ G. Kirchgatter
27.12 Vegetables	e. Institut für Gemüsebau/ <i>Institute of Vegetable Growing</i>	805 Freising-Weißenstephan

Seat/Nature of program	Institution and projects	Address and staff
Continuation of 27.12	General problems of plant cultivation in the open and under glass	R. von Hösslin (Head)
27.13 Fruit	f. Institut für Obstbau/ <i>Institute of Fruit Growing</i>	805 Weißenstephan
	Planting systems for pome, stone and berry fruit; rootstock and variety testing	Dr. H. Kettner (Head)
27.14 Processing	g. Institut für Obst- und Gemüseverwertung/ <i>Institute of Fruit and Vegetable Processing</i>	805 Freising-Weißenstephan
	Fruit juices and ciders, fruit wines, liquid and frozen preserves, jams	Mrs. E. Holfelder (Head)
27.15 Perennials, woody plants, plant sociology	h. Institut für Stauden, Gehölze und angewandte Pflanzensoziologie/ <i>Institute of Herbaceous Perennials and Woody Plants, and Applied Plant Sociology</i>	805 Freising-Weißenstephan
	Survey and testing of varieties of herbaceous and woody plants and turfs for garden and landscape plant communities and landscape protection	Prof. dr. R. Hansen (Head)/ Dr. J. Sieber
27.16 Engineering	i. Institut für Technik im Gartenbau/ <i>Institute of Horticultural Engineering</i>	805 Freising-Weißenstephan Head: Dr. H. Hege
27.17 Ornamental plants	j. Institut für Zierpflanzenbau unter Glas/ <i>Institute of Ornamental Plant Growing under Glass</i>	805 Freising-Weißenstephan
	Cultivation techniques, decisions on cultural and varietal details, testing of provenance of pot plants and cut flowers	Prof. dr. J. Münch (Head)
28. Weinsberg	Staatliche Lehr- und Versuchsanstalt für Wein- und Obstbau/ <i>State Teaching and Experiment Station of Viticulture and Fruit Growing</i>	Hallerstr. 6, Weinsberg Krs. Heilbronn (Baden-Württemberg) Dir.: E. Klenk
28.1 Viticulture, fruit		
29. Wolbeck	Lehr- und Versuchsanstalt für Gartenbau der Landwirtschaftskammer Westfalen-Lippe/ <i>School of Horticulture and Horticultural Experiment Station of the Chamber of Agriculture Westfalen-Lippe</i>	Münsterstrasse 24, 4401 Wolbeck, Krs. Münster Head: H. Schulte-Scherlebeck
29.1 General horticulture		

Hungary



1. Budapest, 2. Debrecen, 3. Fertőd, 4. Gödöllő, 5. Kecskemét, 6. Keszthely, 7. Szeged, 8. Tápiószek, 9. Újfehértó.

General Survey

Horticultural research is carried out by departments of the independent Horticultural and Viticultural University, the Horticultural Department of the Agricultural University, the Horticultural Research Institute and some departments of the agricultural research institutes. The research work on viticulture and medical plant growing is carried out at special institutes, classified under horticulture, but these two aspects are not dealt with in this survey.

The above-mentioned institutes are supervised by the Ministry of Agriculture. The Department for Agricultural Science of the Hungarian Academy of Sciences has no horticultural research institutes of its own but gives special grants to some research projects and has a great influence on scientific education. Research work at the Horticultural and Viticultural University, the Horticultural Institutes and the Horticultural Department of the Agricultural University is mainly concerned with general problems in the field of horticulture, particularly with plant growing

and breeding. The other regional institutes mainly deal with growing and breeding problems in specific parts of the country. However, this system is not rigid for in some regional institutes advanced research is carried out on problems of general importance. The above-mentioned organization does not imply subordination of any institutes. The institutes come directly under the Ministry of Agriculture. The Education and Research Department of the Ministry prescribes projects directly to the Institute.

This decentralized system is bound together in collective project groups in which representatives of workers engaged in the principal research projects and representatives of growers collaborate.

The research projects are determined on the basis of proposals of these project groups, which also partly supervise the research work in progress.

The institutes have special farms for research and education where they make practical experiments and multiply the high-grade seed produced on the breeding farms. These estates are large, ranging from 500 to 2,000 ha.

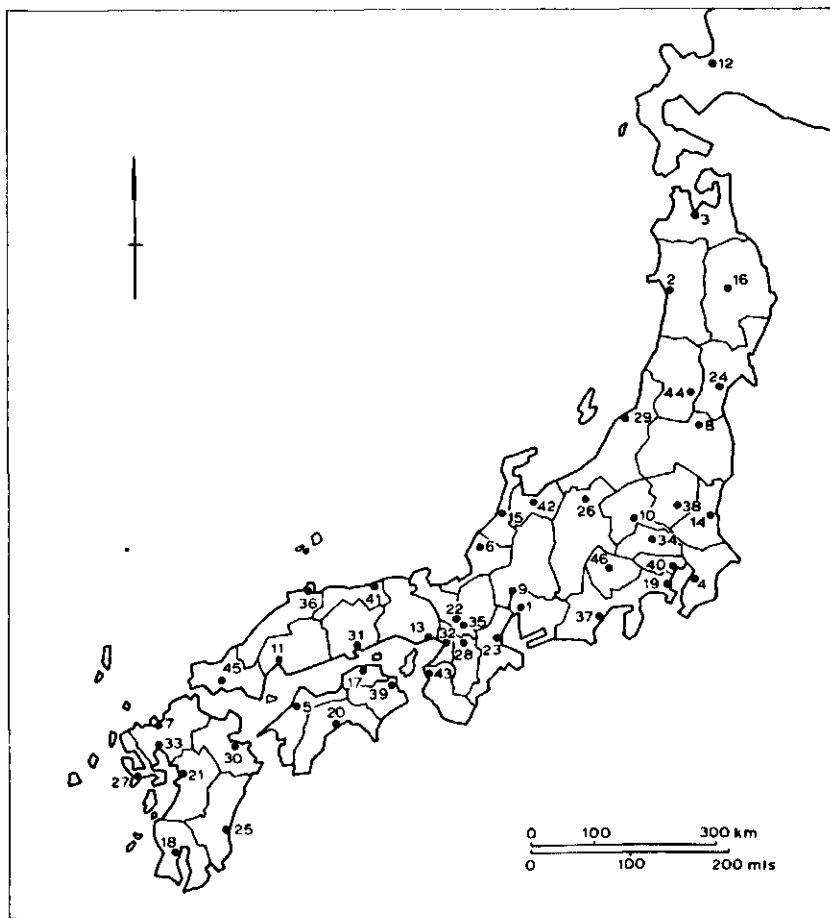
Seat/Nature of program	Institution and projects	Address and staff
1. Budapest	Kertészeti Kutató Intézet/ <i>Horticultural Institute</i>	Dósa György ut 2, Budatétény, Budapest XXII Dir.: Dr. L. Elek Dr. L. Elek
1.1 General horticulture	Fruit growing (economic problems) a. Biological Department Melon breeding Genetics (pollen sterility) Virology b. Department of Farm Management Farm management (forcing), glasshouses c. Department of Fruit Growing Growing of strawberries, black currants, apricots Fruit breeding (apple, peach); fertilization problems in fruit crops Plums Pomology Pear growing d. Department of Vegetable Growing Growing and breeding of onions, garden beet, lettuce Breeding for heterosis	Dr. B. Molnár (Head) A. Andrásfalvi M. V. Németh Dr. J. Maczák J. Rozsnyay (Head) Dr. P. Maliga E. Tóth Dr. S. Brózik Dr. P. Nagy Dr. M. Borka (Head) G. Asztalos
1.2 General horticulture	Kertészeti és Szőlészeti Főiskola/ <i>College of Horticulture and Viticulture</i> Education and research in all branches of horticulture and viticulture. a. Chair of Agriculture Green manure in horticulture Fertilization of early potatoes b. Chair of Botany Dendrology Dendrology, taxonomy of wild growing fruits Histology c. Chair of Chemistry Colour materials in wines; soil analytical methods Colour materials in wines Soil analytical methods d. Chair of Fruit Growing Nutritional problems and mulching in fruit growing, storage of apples and pears Intensive crown shapes and pruning methods Interspecific hybridization with peaches e. Chair of Genetics and Plant Breeding Breeding of fruits and vine for resistance Breeding of cucurbits f. Chair of Horticultural Economics Economics of viticulture Labour organization problems in the co-operatives Economics of the production under glass Economics of vegetable growing Economics of fruit growing g. Chair of Horticultural Engineering Soil cultivation on slopes; harvesting of soft fruits; mechanization in fruit growing and viticulture Glasshouses	Menesi ut 44, Budapest XI Rector: Prof. dr. P. Kozma Dr. T. Tóth Dr. I. Szabó Prof. dr. Z. Kárpáti Dr. A. Terpó Mrs. dr. L. Görgényi Prof. dr. I. Pais G. Gombkötő Mrs. K. Sik Dr. R. Boros Dr. F. Gyuró Dr. S. Kovács Prof. dr. I. Tamássy/ Dr. I. Koleda Dr. B. Barba/Dr. K. Mozsár/ Mrs. dr. A. Szőnyi Dr. I. Dezső Dr. I. Rédei Dr. L. Sőlyom Dr. M. Hankó I. Kopcsó Dr. K. Lammel Dr. J. Karay

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Budapest (1.2)	Harvesting of vegetables Seed cleaning	F. Mészáros/I. Szász L. Serf
	h. Chair of Landscape Architecture Planning of green belts Town and country planning Aesthetical problems in landscape architecture Planning of parks of recreation institutions Garden equipments Application of plants in landscape and garden Landscape architecture; technical problems	Prof. dr. I. Ormos Dr. M. Möcsényi Dr. A. Balogh L. Csöti J. Virág Mrs. dr. M. Möcsényi F. Mezey
	i. Chair of Microbiology and Food technology Microbiology of fruit and vegetable preservation; application of antibiotics in processing; effects of radiation in food storage Effect of radiation at processing and storage of horticultural products Enzymology	Prof. dr. K. Vas Mrs. Dr. E. Dobray Mrs. Dr. G. Kovács
	j. Chair of Nursery Rootstocks and intergrafting of apples and pears Seed production and stratification of stone fruits	Prof. dr. E. Probocskai Mrs. Dr. I. Sebők
	k. Chair of Oenology Ultrasonic treatment of wine specialities Wine production and treatment in the Hungarian Plain Stabilization of wines with early treatment	Prof. dr. L. Rakcsányi Dr. G. Kádár I. Eperjesi
	l. Chair of Ornamental Plants and Dendrology Selection of drought resistant grass species; selection of plants for light sandy soils; flower bulb growing; Pelargonium Growing and breeding of Chrysanthemum indicum Soilless culture; growing of Cyclamen persicum Perennial plants Selection of drought resistant trees and shrubs	Prof. dr. J. Domokos F. Incze B. Nagy M. Nádasz E. Sipos
	m. Chair of Plant Protection Entomology: Acaridae; sterilization of insects Pests of soft fruits; Diptera, Trypetidae Phytopathology	Prof. dr. S. Bognár Dr. G. Tóth Dr. S. Kaszonyi/M. Glits
	n. Chair of Soil Science Soil erosion; manuring problems on sandy soils Soil erosion in orchards, mulching	Prof. dr. Z. Fekete L. Zsoldos
	o. Chair of Vegetable Growing Forcing and early production of vegetables, nutritional problems, growing and breeding of peppers Plant propagation and breeding Medicinal plant growing, especially Matricaria chamomilla Light requirements of vegetables, mushroom growing Crop rotation in vegetable growing Temperature requirements of vegetables	Prof. dr. A. Somos Dr. L. Koródi Dr. J. Kerekes Dr. S. Balázs Dr. F. Tarjányi Dr. I. Filius
	p. Chair of Viticulture Breeding, biology of flowering and metabolism in vine Investigation of growing methods, pruning	Prof. dr. P. Kozma Dr. P. Csepregi

Seat/Nature of program	Institution and projects	Address and staff
Continuation Budapest(1.2)	systems, variety trials Varieties and cultural methods	Dr. J. Zilai
1.3 Processing	Konserv- és Paprikaipari Kutató Intézet/ <i>Research Institute for the Preserving and Paprika Industry</i> Fruit juices Technology Raw materials Vitamins Machinery Packaging Economics	Földvári ut 4, Budapest IX Dir.: Dr. E. Kardos Dr. E. Kardos Dr. S. Török Dr. G. Kilb Mrs. J. Kiszél Z. Zacher Dr. F. Balla Mrs. E. Szenes
1.4 Genetics	Magyar Tudományos Akadémia Genetikai Intézet/ <i>Institute of Genetics of the Hungarian Academy of Science</i> Genetics (tomatoes)	Herman Ottó ut 15, Budapest II Dir.: B. Györfy Dr. B. Györfy
1.5 Plant protection	Növényvédelmi Kutató Intézet/ <i>Research Institute for Plant Protection</i> Horticultural entomology Hymenoptera, diptera, Colorado beetle, ecology Aphididae, Coccidea Nematodes Mildew diseases Apoplexy in apricots Bacteriology Virology Mycology	Herman Ottó ut 15, Budapest II Dir.: Dr. G. Ubrizsy Dr. G. Reichart/Mrs. Dr. K. Vajna Dr. G. Szelényi Dr. L. Szalay Marzsó Mrs. I. Márk Dr. Z. Csorba Dr. B. Berend Dr. Z. Klement Dr. J. Szirmai/Mrs. Dr. A. Molnár/L. Beczner Mrs. M. Paizs
1.6 Propagation	Országos Mezőgazdasági Fajta-és Termelés-technikai Minősítő Intézet/ <i>National Institute for the Qualification of Agricultural Varieties and Production Techniques</i> - Department of Vegetable Crops - Department of Fruit, Vine and Ornamental Plants	Keleti Károly ut 24, Budapest II Dir.: Dr. S. Kapás Head: I. Komjáti Head: Dr. P. Tomosányi
2. Debrecen	Debreceni Agrártudományi Főiskola, Kertészeti Tanszék/ <i>Horticultural Experiment Station of Debrecen Agricultural College</i> Directed by the Chair of Horticulture of the Agricultural College. Breeding and purification of Brassicas and dwarf Canna; green manuring and agrotechniques of winter apple and Ribes grossularia; economic efficiency of the methods in vine-stock growing.	Debrecen, Pallag Head: Ass. prof. F. Radnóczy Head sci. staff: Gábor Preczner
2.1 General horticulture		
3. Fertőd	Növénynemesítési és Növénytermesztési Kutató Intézet/ <i>Institute of Plant Breeding and Plant Growing</i> Breeding and growing of soft fruit.	Fertőd Dir.:
3.1 Propagation		
4. Gödöllő	Agrártudományi Egyetem, Kertészeti Tanszék/ <i>Agricultural University, Chair of Horticulture</i> Irrigation of vegetable plants Fruit Growing	Gödöllő Prof. dr. L. Cselötei Dr. L. Csider
4.1 General horticulture		
5. Kecskemét	Duna-Tiszaközi Mezőgazdasági Kísérleti Intézet/ <i>Agricultural Experimental Institute for the Donau-Theiss Region</i>	P.O. Box 116, Kecskemét Dir.: Dr. G. Mészöly
5.1 General horticulture		

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kecskemét (5.1)	Tomato (breeding, resistance, growing) Tomato growing Cucumber and gherkin breeding Paprika breeding Tomato processing Melon breeding Tomato disease research Apricot and peach growing, arboriculture Apricot, peach, plum, apple and pear growing, irrigation Apricot, peach, sour cherry and apple pruning Apricot, peach and sour cherry growing	Dr. G. Mészöly B. Ráldy/A. Hodossi/K. Biró L. Körös L. Vukovich L. Bontovits A. Kiss A. Hódosy F. Nyujtó I. Csöbönyei L. Molnár J. Szögi
6. Keszthely	Mezőgazdasági Akadémia, Kertészeti Tanszék/ <i>Agricultural College, Chair of Horticulture</i>	Keszthely
6.1 General horticulture	Pruning of peach trees Heating of glasshouses Forcing of vegetables	D. Ferdinand Dr. I. Náfrádi J. Kovács
7. Szeged	Délalföldi Mezőgazdasági Kísérleti Intézet/ <i>South-Hungarian Agricultural Research Institute - Department of Horticulture</i>	Szeged Dir.: Dr. F. Sándor
7.1 General horticulture	Onion growing, breeding and machining Onion and root crop breeding Peach, strawberry and rose growing Biochemistry, capsaicin research Paprika breeding	J. Bruder (Head) Dr. F. Szalay Z. Visnyovszky Dr. L. Benedek I. Erdei
8. Tápiószele	Országos Agrobotanikai Intézet/ <i>National Institute for Agrobotany - Department of Horticulture</i>	Tápiószele
8.1 Botany	Collection of vegetable varieties (cultivars)	Dr. B. Koch (Head)
9. Ujfehértó	Nyírségi Mezőgazdasági Kutató Intézet/ <i>Agricultural Research Institute for Nyirseg - Department of Horticulture</i>	Ujfehértó
9.1 General horticulture	Apple growing, apple breeding, rootstock research	Dr. F. Pethő (Head)

Japan



Prefectures: 1. Aichi, 2. Akita, 3. Aomori, 4. Chiba, 5. Ehime, 6. Fukuoka, 7. Fukuoka, 8. Fukuoka, 9. Gifu, 10. Gumma, 11. Hiroshima, 12. Hokkaido, 13. Hyogo, 14. Ibaraki, 15. Ishikawa, 16. Iwate, 17. Kagawa, 18. Kagoshima, 19. Kanagawa, 20. Kochi, 21. Kumamoto, 22. Kyoto, 23. Mie, 24. Miyagi, 25. Miyazaki, 26. Nagano, 27. Nagasaki, 28. Nara, 29. Niigata, 30. Oita, 31. Okayama, 32. Osaka, 33. Saga, 34. Saitama, 35. Shiga, 36. Shimane, 37. Shizuoka, 38. Tochigi, 39. Tokushima, 40. Tokyo, 41. Tottori, 42. Toyama, 43. Wakayama, 44. Yamagata, 45. Yamaguchi, 46. Yamanashi.

General Survey

Regarding geographical features, Japan lies lengthwise from north to south with highly mountainous topographical characters and so the ecological conditions of the land vary extremely in each region. The kinds or varieties of cultivated crops and the methods used also vary from each other.

Considering the development of agriculture in Japan, rice, barley and wheat had been mainly cultivated and have been the main objectives of agricultural research, but after World War II, following changes in food habits and in social conditions, horticulture, as well as livestock have increased in importance. Fruit crops especially promise to be important crops that enable farmers to increase their incomes.

The growing area of fruit crops in Japan is calculated at about 272,000 hectares and the production attained is about 3,250,000 tons. This area is about twice that of twenty years

ago, and it is presumed that this will have doubled in the next ten years. The planted area of vegetable crops in Japan is about 530,000 hectares, and the production in 1960 was calculated at 10 million tons. It is estimated that production will have doubled by 1971.

Systematic research in horticulture started later than that for rice or wheat, reflecting the relative importance of horticulture in food habits in Japan, and thereafter, research continued by a limited number of workers, with a limited budget. And so, many problems, varying from region to region, had not been investigated experimentally until the last 10 years when the system underwent a rapid revolution.

In Japan, organizations for research, education and extension work concerning agriculture are not united in one body as in the state experiment stations in USA. In universities, which belong to the Ministry of Edu-



"Phytotron" of Horticultural Research Station (Min. of Agr. & Forestry) Hiratsuka, Japan. Established, December 1963.

cation, mainly fundamental problems are studied. Themes that are not mainly of local interest, or problems which require many workers, or which require a large budget are mostly conducted or studied in the horticultural research stations, which belong to the Ministry of Agriculture and Forestry. The application of the results of research conducted in these organizations, local problems that directly affect production in local places, are subjected to experiments in the prefecture horticultural experiment stations or in the departments of horticulture of the prefectural agricultural experiment stations. The extension services which are based on the results of the experiments performed in the above mentioned organizations are handled through the extension services of the Ministry of Agriculture and Forestry and of the prefectural stations or through the system of the private agricultural co-operations.

Universities

About forty universities in Japan have a faculty of agriculture or a faculty of horticulture. Fundamental research as well as education in the field of horticulture are the concern of these faculties. Among these universities, Tokyo University, Kyoto University, Hokkaido University and Kyushu University have assumed the leadership. The faculties of agriculture of these universities were established in 1890, 1924, 1918 and 1919 respectively.

The Horticultural Research Stations

In 1902, the Department of Horticulture of the Agricultural Experiment Station, located in Tokyo, was established at Okitsu, Shizuoka Prefecture, and this became independent as the Horticultural Research Station in 1921. From that time, as the only national institute for horticultural research, the Horticul-

tural Research Station has been the centre for horticultural research in Japan. Many experiments and studies have been performed here. A number of horticultural technicians has been trained in this station which has undertaken the role of technical service centre for a long period. After World War II, the headquarters of this station were removed to Hiratsuka, and Okitsu became one of three branch stations. In 1950, the stations were split up and were absorbed either into the National Institute for Agricultural Science or into the agricultural experiment stations of each region and became the departments of horticulture of that station. In 1961, they became independent again as the Horticultural Research Station, with the main station centred at Hiratsuka and with three branch stations, at Okitsu, Kurume and Morioka.

The Horticultural Research Station is the fruit breeding centre linked up with the prefectural experiment stations spread all over the country. Further it supervises the programming of the whole horticultural research and it also performs research and experimentation on basic problems in horticulture.

Prefectural experiment stations

Most of the prefectural experiment stations which belong to local governments were established during 1900 to 1910. Their activities are now of various forms: prefecture horticultural experiment station, fruit crops experiment station, or the department of horticulture of the prefecture agricultural experiment station. Now these organizations are required to be active as centres for technical extension services, and are required to carry out experiments concerning practical problems which relate directly with production in that region and extension works based on the experimental results obtained at various research organizations throughout

Japan.

Outline of horticultural research in Japan

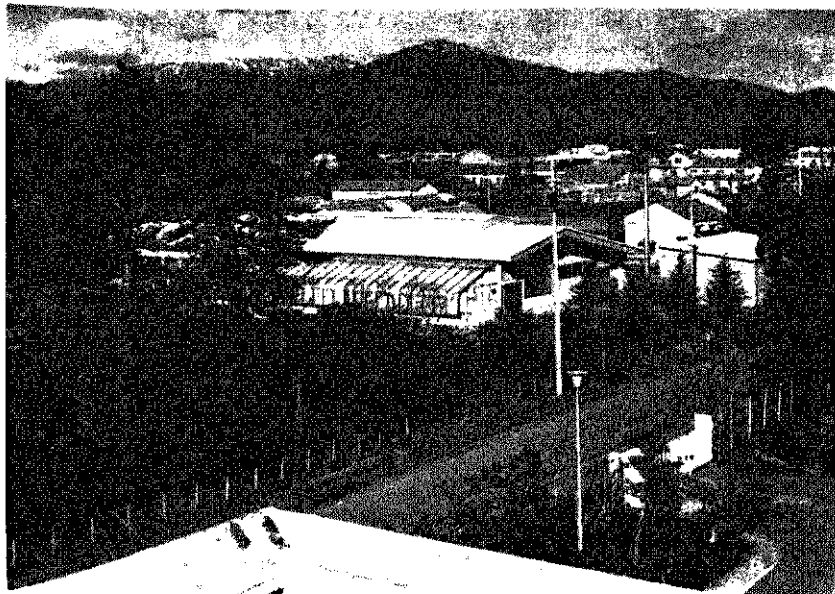
In the early stages of horticultural research, experiments were limited to fruit crops and systematic experiments on vegetables did not start until after World War II. Research concerning flowers started later than this, and though empirical experiments by amateurs had been performed since early days, it was only after World War II that systematic experiments were carried out by experiment stations.

Fruit crops. The period from the beginning of this century to World War I is also the period of introductions of horticultural techniques from Europe and America and of collecting varieties, testing their adaptability and studying methods of cultivation. Application of fertilizers was only experimental at this stage. In the next period, from World War I to World War II, pollination and fruit-setting, the chemical control of diseases and insects, as well as soil fertility, were subjects of experiments. Experimental results enabled production to increase and become stabilized; the fundamentals of cultivation methods that are suitable to Japan were established. Systematic breeding of fruit crops was also started in this period at Okitsu. After World War II, thinning and artificial pollination, and mechanization of chemical spraying were also subjected to experimentation and are now practised. Packaging with corrugated cardboard boxes was taken up as a post-harvest problem and has been put into practice. As a result of modernization in agriculture in recent years horticultural crops, especially fruit crops, have become increasingly important. Topics that are

being investigated at present are mentioned below. Research organizations are taking over part of these according to their nature.

Breeding of fruit crops is continued mainly in the Horticultural Research Station, Ministry of Agriculture and Forestry; peaches, Japanese pear, and chestnut are being studied at Hiratsuka, oranges and persimmon are taken the particular concern of Okitsu, and the breeding of apples at Morioka. The main objectives are: to breed canning peach varieties that are adaptable to the Japanese climate, which has high temperatures and a high humidity in summer; delicious Japanese pear varieties which are resistant to black spot; good chestnut varieties which are resistant to chestnut gall wasp; and apple varieties of high quality with good keeping qualities in storage. Chemical thinning and non-bag fruit culture are being experimented with to decrease cost and labour. Leaf analysis and other problems of nutrition physiology are being studied to decide on suitable applications of fertilizers. Methods of soil management are also being studied to maintain and to increase the soil fertility of orchards. Demonstrations on the control of insects and diseases, microbial control of fruit sucker moth, breeding of chestnut varieties resistant to chestnut gall wasp, control of root rot disease, and other various research work on chemicals are now being carried out.

In addition to these current problems, those which should be studied in the future are as follows: breeding of varieties of good quality which are resistant to insects or diseases, breeding of stock varieties of apple, Japanese pear and oranges, an investigation into climate and soil conditions which are



Horticultural Research Station at Hiratsuka. In the middle: phytotron. (Photo S. Nishi, January 1964).

suitable for fruit crops, practical application of chemical thinners, establishment of culture systems with large-sized machines, development and application of new type agents to control insects and diseases, forecast of insects and diseases, etc.

Vegetable crops. Before World War II, most cultural methods in vegetable crops were empirical and experiments had been limited to problems about breeding, seedling growing, and fertilization. The level of these experiments was incomplete. Only experiments on breeding of F_1 hybrids, performed during 1937-1944, obtained great success and were prominent throughout the world. After World War II, for the establishment of a production system of vegetables all-the-year-round, ecological studies of varieties and their suitable growing areas and practical use were experimented with first of all. Next, experiments on varietal classification and on the selection of suitable varieties for each culture-type were performed. After 1951, the utilization of vinyl film in vegetable growing introduced the differentiation of more intensive culture-types, and emphasized the many related problems about breeding and methods of culture. After about 1955, decrease of productivity, caused by poor management during World War II, had become outstanding in the old vegetable growing regions where production had been continuous since before World War II. To cope with this, soil and fertilizers, as well as control of diseases and insects were experimented with and based on these experiments, and research on breeding resistant varieties and rational soil management and fertilization, is now carried out not only in the field, but also in vinyl tunnels and in vinyl houses. And in the next period, with a view to enlarging vegetable production and to stabilizing vegetable supply which is apt to lose its stability owing to small scale management-research work for suitable climates, soil and ecological analysis were performed, and at the same time, aiming at the breeding of superior varieties, breeding of resistant varieties, quantitative inheritance, and breeding techniques were studied. Concerning the researches on the control of diseases and insects, experiments on new insecticides and fungicides as well as on seed sterilization and on nematodes have been undertaken. Absolute decrease in the agricultural popu-

lation caused by the affluence to the city has become a serious problem since 1960, and it has become necessary to decrease the amount of labour required in vegetable culture which had hitherto been conducted very intensively. As a theme for this problem studies were made on gravel culture, where it would be possible to change labour-intensive management into capital-intensive, as well as on the introduction of cultivating machines.

As to the problems of the future, with a view to enlarging and stabilizing the vegetable production and to rationalizing the management, breeding of superior varieties, especially varieties resistant to disease and insects, the control of virus diseases, nematodes, soil disease, etc. have to be studied. Simplifying growing crops from seed, rationalization of fertilizing, establishment of systems of mechanized culture must also be studied in order to rationalize the method of production and to increase the productivity of vegetable culture.

Floriculture. Research with flowers, both of the Japanese native flowers and of foreign flowers, had been the province of the experienced group of amateurs since the beginning, and little was done at first by systematic experiments. It may be said that the systematic studies on flowers were begun after World War II.

Now research work with flowers is performed in the prefectural experiment stations in flower productive regions, in universities throughout Japan, as well as in the Horticultural Research Stations of the Ministry of Agriculture and Forestry in Hiratsuka and Kurume. Experiments on tulip are the most numerous, and those on chrysanthemum and on lilies follow them. The most favorite topics are those about flowering control, followed by experiments on methods of culture and on varieties.

As to the problem of the future to enlarge the production of bulbs for export, breeding of superior varieties, the analysis of suitable conditions that affect bulb quality, the control of virus diseases, and the control of diseases in storage and in transportation are all subjects where research work has been requested. And in order to decrease the labour required, problems about automatic irrigation mainly in greenhouses, mechanization of field work, weed control, etc. must all necessarily be studied in future.

Seat/Nature of program	Institution and projects	Address and staff
Aichi	Aichi Prefectural Agricultural Experiment Station	Kiyosu-chō, Nishikasugai-gun, Aichi-pref. Dir.: M. Shiroyama
1.1 General horticulture	General horticulture - Flower Division Flower breeding, artificial light and flowering Breeding, hydroponics (chrysanthemum) - Vegetable Division Vegetable growing Mechanical cultivation of vegetables Vegetable breeding (tomato) Pre-cooling and pre-packaging Pathology Soil chemistry Soil chemistry, soil fertility and minor element nutrition Soil chemistry, vegetable fertilizer application Gamagōri Branch Fruit growing Citrus growing Toyota Branch Fruit growing, fertilization Plant pathology Fruit growing Processing, refrigeration Processing, raw crops growing, breeding (tomato) Biochemistry Chemistry Utsumi Branch Fruit growing Citrus growing, growth regulators Soil-water relationships, irrigation Citrus growing	Chief: S. Hayashi K. Yonemura Chief: K. Ishiguro K. Itō Y. Sakurai M. Aoyagi K. Ishigami K. Katō N. Shimada A. Takei Chief: F. Izawa H. Makino/K. Senga Chief: K. Tanaka M. Katsumine A. Kawabuchi/H. Shinoda I. Kamiya Y. Umeda Y. Ido Y. Tanaka Chief: T. Andō T. Suzuki I. Toyota M. Kaneko/T. Kimbara/ M. Sakakibara
1.2 General horticulture	Meijyo University, Laboratory of Horticulture Faculty of Agriculture Growing of vegetables, physiology and application of plant growth regulators (tomato) Ornamentals and landscape architecture Plant physiology (primrose) Publ.: Bulletin Fac. Agr. Meijyo University	Takagi-chō, Kasugaishi, Aichi-pref. Prof. T. Ishii Prof. H. Akita -
1.3 General horticulture	Nagoya University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Phytotron (66 m ²), consisting of 3 glasshouses of 3.6 x 3.6 m ² . Ranges of temperature: 13-30°C from April to October and 8-25°C from November to March, relative humidity 75%. Growing of vegetables, floriculture, flowering, breeding, reproduction (onion, Chinese cabbage, tulip, rose, orchid) Pomology, irrigation, propagation, leaf-analysis (Japanese pear, chestnut, persimmon, orchid) Growing of vegetables, floriculture, pithiness of root vegetables, flower colour (Chinese cabbage, radish, tulip, rose) Floriculture, breeding, propagation, self-incompatibility (tulip, lily, primula)	Koyama, Shinden-chō, Anjo, Aichi-pref. Prof. dr. M. Sisa Prof. dr. H. Torikata T. Takano H. Higuchi

Seat/Nature of program	Institution and projects	Address and staff
2. Akita	Akita Fruit Tree Experiment Station	Daigo, Hiraka, Hiraka-gun, Akita-pref.
2.1 Fruit	Pomology, propagation, pruning, fruit setting (apple) -Chemistry Division Soil fertility and fruit setting, leaf analysis, absorption of elements (apple) -Cultural Division Fruit setting, chemical thinning, physiological injury (apple, pear, peach, grape) -Phytopathology and Entomology Division Ecology of insect and disease, new chemicals screening Publ.: Annual Report	Dir.: K.Kon Chief: T.Yamazaki T.Niizuma Chief: H.Suzuki S.Tanno/K.Kanbe Chief: H.Narita S.Takahashi/N.Kagaya/ Y.Takahashi
2.2 Vegetables	Akita Prefectural Agricultural Experiment Station Agronomy, soil management (rice) -Horticultural Division Vegetable growing, mechanical cultivation (asparagus, lettuce) Publ.: Rep. Akita Pref. Agr. Exp. Station (irr.)	Araseki, Izumi, Akita, Akita-pref. Dir.: S.Tsukamoto Chief: D.Togashi T.Fujimoto/S.Akesawa
3. Aomori	Aomori Apple Experiment Station	Fukutami, Kuroishi, Aomori-pref.
3.1 Apples	Phytopathology -Chemistry Division Soil management, conservation of apple orchards, fertilization and nutrition of apples Fertilizer and plant nutrition section: Fertilization and nutrition of apples Soil improvement section: soil and water management and soil conservation, soil fertility of apple orchards, classification of soil -Cultural Division Pruning, orchard management, agricultural meteorology Breeding section: breeding of apples, graft injury and propagation Culture section: cultivation, storage of apples Economic section: farm management and marketing -Phytopathology and Entomology Division Control and forecasting outbreaks of apple diseases Entomology section: control of apple insects Phytopathology section: control and forecasting outbreaks of apple diseases Nanbu Branch Apple cultivation Cultural section Phytopathology and entomology section Publ.: Annual Report; Bull. Aomori Apple Exp. Station etc.	Dir.: Dr. J. Kimura Chief: Dr. J. Shibukawa Head: K. Nagai Head: M. Sōma Chief: Dr. S. Fukushima Head: M. Yamada Head: J. Miura Head: T. Hyūga Chief: C. Tsugawa Head: M. Yamada Head: S. Kudo Chief: T. Eto Head: Head: Y. Tanaka
3.2 Vegetables	Aomori Prefectural Agricultural Experiment Station Agronomy, breeding (rice) - Horticultural division Vegetable growing, physiology of flowering, ecology in cool climates (Allium) Do., forcing culture Vegetables for processing Vegetable growing Publ.: Bull. Aomori Pref. Agr. Exp. Stat. (ann.)	Sunamori, Kuroishi, Aomori-pref. Dir.: M. Tanaka Chief: K. Hirao S. Yokoi Y. Sakai Y. Mikami

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Aomori	Hirosaki University, Laboratory of Horticulture, Faculty of Agriculture	Bunkyo-chō, Hirosaki, Aomori-pref.
3.3 Fruit	Equipment: Environment control chamber, isotope room. Physiology of stock-scion relationship and propagation (apple) Physiology of fruit development (apple) Publ.: Bulletin Faculty of Agriculture Hirosaki University	Prof. N. Aoki I. Okuse Ass. prof. T. Kikuchi
4. Chiba	Chiba Prefectural Agricultural Experiment Station	Ōkanazawa-chō, Chiba, Chiba-pref.
4.1 General horticulture	Pomology, labour saving in fruit growing -Deciduous Fruit Division Production on the volcanic ash soil, pollen storage (Japanese pear), virus disease (Japanese pear) Sod culture, artificial pollination (Japanese pear), disease control (Japanese pear) N and P ₂ O ₅ fertilization, irrigation Labour saving, training and pruning -Vegetable Division Vegetable growing, grafting on disease resistant rootstocks Fruit abnormality in vinyl house cultivation of tomato, forcing of strawberry Seedling growing under unfavourable conditions, gravel culture (tomato), disease control Forcing of vegetables (cucumber, pepper) Awa Branch Breeding and seeding of lettuce and some other European vegetable crops Growing and breeding of the second crops of the low land (broad bean and green pea) Pomology, fruit productivity of citrus Storage and quality of Satsuma orange Loquat growing Quality of fruit (orange) Plant physiology of citrus Flower forcing of bulbs, corms and tubers (tulip, daffodil, lily, iris, calla, freesia) Carnation productivity and growing physiology	Dir.: S. Morita Chief: T. Noda H. Ishiwata S. Yoshiooka / S. Amma W. Hitokuwada Chief: K. Ishibashi A. Okada S. Ogiwara T. Toki Chief: Y. Inako / T. Sakai T. Togura S. Hirano S. Morioka S. Nakai Y. Nagato M. Iwata K. Hayashi Y. Hiraki
4.2 General horticulture	Chiba University, Faculty of Horticulture Disease control of horticultural crops Publ.: Techn. Bulletin Faculty of Horticulture, Chiba University (ann.) -Laboratory of Applied Entomology Piercing moth, mites and systemic insecticides -Laboratory of Floriculture Flower-bud differentiation and development of floricultural plants; nutrition of flowering crops Breeding of flowering crops Factors on the quality and yield of cut flowers with particular reference to spacing of plants; analysis of flower colour (particularly China aster and carnation) in relation to flower quality -Laboratory of Plant Breeding Breeding of horticultural crops -Laboratory of Plant Pathology Plant parasitic fungi, nematodes, virus and antibiotic chemicals -Laboratory of Pomology General pomology	Tojo, Matsudo, Chiba-pref. Dean: Prof. T. Kawamura Prof. dr. K. Nomura Prof. dr. K. Kosugi Ass. prof. E. Asayama M. Yokoi Ass. prof. R. Iwasa Prof. T. Kawamura / K. Hirao Prof. dr. K. Nagasawa

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Chiba (4.2)	Inducement of parthenocarpy, chemical thinning, physiology of fruit trees -Laboratory of Vegetable Growing Physiology and breeding of vegetables (tomato, cucumber, pepper) Seedlings culture and physiology of vegetables (tomato, cucumber) Physiology of vegetables, CO ₂ application (tomato, cucumber)	Ass.prof.dr.M.Cnō/ E.Takahashi Prof.dr.T.Fujii Ass.prof.dr.H.Watanabe T.Itō
5. Ehime	Ehime Prefectural Agricultural Experiment Station	Dōgo, Matsuyama, Ehime-pref.
5.1. General horticulture	Agricultural economics -Horticultural Division Vegetable growing, seedling beds, weed killers, labour saving in vegetable growing, forcing Labour saving in vegetable seedling growing, flower-bud differentiation Floriculture	Dir.S.Okada H.Akikawa K.Shinohara T.Nishibe
5.2 Fruit	Ehime Prefectural Fruit Tree Experiment Station Citrus growing Deciduous tree growing Soil, fertilizer and nutrition in citrus growing Disease and pest control in citrus Citrus breeding Management economics of citrus growing Soil and fertilizers Disease and pest control Machinery of citrus growing Iwaki Branch Disease and pest control in citrus growing General citrus growing Kihoku Branch Deciduous fruit tree growing Nanyo Branch Citrus growing Pest control Publ.: Annual Report and Bulletin	Higashino-chō, Matsuyama, Ehime-pref. Dir.: K.Yakushiji K.Yakushiji/M.Miyoshi/ T.Mukai/Y.Ishida M.Kubo/T.Yamanaka T.Sakamoto H.Ōmori K.Yamaguchi/H.Watanabe M.Yoshioka/A.Poi S.Okuchi S.Mori/F.Takechi A.Okazoe Chief: M.Zinno S.Akamatsu Chief: S.Kubo/T.Ikeda/ M.Onishi Chief: T.Maruki/A.Ōwada/ K.Funagami H.Matsumoto
5.3 General horticulture	Ehime University, Laboratory of Agronomy and Plant Genetics, Faculty of Agriculture Crop physiology, water relation and its control (citrus, cereals), breeding, disease resistance (Cucumis), pelargonium for perfume Breeding, cytology (cruciferous vegetables), pelargonium for perfume Physiology, stomata movement Publ.: Mem. of the Ehime University, Sec. VI (Agr.)	Tarumi-chō, Matsuyama, Ehime-pref. Prof.dr.T.Tamai Ass.prof.dr.S.Tokumasu S.Jodō
5.4 General horticulture	Ehime University, Laboratory of Horticulture, Faculty of Agriculture Pomology, histology, physiology of fruit development, physiological disorder of fruits and trees, minor element nutrition (citrus) Vegetable growing and floriculture, ecology of liliaceous plants, propagation of ornamental plants Publ.: Mem. of the Ehime Univ. Sec. VI (Agr.)	Tarumi-chō, Matsuyama, Ehime-pref. Ass.prof.K.Matsumoto/ K.Kadoya/H.Daito Ass.prof.T.Sento

Seat/Nature of program	Institution and projects	Address and staff
6. Fukui	Fukui Prefectural Agricultural Experiment Station, Aso Branch	Sanjyū-hassha-chō, Fukui, Fukui-pref.
6.1 <i>General horticulture</i>	Vegetable growing, vegetable cultivation in paddy fields, labour saving Vegetable nursery Vegetable ecology Floriculture, propagation (tulip)	Dir.: S. Kunitomi M. Kosuge M. Matsuyama A. Kurosawa
6.2 <i>Fruit</i>	Fukui Prefectural Agricultural Experiment Station, Hosorogi Branch Pomology, varietal trials and labour saving (peach, grape, Japanese pear) Do. (grape) Do., soil management (peach, apple, plum) Soil management, fertilizer application method Plant physiology, growth substances (grape, persimmon) Ripe-rot of grape Insects, nematodes Diseases, spray apparatus Physiology, breeding (grape) Physiology chemical thinning, replanting problems (peach) Do. (grape) Publ.: Annual Report	Kanazu-chō, Sakai-gun, Fukui-pref. Dir. T. Tanaka K. Tomita K. Tsuchiya N. Sakuma H. Nakada R. Yano I. Osada A. Harada/T. Tsuchiya T. Amemiya Y. Ymada/H. Hagiwara T. Shimizu
7. Fukuoka	Fukuoka Prefectural Agricultural Experiment Station, Horticultural Branch	Kashihara, Fukuoka, Fukuoka-pref.
7.1 <i>Fruit</i>	Pomology, general cultivation, breeding, physiology (grape, peach, Japanese pear) Entomology Phytopathology Fruit tree growing (persimmon, chestnut) Breeding and cultivation (grape) Do. (Japanese pear, chestnut) Soil and fertilizer application Chemistry of orchard soil Chemistry of greenhouse soil Citrus breeding, growing (chestnut) Citrus growing, physiology, analysis of carotenoids Buzen Branch Agronomy Deciduous fruit trees, varietal adaptation Processing of horticultural products Publ.: Annual Report	Dir. T. Ōta M. Miyahara S. Tanaka M. Hashino F. Hamachi A. Morita H. Hatanaka Y. Nakajima A. Ōgami T. Kuriyama/M. Shimosako S. Shiraishi Chief: T. Ishino K. Mitsuzawa/I. Emura N. Naitō
7.2 <i>General horticulture</i>	Horticultural Research Station (Ministry of Agriculture and Forestry), Kurume Branch Vegetable growing, plant physiology, nutrition, gravel culture, nursery -Education of Horticultural Technicians Carrot, onion, oriental melon Carrot, cauliflower, Welsh onion -Laboratory of Floriculture: breeding, propagation and physiology Azalea, lily Lily Azalea -Laboratory of Fruit Injurious Insects Biological control of insect pests Biology of mites -Laboratory of Pomology Deciduous fruit trees	Mii-machi, Kurume, Fukuoka-pref. Dir.: Dr. K. Yamasaki Dr. K. Yamasaki Head: H. Katsumata Y. Matsuo Dr. T. Tamura M. Suzuki M. Kunishige Head: M. Tanaka K. Inoue Head/T. Matsuo/K. Kawase

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Fukuoka (7.2)	Citrus -1st Laboratory of Vegetable Crops: genealogy, inheritance and breeding Cucumber, radish Watermelon, herbicides Melon, cabbage Cucumber, tomato -2nd Laboratory of Vegetable Crops: cultural improvement, vegetable nutrition and breeding Tomato, strawberry, pea Strawberry nutrition Pea nutrition Tomato Kutchinotsu Station Late maturing oranges and citrus Citrus culture	T.Kozono Head: K.Fujieda K.Ito M.Ashizawa S.Matsuo Head: M.Yamato F.Honda S.Okitsu H.Yasui Head: T.Shichijo N.Okudai/J.Kobachi
7.3 General horticulture	Kyushu University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Phytotron (246 m², 6 glassrooms, 5 artificial lighted (1,000-10,000 lux) dark rooms and a glassroom equipped with windtunnel (Goettingen type), temperature range 15-30°C during day-time, 13-25°C during night hours. Cytogenetics and breeding (Brassica and related species), immunosystematic studies (citrus, bean), plant physiology (sugar beet, cucumber) Genetics and breeding of ornamentals (Antirrhinum, Begonia subtropical plants) Physiology (citrus, bean) Genetics and breeding of vegetables (Brassica and related species, Allium, Colocasia) Physiology of gibberellins (grape), artificial polyploidy (Japanese pear, loquat) Publ.: J.Fac.Agr.Kyushu Univ. (semi-ann.)	Hakozaki, Fukuoka, Fukuoka-pref. Prof.dr.E.Fukushima Ass.prof.dr.S.Uemoto Dr.T.Matsui Dr.S.Iwase S.Muranishi
8. Fukushima	Fukushima Prefectural Horticultural Experiment Station	Hirano, Iizaki-machi Shinobu-gun, Fukushima-pref.
8.1 General horticulture	General horticulture, pomology, breeding -Fruit Tree Division Growing of deciduous fruit trees -Horticultural Processing Division -Phytopathology and Entomology Division Disease and pest control of deciduous orchards, nematodes -Vegetable Division Vegetable growing and breeding Iwaki branch Vegetable growing Publ.: Annual Report	Dir.: Dr.H.Iwagaki Chief: K.Yamane Chief: R.Satō Chief: K.Fndō Chief: H.Kimura Chief: H.Kōno
9. Gifu	Gifu Prefectural Agricultural Experiment Station	Matamura, Gifu, Gifu-pref.
9.1 General horticulture	Agronomy -Horticultural Division Vegetable growing and breeding, polyploidy (watermelon, Chinese cabbage), induced mutations (onion, egg plant) Vegetable breeding (watermelon, tomato, egg plant), vegetable growing under plastic film Vegetable breeding (Chinese cabbage, cabbage, onion), embryo culture	Dir.: K.Kubota Chief: Dr.K.Takasugi S.Shiraki T.Uematsu

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Gifu (9.1)	Fruit tree breeding, chemical thinning (persimmon) Plant protection in orchards (persimmon), improvement of pruning Floriculture, breeding, physiology of flowering, propagation Breeding of flowers (Chrysanthemum, primrose) plant growth regulators - Nan-nō Branch Vegetable forcing under vinyl film, plant growth regulators, gravel culture	T.Horiguchi T.Gō S.Koyasu K.Kimura
9.2 General horticulture	Gifu University, Laboratory of Horticulture, Faculty of Agriculture General horticulture, sap-stress of fruit trees, soil sickness of vegetable crops (persimmon, taro) Physiology of floral initiation, vernalization of vegetable crops, plant growth regulators, breeding of vegetable crops (Cruciferous vegetables, spinach) Fruit growing, growth of fruit (persimmon) Publ.: Res.Bull. of Fac. of Agr. Gifu Univ.	Chief: M.Takada T.Kuwahara Monzen-chō, Naka, Kakamigahara, Gifu-pref. Prof.K.Atumi Ass.prof.dr.A.Kagawa M.Nakamura
10. Gumma	Gumma Prefectural Agricultural Experiment Station, Kizaki Vegetable Trial Branch	Kizaki-shinmei-chō, Nitta-machi, Nitta-gun, Gumma-pref. Dir.: Y.Oshika
10.1 Vegetables	Vegetable growing, forcing, vinyl film utilization, vernalization Breeding of cucumber Strawberry culture, seedling growing Breeding of egg plant, vinyl house Vegetable growing in highland area, vegetable pests Publ.: Annual Report	S.Ōno H.Ōta A.Nishide K.Kurihari
Hiratsuka	see 19.1 Kanagawa	
11.Hiroshima	Hiroshima Prefectural Agricultural Experiment Station	Saijyō-Chō, Kamo-gun, Hiroshima-pref. Dir.: Y.Nakano
11.1 Fruit	General horticulture Deciduous Fruit Tree Division: mainly grapes, Jap.pear, peach, Jap.persimmon and chestnut Synthetic research of deciduous fruit culture and management Physiology of fruit trees, especially nutrition and moisture Establishment of orchards and physiology of pomiculture Physiology of fruit trees, especially soil and nutrition Pest and disease control Chemical control of fruit culture Publ.: Annual Report	Chief: C.Yoshihara C.Yoshihara M.Endō H.Kobayashi Y.Kurokawa S.Ogasawara Y.Kambara
11.2 Citrus	Hiroshima Prefectural Agricultural Experiment Station, Citrus Branch General horticulture Physiology of citrus Ecology and control of insects Improvement of cultural methods Phytopathology Breeding	Kihara-machi, Mihara, Hiroshima-pref. Dir.: T.Ishii T.Watanabe K.Sadai Y.Iiya/T.Akimoto A.Sasaki K.Sakai
11.3 General horticulture	Hiroshima Prefectural Agricultural Experiment Station, Kabe Horticultural Branch	Nakano, Kabe-machi, Asa-gun, Hiroshima-pref.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Hiroshima (11.3)	Vegetable growing, gravel culture Water physiology of vegetable crops Ecological studies on vegetable varieties (cauliflower, lettuce, strawberry, tomato) Plant physiology, weed killers Seed growing (onion, spinach) Physiology of flowering of bulb and tuber crops Physiology flowering (Chrysanthemum) Publ.: Annual Report	Dir.: S. Matsuda A. Okimoto T. Watahara J. Ootomo T. Matsuda H. Shino H. Korematsu
12. Hokkaido	Hokkaido Central Agricultural Experiment Station	Hachiken, Kotoni, Sapporo (in near future: Kita-Naganuma), Hokkaido
12.1 General horticulture	Agronomy General fruit growing, frost hardiness, rootstocks of apple and grape Vegetable growing, varietal trials (tomato, carrot, strawberry, cabbage, onions), weed control Processing (fruit, vegetables) General fruit growing (apple, grape, peach, pear) Fruit growing (small fruit, cherry, plum) Vegetable growing, breeding (spinach, strawberry, celery) Processing - Donan Agricultural Experiment Station, Horticultural Section General horticulture Fruit growing (apple, Japanese pear, peach, grape) Vegetable growing (Chinese cabbage, cabbage, tomato) Vegetable growing - Ebeetsu Apple Testing Field Apple growing - Gano Testing Field Lily breeding Publ.: Rep. Hokkaido Centr. Agr. Exp. Stat.; Bull. Hokkaido Centr. Stat.	Dir.: K. Mishima Chief: Dr. N. Akabane F. Takahashi T. Yamazaki S. Hosogai H. Watanabe H. Dohi T. Taga Chief: K. Araki S. Shirogane H. Tsuchiya K. Sawada/T. Inuzuka Chief: S. Hosogai/ T. Minegishi/R. Ogano Chief: K. Yamaya
12.2 General horticulture	Hokkaido National Agricultural Experiment Station Equipment: Phytotron, isotope chamber - Laboratory of Fruit Production Pomology, fruit tree growing and breeding, chemical thinning of flowers and fruits (apple and small fruits) Chemical thinning of flowers and fruits (apple) Fruit storage and processing (apple, small fruits) Insecticides and fungicides application (apple) - Laboratory of Vegetable Crops Cytogenetics, flowering, plant growth regulators (cucurbits, cucumber, asparagus) Vegetable growing and breeding (asparagus, spinach, strawberry) Genetics, flowering, biometrics (tomato, eggplant) Vegetable growing and breeding (onion, carrot) Plant growth regulators (cucumber) Publ.: Res. Bull. Hokkaido Nat. Agr. Exp. Stat.; Rep. Hokkaido Nat. Agr. Exp. Stat.	Hachiken, Kotoni, Sapporo, Hokkaido Chief: K. Miyashita/ E. Sōma S. Tachibana M. Sato S. Ikeuchi Chief: Dr. H. Hayase Dr. T. Hanaoka Dr. S. Komoti M. Nagai M. Tanaka
12.3 General horticulture	Hokkaido University, Laboratory of Horticulture, Faculty of Agriculture	Nishi-9, Kita-9, Sapporo, Hokkaido

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Hokkaido (12.3)	General horticulture: morphology and physiology (asparagus, yam), keeping quality in storage (apple) Factors on flowering of vegetables (Cucurbits), keeping quality in storage (apple) Vegetable growing, morphology and physiology (yam, asparagus, allium) Flowering and ornamental plant breeding, propagation (lily) Chemistry of flower colour, propagation (dahlia) Physiology of growth (tulip) Publ.: J. Fac. Agr. Hokkaido Univ.; Mem. Fac. Agr. Hokkaido Univ. (ann.)	Prof. dr. E. Sawada Ass. prof. dr. T. Tamura Dr. T. Yakuwa Prof. dr. H. Myodo Ass. prof. M. Okumura H. Chōno
13. Hyōgo 13.1 General horticulture	Hyōgo Prefectural Agricultural Experiment Station Agronomy, breeding (wheat) - Horticultural Division Vegetable breeding, plant growth regulators Chemistry section Horticultural products utilization Food technology laboratory Ornamental section Ornamental culture and breeding Ornamental culture and breeding, propagation (bulbs) Culture and gravel culture Ornamental culture Vegetable section Vegetable growing, breeding (strawberry) Vegetable breeding (strawberry) Vegetable breeding (cabbage, onion), gravel culture Vegetable culture - Awaji Branch Citrus culture Fruit tree growing Ornamental culture Vegetable culture - Kande Branch Fruit culture - Tajami Branch Fruit tree growing (pear) Fruit culture Vegetable culture and management Vegetable growing - Takarazuka Branch Vegetable culture Vegetable culture and breeding Ornamental culture Publ.: Annual Report	Kitaōji-chō, Akashi, Hyōgo-pref. Dir.: T. Fukumoto Chief: J. Itō Chief: S. Akuta T. Murayama/M. Sawa Chief: T. Fujimura S. Fujioka M. Fujino K. Inagaki Chief: H. Fujimoto Y. Ōmori T. Mori H. Kobayashi Chief: S. Sunagawa/T. Tanigushi/H. Koshio S. Kanda H. Okudono H. Ikegami T. Nakaoka/I. Maeyama/ T. Kabumoto/N. Nishitani K. Ōhashi M. Kitagaki S. Shibata Y. Ikeuchi Chief: K. Hamada/N. Nishida T. Kitano I. Onohara
13.2 General horticulture	Hyōgo University of Agriculture, Laboratory of Horticulture Equipment: Growth chamber Vegetable growing and ornamental crops; breeding and biometrics Physiology of vegetables (onion) Breeding and physiology (ornamental crops) Physiology and nutrition of fruit trees (loquat, chestnut)	Sasayama, Takigun, Hyōgo-pref. Prof. dr. N. Nakamura Ass. prof. M. Terabun S. Maekawa Ass. prof. M. Tsukamoto

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Hyōgo (13.2)	Physiology of cold resistance (chestnut) Physiology and nutrition of fruit trees (chestnut) Publ.: Sci.Rep.Hyōgo Univ.Agr. (ann.); Mem.Hyōgo Univ.Agr.	Ass.prof.M.Sawano T.Ichii
14. Ibaragi	Ibaragi Prefectural Agricultural Experiment Station	Ami-machi, Inashiki-gun, Ibaragi-pref.
14.1 General horticulture	Equipment: Series of temperature control refrigerator type incubators, field insectary. Pomology, propagation - Environment Division Horticultural pests Phytopathology Soil and fertilizers Plant physiology Publ.: Annual Report	Dir.: S.Iwasa S.Iwasa Chief: K.Sekiguchi/ Y.Kimura K.Uchida/S.Yoneyama E.Komatsu Y.Ishizuka
14.2 General horticulture	Ibaragi University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Isotope laboratory of semi-high level. Problems on transplanting deciduous fruit trees (persimmon) General vegetable growing Publ.: Bull.Ibaragi Univ.Agr.Sci. (ann.)	Ami-machi, Inashiki-gun, Ibaragi-pref. Prof.M.Izaki Ass.prof.A.Itakura
14.3 Radiation breeding	Institute of Radiation Breeding Equipment: Gamma-field: a circular field with radius of 100 m, ^{60}Co source of circa 3,000 curie in the centre of the field. The field is surrounded with a defensive dike of 8 m height. Gamma greenhouse: octagonal greenhouse with radius of circa 7 m, ^{137}Cs of 130 curie is placed in the centre. Radiation breeding (citrus, tomato, asparagus) - Horticultural Division Radiation breeding fruit trees (citrus, apple, persimmon) Radiation breeding tomato, onion, cabbage Radiation breeding roses, chrysanthemum, abelia Publ.: Gamma-field symp. (ann.)	Ōmiya-machi, Naka-gun, Ibaragi-pref. Dir.: K.Kawara K.Kawara Head: T.Nishida K.Yamakawa K.Nakajima
14.4 General horticulture	Takii's Plant Breeding and Experiment Station, Ibaragi Experiment Station Vegetable breeding (cruciferous crops, tomato, cucumber, onion) - Ibaragi Experiment Station Cucumber, cabbage, Chinese cabbage Radish, turnip, carrot Peach, persimmon, chestnut, Japanese pear Rose, carnation, chrysanthemum Publ.: Bull.Takii's Plant Breeding and Exp. Stat. (irr.)	Ushiko-chō, Ibaragi-gun, Ibaragi-pref. Dir.: Dr.S.Itō K.Kunimasa H.Fukushima I.Yamano T.Yoshida
15. Ishikawa	Ishikawa Prefectural Agricultural Experiment Station	Nakabayashi, Nonoichi-machi, Ishikawa-gun, Ishikawa-pref.
15.1 General horticulture	Agronomy	Dir.: R.Nakagawa

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ishikawa (15.1)	- Horticultural Division - Vegetable growing - Fruit tree growing - Unoke Branch - Vegetable growing (yam, melon) - Do. (asparagus, tomato) - Do. (Welsh onion) - Publ.: Annual Report	Chief: M.Ogawa/Y.Yamaguchi K.Shiozawa/K.Inaba Chief: S.Munehiro T.Nakazawa K.Nishino
16. Iwate	Horticultural Research Station, (Ministry of Agriculture and Forestry), Morioka Branch	Nabeyasshiki, Shimokuriyagawa, Morioka, Iwate-pref.
16.1 General horticulture	Pomology, nutrition of fruit trees, water culture of apple, N-nutrition - Laboratory of Entomology: ecology and control of fruit pests, insect association in apple orchard (spider mite, peach fruit moth, leaf roller) - Laboratory of Fruit Nutrition: mineral nutrition, N and Ca nutrition, foliar analysis - 1st Laboratory of Fruit Trees: breeding of deciduous fruit (apple), rootstock, injury caused by grafting, inheritance of apple characters, artificial pollination - 2nd Laboratory of Fruit Trees: plant physiology, physiology of flowering, inheritance of apple characters, chemical thinning, quality of fruit, orchard mechanization - Laboratory of Plant Pathology: fruit tree pathology, soil borne diseases, fungus diseases - 1st Laboratory of Vegetable Crops: breeding and inheritance of vegetable crops, varietal trial, cold resistance, cultural practice (tomato, strawberry, Chinese cabbage, cabbage) - 2nd Laboratory of Vegetable Crops: plant physiology, nutrition of vegetables, cultural practice, phytohormon, weed control, mechanization (tomato, strawberry) Publ.: Bull.Hort.Res.Stat.(Min.Agr.For.) ser. C, Morioka (ann.)	Dir.: Dr.H.Mori Head: H.Sugawara/K.Homma/ T.Ujie/M.Wako Head: T.Suyama/H.Yokomizo/ S.Takeuchi Head: S.Sadamori/Y.Yoshida/ S.Tsuchiya/T.Hanyūda Head: E.Kawamura/T.Kubota/ H.Fukuda/Y.Yamane Head: Y.Hoshino/K.Sawamura/ H.Yanase/K.Takahashi Head: S.Kamimura/T.Takai/ K.Ito Head: I.Abe/S.Henmi/ N.Seyama/T.Fndo
16.2 General horticulture	Iwate Prefectural Horticultural Experiment Station General horticulture: breeding, physiology and pest control - Fruit Tree Division - Physiology and breeding - Physiology and breeding of deciduous fruit trees (grape) - Pest control and plant pathology - Pest control - Physiology and breeding (apple) - Fruit tree nutrition, chemical analysis - Vegetable and Flower Division - Breeding, physiology of vegetables and flowers - Breeding and growing of vegetables - Flower growing - Vegetable growing - Nanbu Branch - General horticulture - Vegetable growing - Publ.: Annual Report	Narita, Iitoyo-chō, Kitakami, Iwate-pref. Dir.: S.Itō Chief: S.Segawa S.Jin H.Sekizawa/T.Hiraragi M.Kobayashi H.Kanno A.Itō Chief: K.Ono K.Takahashi T.Yoshiike S.Iwadate Chief: R.Matsumoto K.Kanno

Seat/Nature of program	Institution and projects	Address and staff
16.3 Vegetables	Iwate University, Laboratory of Horticulture, Faculty of Agriculture Genetics, vegetative hybrids (tomato) Publ.: J.Fac.Agr.Iwate Univ. (twice a year)	Ueda, Morioka, Iwate pref. Prof. J. Kasahara/T. Nakamura/Y. Yoneyama
17. Kagawa 17.1 General horticulture	Kagawa Prefectural Agricultural Experiment Station Agronomy (rice, beet) Horticultural Division Vegetable growing, factors affecting the yield (watermelon, squash) Grafting of vegetables, labour saving in vegetable growing Vegetable growing in vinyl-house (tomato, cucumber and lettuce) Gravel and sand culture of vegetables and flowers Vegetable seed raising Publ.: Annual Report	Bussshozan-chō, Takamatsu, Kagawa-pref. Dir.: K. Suezawa Chief: K. Ota K. Miyawaki M. Katai T. Suekane/Y. Sasaki K. Kawakita
17.2 General horticulture	Kagawa Prefectural Agricultural Experiment Station, Shōzu Branch Utilization and processing of olives and vegetables Physiology and breeding of olive, improvement in olive cultivation Propagation of olive, care of olive orchard Weed control, sweet potato, potato Vegetables for canning and processing, spices Floriculture Publ.: Annual Report	Ikeda, Ikeda-chō, Shōzu-gun, Kagawa-pref. Dir.: N. Kasai N. Kasai/Y. Anabuki H. Miki S. Miki Y. Hagimori Y. Kawanishi K. Kimura
17.3 General horticulture	Kagawa University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Electron microscope; environment controlling chamber (temperature, humidity, intensity of illumination, day length and soil temperature); infra-red analyses. Growing and seed production of vegetables, tropical horticulture (pine apple) Vegetable growing, flowering and breeding (watermelon, cucurbits, carrot, onion) Vegetable growing, physiology of seed germination, inhibiting substance (carrot) Pomology, fruit physiology in relation to water, physiology and ecology of fruit trees on sloping orchards, drought injury and irrigation of orchards Pomology, physiology and morphology (citrus) Pomology, colouration of fruits (persimmon) Asymbiotic germination of orchids Technology on horticultural products, utilization of persimmon fruits, chemistry of pectic substances Publ.: Techn. Bull. Fac. Agr. Kagawa Univ. (twice a year); Mem. Fac. Agr. Kagawa Univ. (irr.)	Ikeda, Miki-machi, Kida-gun, Kagawa-pref. Prof. dr. S. Watanabe Ass. prof. H. Kurata S. Aki Prof. dr. M. Ashizawa Ass. prof. H. Inoue T. Chūjo Ass. prof. K. Karo Ass. prof. dr. T. Tarutani/ M. Menabe
18 Kagoshima 18.1 General horticulture	Kagoshima Prefectural Agricultural Experiment Station Agronomy, breeding (rice) - Horticultural Division Vegetable breeding (pea, cucumber, egg plant, radish) Vegetable physiology, gravel culture (tomato, cucumber, melon, watermelon)	Kamifukumoto, Taniyama, Kagoshima-pref. Dir.: T. Harada Chief: T. Ōta R. Miyaji

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kagoshima (18.1)	Floriculture, breeding, growing (lily, iris, freesia, gladiolus) Vegetable breeding (pea, cucumber, radish) Publ.: Annual Report	M. Kobayashi Y. Ōno
18.2 General horticulture	Kagoshima Prefectural Agricultural Experiment Station, Oshima Branch Agronomy - Horticultural Division Tropical fruit trees, varietal trials, mulching (pineapple), ecological studies (banana, papaya) Citrus growing Vegetable growing, seed growing, breeding, weed killer, forcing	Uragami, Naze, Kagoshima-pref. Dir.: T. Yoshikuni K. Akizuki T. Kanō M. Shimo/S. Sakoda
18.3 Fruit	Kagoshima Prefectural Pomiculture Experiment Station Breeding, rootstock growing, propagation Orchard management, ecological study, fruit storage (citrus) Pest and disease control, forecast of outbreaks of diseases and pests, testing new chemicals Subtropical fruit trees, rootstock breeding, pruning (citrus) Tropical fruit trees, soil management, weather injury Management of orchards, fruit storage Fruit tree breeding Pest and disease control Publ.: Annual Report	Honjyō, Tarumizu, Kagoshima-pref. Dir.: I. Miyazaki A. Shikura M. Kōno I. Sakamoto M. Kojima C. Hatanaka S. Arizono M. Nagahama
18.4 General horticulture	Kagoshima University, Laboratory of Horticulture, Faculty of Agriculture Pomology (citrus) Vegetable growing, male sterility (radish) Publ.: Mem. Fac. Agr. Kagoshima Univ. (ann.), Bull. Fac. Agr. Kagoshima Univ. (ann.)	Uerata-chō, Kagoshima, Kagoshima-pref. Prof. S. Nakamura Ass. prof. H. Ogura
19 Kanagawa	Horticultural Research Station (Ministry of Agriculture and Forestry)	Nakahara, Hiratsuka, Kanagawa-pref.
19.1 General horticulture	Equipment: Phytotron, covering 868.8 m ² and consisting of 6 glassrooms, 4 artificially lighted (7,000-15,000 lux) dark rooms and 2 dark rooms of low temperature. Temperature ranges of glassrooms during day-time 10-32°C and during night hours 8-25°C and of dark rooms 8-35°C when lighted and 8-25°C during the dark period. Temperature in low temperature dark rooms -5 unto -2°C and 3 unto 9°C respectively. Humidity of glassrooms 70-95% and of lighted rooms 70%. Pomology, breeding Department of Environment -Laboratory of Entomology: pest control in orchards, forecasting outbreaks of pests, ecology of insects -Laboratory of Orchard Meteorology: survey of favourable climatic conditions for orchards, weather injury of orchard -Laboratory of Orchard Soil: soil fertility and fruit productivity, method of soil management, sod culture, soil survey for orchard, physical properties of soil	Dir.: Dr. M. Kajiura Dr. M. Kajiura Head: Dr. H. Kitajima Head: N. Obo/dr. T. Shin-kaji/dr. Y. Murakami Head: Y. Nakagawa/T. Iwasaki/A. Sumita Head: T. Itakura/Dr. K. dr. K. Sekiya/K. Aoba/ K. Suzuki

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kanagawa (19.1)	- Laboratory of Plant Pathology: fruit tree diseases, forecasting disease outbreaks Department of Pomology General cultivation and nutrition - Laboratory of Breeding Techniques: studies on the basic problems in deciduous fruit tree breeding, flowering and fruit-setting, plant growth regulators, embryo culture, cytology - Laboratory of Fruit Tree Breeding: breeding of deciduous fruit trees and methods of breeding, peaches for processing, chestnut gall resistance, rootstock breeding, quality of Japanese pear - Laboratory of Fruit Tree Growing: plant physiology, nutrition, leaf analysis, foliar spray, water culture of Satsuma orange - Laboratory of Processing: method of processing, quality of materials, canning of peach and chestnut Department of Vegetable Crops Breeding (cruciferous vegetables) - Laboratory of Breeding Techniques: theory and breeding techniques for vegetables, interspecific hybrids, matroclinous hybrids, embryo culture, propagation, inheritance of quantitative characters, sex expression, growth regulators, gametocides, weed killers (Cruciferae, tomato, cucumber, spinach, peanut) - Laboratory of Floriculture: plant physiology, physiology of flowering, forcing of bulb flowers, vernalization of freesia, lily breeding, embryo culture - Laboratory of Nutrition: Plant physiology, absorption of nutrient elements, soil fertility and growth of vegetables, P_2O_5 nutrition in volcanic soil, methods of seedling growing, gravel culture - Laboratory of Resistant Breeding: breeding techniques and theories, interspecific hybrids, soft-rot of Chinese cabbage, scab and downy mildew of cucumber, virus resistant radish, nematodes - Laboratory of Seed Growing: theories on seed growing, ageing of mother plant, productivity of seed and environmental conditions Kurume Branch, vide: 7.2 Morioka Branch, vide: 16.1 Okitsu Branch, vide 37.1 Publ.: Bull.Hort.Res.Stat. (Min.Agr.For.) Ser.A, Hiratsuka (ann.)	Head: Dr.K.Kishi/K.Takana-shi/K.Abiko Head: Dr.K.Sato Head: Dr.M.Iizuka/Y.Machida/I.Kozaki/T.Tashiro Head: K.Kanato/A.Kurihara/I.Shimura/M.Yoshida/O.Kishimoto/E.Nakaya/K.Yoshinaga/Y.Makino Head: M.Ishihara/Y.Hase/S.Konno Head: J.Kitao/K.Matsuda/T.Tokita Head: Dr.S.Shimizu Head: Dr.S.Nishi/M.Toda/S.Umeda Head: Dr.S.Abe/J.Kawata/A.Utada Head: Y.Hori/Y.Tatsumi/K.Arai/T.Miyakusu Head: K.Kanazawa/K.Takada/T.Tatsumi/K.Takatsuka Head: B.Yamada/S.Utsumi/T.Kōyama/H.Kato
19.2 General horticulture	Kanagawa Prefectural Horticultural Experiment Station Equipment: Growth chamber: constant temperature, electric orange-storage house Pomology - Chemical Analysis Division Chemistry of fruit trees, leaf analysis, improvement of fertilization Do., vegetable crops	Ninomiya, Naka-gun, Kanagawa-pref. Dir.: T.Adachi T.Adachi Chief: M.Kotō S.Takeshita

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kanagawa (19.2)	- Floriculture Division Growing and breeding, cultural improvement (carnation, stock) Do., forcing (daffodil, cyclamen) Do., interspecific hybridization (peony, flower tree) - Pomiculture Division Growing and cultural improvement Growing and breeding, cold resistance (peach, Japanese pear) Entomology - Vegetable Culture Division Vegetable growing, improvement of nursery bed (tomato) Vegetable growing and breeding, cultural and varietal trial improvement (onion, cucumber, tomato) Vegetable growing and plant physiology (lettuce, broccoli) Vegetable growing and breeding, vernalization (strawberry) Publ.: Bull. Kanagawa Hort. Exp. Stat. (ann.) - Miura Branch Vegetal growing and cultural improvement Growing and breeding, varietal and cultural improvement of vegetables Floriculture, growing and breeding, forcing (carnation, stock) - Nebukawa Branch Improvement of storage of oranges and quality of fruit Growing and improvement of quality of fruit, labour saving (Satsuma orange) Phytopathology of citrus, control of diseases, improvement of storage of oranges Entomology	Chief: H. Ozawa Y. Miura Y. Okawa Chief: T. Watanabe/T. Akiyama/M. Hirobe Y. Yasunobu S. Itō Chief: M. Shimokawa T. Itagi T. Hiraoka C. Sugiyama/T. Kaname Chief: T. Yokomizo M. Hiraishi I. Hayashi Chief: Dr. C. Ogaki S. Sekino K. Ushiyama M. Uchida
19.3 Botany	Kanagawa Prefectural Ōfuna Botanical Garden Distribution of newly imported flowers; investigation of the production from the economical point of view; propagation for export of plants like Amaryllis, peony, Japanese Iris; service to the growers intending to trade ornamental plants for export; exhibition of plants like lilies, peonies, Japanese Iris and ornamental trees and shrubs grown in Japan for export. Taxonomy, ecology, breeding of flowers (Lilium sp.) Plant physiology, breeding, mite control (Lilium spp.) General floriculture Classification, breeding (herbaceous peony, Japanese Iris) Plant physiology, propagation, grafting, cuttings, ecology Insect and disease control, ecology Plant physiology, forcing Landscape architecture	Okamoto, Kamakura, Kanagawa-pref. Dir.: M. Shimizu M. Shimizu K. Ueno G. Nakajima M. Ichikawa M. Wakisaka O. Namikawa N. Kizaki A. Shinoda
19.4 Genetics	Kihara Institute for Biological Research Cytogenetics (wheat) - Division of Applied Genetics	Mutsukawa, Minami-ku, Yokohama, Kanagawa-pref. Dir.: dr. H. Kihara

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kanagawa (19.4)	Inheritance, interspecific hybridization, polyploidy (watermelon) Do., (beet, tulip) Publ.: Seiken Zihō, Rep. Kihara Inst. Biol. Res. (ann.)	Dr. M. Shimotsuma Y. Kusaka
19.5 General horticulture	Sakata Seed Plant Breeding and Experiment Station Vegetable breeding - Chigasaki Experiment Station Petunia Outdoor flowers, coleus Chrysanthemum, Morning Glory Antirrhinum, primula, cyclamen - Chogo Experiment Station Cabbage, pepper Pepper, egg plant Cabbage	Dir.: Dr. R. Akiya Nakajima, Chigasaki, Kanagawa-pref. K. Kaneko/K. Takeda T. Akutsu M. Takagi N. Miyazaki Kamiyadai, Chogō, Fujisawa, Kanagawa-pref. K. Masabayashi H. Muramatsu K. Miyaishi
Kashihara	see 28.1, 28.2 Nara	
20. Kōchi	Kōchi Prefectural Agricultural Experiment Station	Osone, Nangoku, Kōchi-pref.
20.1 Vegetables	Agronomy, breeding (rice) - Horticultural Division Vegetable growing, breeding Vegetable growing, forcing (cucumber, pepper) Vegetable breeding Vegetable growing (watermelon) Vegetable breeding (tomato) Publ.: Annual Report	Dir.: S. Kawamura Chief: T. Shimoyama M. Ishihara D. Nakazawa W. Nonami Y. Ikegami
20.2 General horticulture	Kōchi University, Laboratory of Horticulture, Faculty of Agriculture Vegetable growing and breeding, ecology, plant growth regulators, mutation (tomato, cucumber, egg plant, muskmelon, pine apple) Vegetable growing, growth regulators, fruit development Floriculture, vegetable growing Floriculture, physiology of seed germination and flowering (orchid) Pomology, physiology of hardening (citrus) Pomology, physiology, fruit nutrition (citrus) Publ.: Res. Rep. Fac. Agr. Kōchi Univ. (ann.)	Monobe, Nankoku, Kōchi-pref. Prof. dr. T. Kadota Ass. prof. dr. T. Kato Ass. prof. M. Matsuura Y. Sawa Prof. dr. F. Yoshimura Ass. prof. Y. Nakajima
21. Kumamoto	Kumamoto Prefectural Agricultural Experiment Station	Saiki, Kaminogō-machi, Kumamoto, Kumamoto-pref.
21.1 General horticulture	Agronomy - Horticultural Division Vegetable breeding and growing Floriculture Vegetable breeding, improvement of cultivation (cabbage, egg plant, tomato) Do. (cabbage, cucumber) - Aso Branch Vegetable growing in high land areas Publ.: Annual Report	Dir.: O. Tanaka Chief: M. Ikutake S. Kanie K. Kōno K. Furuta T. Miyamoto/S. Honda
21.2 Fruit	Kumamoto Prefectural Fruit Tree Experiment Station	Funatsu, Kawachi-yoshinomura, Hōtaku-gun, Kumamoto-pref.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kumamoto (21.2)	Fruit growing, pest control of citrus, biological control of citrus pest - Chemistry Division Soil management of citrus orchard, abnormal defoliation of citrus, leaching of fertilizer, P_2O_5 nutrition of citrus, manure application - Cultural Division Late maturing citrus growing, quality of citrus fruit, protection late fruit drop, breeding of citrus, improvement of citrus orchard management - Phytopathology and Entomology Division Pest control of citrus, nematodes, aerial application of chemicals on citrus orchards, new chemicals Kikuchi Branch Improvement of grape and chestnut cultivation, stock for Japanese pear, labour saving in fruit tree growing, flower-bud differentiation of fruit trees Publ.: Annual Report	Dir.: K.Nishida Chief: Y.Hirakata/K.Iwamoto/H.Uchibori/R.Otsu Chief: T.Miike/K.Mishima/T.Hasasue Chief: S.Yamamoto/M.Kamimura/N.Kamimura/S.Takeuchi Chief: K.Osada/M.Nishi/N.Yoshinaga/K.Inaba/Nakamura/Y.Onizuka
Kerume	see 7.2 Fukuoka	
22. Kyōto	Kyōto Prefectural Agricultural Experiment Station	Amarube-machi, Kameoka, Kyōto-pref.
22.1 General horticulture	Agronomy (rice) - Horticultural Division Vegetable varietal trial, forcing Fruit tree physiology, gibberellins Fruit tree varietal trial, cultivation - Tango Branch Floriculture, varietal trial (tulip) Vegetable growing, varietal trial, cultural improvement Pomology, varietal trial, cultivation Local varietal trial - Yamashiro Branch Pomology, chemical thinning (persimmon) Fruit tree varietal trial Vegetable varietal trial, forcing Publ.: Annual Report	Dir.: T.Otsu Chief: T.Kawakatsu/T.Nishimura/Nishino J.Namikawa N.Uemura Chief: K.Adachi/T.Mukai H.Fujimura/K.Kawada Y.Fujiwara N.Kinohira/O.Mizu Chief: H.Matsuno/Y.Kohashi S.Hata T.Itō/K.Morikawa
22.2 General horticulture	Kyōto Prefectural University, Laboratory of Horticulture, Faculty of Agriculture Pomology, physiology, breeding, stock-scion relationships (persimmon, peach, Japanese pear) Pomology, physiology (persimmon, peach) Vegetable growing, and floriculture, physiology, breeding, plant growth regulators (cucurbits, solanaceous vegetables, orchids) Floriculture, physiology (orchids) Vegetable growing, physiology, gametocide (pepper, tomato) Publ.: Sci.Rep.Kyōto Pref.Univ.; Agr.(ann.)	Hangi-chō, Simogamo, Sakyō-ku, Kyōto, Kyōto-pref. Prof.dr.M.Kimura Ass.prof.Y.Sobajima/M.Ishida Prof.dr.S.Takashima dr.I.Itō T.Hirose
22.3 General horticulture	Kyōto University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Phytotron Pomology, fruit nutrition (grape vine, deciduous fruits) Fruit nutrition (pear) Pomology, fruit nutrition (peach)	Kitashirakawa, Sakyō-ku, Kyōto, Kyōto-pref. Prof.dr.A.Kobayashi Ass.prof.dr.T.Hosoi Ass.prof.dr.A.Fukuda

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kyōto (22.3)	Pomology (persimmon) Pomology Physiology, flowering and plant growth regulators (Chrysanthemum, orchid, tomato, onion) Floriculture Publ.: Stud.Inst.Hort.Kyōto Univ.(ann.)	H.Kitagawa K.Iwasaki/K.Kuroda/T.Teranuma/M.Iwata Prof.Y.Tsukamoto T.Asahira/Y.Sano
22.4 Genetics	Kyōto University, Laboratory of Genetics, Faculty of Agriculture Genetics, breeding (Brassica, radish, water melon, Ipomoea) Genetics, breeding (Ipomoea)	Kitashirakawa, Sakyō-ku, Kyōto-pref. Prof.dr.I.Nishiyama T.Teramura
22.5 General horticulture	Takii's Plant Breeding and Experiment Station Vegetable breeding (cruciferous crops, tomato, cucumber, onion) Cabbage, Chinese cabbage, radish, carrot Onion, tomato, cucumber Cytology, germination of seeds Chinese cabbage Cabbage, spinach European vegetables Radish, turnip, carrot Cucumber, tomato, egg plant, pepper Watermelon, squash Onion Pansy, stock, primula Snapdragon, sunplant Publ.: Bull.Takii's Plant Breeding and Exp. Station	Nagaoka-chō, Otokuni-gun, Kyōto-pref. Dir.: Dr.S.Itō Dr.T.Haruta T.Nishimura H.Fujiwara Y.Mitsushima T.Tsujimoto S.Okumura T.Yamashita I.Takahashi H.Oka T.Matsushita Y.Shibata J.Yokoyama
Matsuyama	see 5.1 - 5.4 Ehime	
23. Mie	Mie Prefectural Agricultural Experiment Station, Kyōto Experiment Station	Ejima-chō, Suzuka, Mie-pref.
23.1 General horticulture	Soil chemistry - Horticultural Division Vegetable growing Citrus culture Grape growing Peach and persimmon growing Japanese pear growing - Kinan Branch Citrus growing Do., soil and fertilizer application Entomology General cultivation of citrus Soil and fertilizer management Vegetable and flower growing Publ.: Annual Report	Dir.: K.Yamada Chief: O.Shibazaki/H.Imaizumi/S.Inagaki Y.Shimosako K.Tamamura Y.Fukada H.Hayashi Chief: S.Nishiba I.Tabata T.Ueno T.Hashimoto Y.Katō S.Yamaguchi
23.2 General horticulture	Mie University, Laboratory of Horticulture, Faculty of Agriculture Pomology (citrus) Nutrition and physiology of vegetable crops (cucumber, tomato) Fruit growing	Kamihama-chō, Tsu, Mie-pref. Prof.J.Fujimura Ass.prof.dr.T.Inden J.Matsushima
24. Miyagi	Miyagi Prefectural Agricultural Experiment Station	Masue, Odawara, Harano-machi, Sendai, Miyagi-pref.
24.1 General horticulture	Agronomy, rice culture	Dir.: M.Shiga

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Miyagi (24.1)	- Horticultural Division Vegetable growing, varietal trials, fruit setting (broad bean, carrot) Floriculture Fruit tree growing, chemical thinning of apple and peach Pruning of fruit trees, soil management Pest and disease control in orchards, forecast of disease outbreaks - Iwanuma Branch Vegetable growing (asparagus, carrot, celery) Publ.: Rep.Miyagi Pref.Agr.Exp.Stat. (twice a year)	Chief: S.Aihara/S.Izumi/ K.Kawamura E.Watanabe T.Kumagai K.Satō Y.Ōizumi/M.Maeda
24.2 Vegetables	Tohoku University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Phytotron Physiology of flowering (cucumber, tomato) Flowering and sex expression (cucumber) Publ.: Tohoku J.Agr.Res. (quarterly)	Kita-6-bancho, Sendai, Miyagi-pref. Prof.dr.H.Itō Dr. T.Saito
25. Miyazaki 25.1 General horticulture	Miyazaki Prefectural Agricultural Experiment Station Agronomy - Horticultural Division Vegetable growing and breeding (cucumber, squash, tomato) Vegetable growing and breeding (cucumber) Floriculture Vegetable growing Vegetable growing and breeding (tomato) Fruit tree growing Citrus growing Publ.: Bull.Miyazaki Agr.Exp.Stat.	Kyōzuka-chō, Miyazaki, Miyazaki-pref. Dir.: Dr. S.Harada Y.Okasako H.Takahashi K.Takahae M.Gotō/Y.Yosihara I.Kawahara Y.Kishimoto H.Hatano/F.Kuroki
25.2 General horticulture	Miyazaki Prefectural Agricultural Experiment Station Agronomy - Horticultural Division Vegetable growing and breeding (cucumber, squash, tomato) Do. (squash, strawberry) Do. (cucumber) Floriculture Vegetable growing Vegetable growing and breeding (tomato) Fruit tree growing Citrus growing Deciduous tree growing Publ.: Bull.Miyazaki Pref.Agr.Exp.Stat.	Kyōzuka-chō, Miyazaki, Miyazaki-pref. Dir.: Dr. T.Tsuchimochi Y.Okasako Y.Gotō H.Takahashi K.Takahae M.Gotō I.Kawara Y.Kishimoto H.Hatano M.Fujisaki
Morioka	see 16.1, 16.3 Iwate	
26. Nagano 26.1 General horticulture	Nagano Prefectural Agricultural Experiment Station, Kikyōgahara Branch Agronomy - Horticultural Division Vegetable breeding for processing (tomato) Vegetable breeding for processing (strawberry) Fruit tree growing (grape)	Hirooka, Sjojiri, Nagano-pref. Dir.: T.Machida M.Serizawa/T.Kobayashi/ M.Fujimori K.Goryū T.Miyoshi/H.Shiba/K.Hirata

Seat/Nature of program	Institution and projects	Address and staff
26.2 <i>General horticulture</i>	Nagano Prefectural Agricultural Experiment Station, Shimoina Branch Agronomy - Horticultural Division Fruit tree breeding Vegetable growing Vegetable breeding	Takamori-chō, Shimoina-gun, Nagano-pref. Dir.: K. Urano K. Miura/K. Maruyama T. Shiratori H. Otani
26.3 <i>General horticulture</i>	Nagano Prefectural Horticultural Station Pomology, growth injury caused by grafting (apple) - Disease and Insect Division Forecasting of disease outbreak Nematodes, vegetable pests Method of chemical spraying Diseases of apple Pests of apple - Fruit Tree Division Fruit tree growing Soil and fertilizer, plant physiology, chemical thinning, growth regulators (apple) Chemical thinning, varietal trial, grafting, propagation (peach, grape, Japanese pear) Graft injury of apple, dwarfing stock, abnormal growth of apple fruit Nutritional problems (apple) Storage of fruit (apple, nuts) Physiological injury caused by low temperature, artificial pollination Artificial pollination - Processing of Horticultural Products General processing Fruit juice Pickles Dry processing of horticultural products - Specific crops Common hop and konjak Tobacco Asiatic ginseng - Vegetable and Flower Division General cultivation problems Vegetable cultivation Vegetable growing and breeding, seed growing (cabbage, Chinese cabbage, onion) Soil and fertilizer application, vegetable growing Floriculture Vegetable breeding, seed growing (Chinese cabbage, cabbage, onion) Publ.: Bull. Nagano Pref. Hort. Stat. (irr.)	Ogawara, Suzaka, Nagano-pref. Dir.: Dr. K. Ushirozawa Chief:: K. Hirose Y. Itō A. Sekiguchi M. Ozawa H. Sekiya Chief: K. Shibamoto K. Miyagawa Y. Tojyō S. Takemae K. Tanaka K. Yokota H. Makita T. Kitamura Chief: J. Yasukawa T. Nakajima T. Yoshida Y. Takeda Chief: T. Ichinose K. Ozawa Y. Miyazawa Chief: M. Tarui H. Tsuchiya N. Hamajima T. Takano F. Otsuka H. Baba
26.4 <i>General horticulture</i>	Shinsbū University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Isotope laboratory As located at high land of 770 m, research is directed to studies on the problems of growing in cold climate. Utilization of horticultural produce, studies on vitamin B ₁ Vegetable growing, colouring of fruits and application of phytohormones (tomato) Abnormal growth, physiology of moisture movement in fruit trees (Japanese pear)	Minamiminowa-mura, Kamiina-gun, Nagano-pref. Prof. dr. R. Iijima Ass. prof. T. Takahashi Ass. prof. K. Kumashiro

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Nagano (26.4)	Growth and temperature (fruit trees) Propagation of bulbs Colouring of fruit (apple) Publ.: Bull.Fac.Agr.Shinshū Univ. (every 2 years); Mem.Fac.Agr.Shinshū Univ. (ann.)	R.Nakamura M.Nakamura S.Tateishi
27. Nagasaki 27.1 Fruit	Nagasaki Agricultural and Forestry Experiment Station Breeding of fruit trees (citrus, loquat) Breeding, microclimate of orchards (citrus, loquat) Soil management of orchard (citrus) Plant physiology (citrus) Plant protection, biological control (citrus, loquat) Citrus propagation Breeding and propagation (citrus, loquat) Microclimate (citrus) Plant protection (citrus) Breeding (citrus, loquat) Plant pathology (citrus)	Haraguchi-gō, Omura City, Nagasaki-pref. Chief: K.Hamaguchi H.Muramatsu Y.Nagai/K.Yazima H.Kanki/T.Imamura Dr.R.Ōgushi H.Tsuru I.Ichinose I.Kishino T.Nishino M.Utsumi T.Ōta
27.2 General horticulture	Nagasaki Prefectural Agricultural and Forestry Centre Ecology, breeding system in horticultural crops and ornamentals - Vegetable and Flower Division Utilization of horticultural produce (orange, tomato) Vegetable growing and breeding (celery, pea) Vegetable growing and breeding (bean, carrot, onion) Vegetable growing under vinyl house (cucumber, tomato) Vegetable growing and breeding (carrot, melon) Floriculture, growing and breeding (lily, azalea) Floriculture Publ.: Annual Report	Kaizu, Isahaya, Nagasaki-pref. Dir.: S.Kumazawa Chief: K.Hamaguchi T.Yamato/T.Yamamoto/ N.Matsubara K.Kawata T.Ōgawa H.Kudamatsi T.Okano K.Aburaya S.Noda
28. Nara 28.1 General horticulture	Nara Prefectural Agricultural Experiment Station Agronomy, soil science - Horticultural Division Vegetable growing, breeding, mulching (watermelon) DO. (muskmelon) Vegetable growing, weed killers, soil, water and vegetable growth Varietal trial (tomato) Vegetable growing and breeding, forcing (cucumber) Floriculture, physiology, nutrition, flowering and phytohormones (cyclamen) Publ.: Annual Report	Shijyō-machi, Kashihara, Nara pref. Dir.: S.Nakazawa Chief: K.Fujimoto K.Minamibori N.Ōbayashi Y.Ueda K.Naito S.Urabe
28.2 Fruit	Nara Prefectural Agricultural Experiment Station, Fruit Tree Branch Artificial pollination (persimmon) Cultivation and breeding, plant nutrition (persimmon) Disease and pest control in orchards Growth regulators (grape) Winter protection of fruit trees (citrus) Publ.: Annual Report	Jimei-chō, Kashihara, Nara-pref. Dir.Y.Yokozawa S.Fukunaga A.Yasui T.Fukushima M.Morimoto

Seat/Nature of program	Institution and projects	Address and staff
29. Niigata 29.1 General horticulture	Niigata Prefectural Horticultural Experiment Station Pomology Vegetable and flower growing, abnormality of strawberry flower and fruit, breeding of tulip Vegetable growing and breeding, male sterility, dwarfiness (cucumber, squash, onion) Vegetable growing, ecology, pruning (cabbage, melon) Vegetable varietal trials (celery, lettuce) Plant physiology, physiological injury of fruit trees, gibberellin (Japanese pear, peach) Snow injury of fruit trees, chemical thinning (peach) Chemical thinning (Japanese pear) Fruit tree growing, soil management of orchards, chemical thinning (persimmon) Diseases and pests of fruit trees Floriculture, breeding (tulip) Plant physiology, flowering and fertilization (tulip and iris) Breeding (lily) Nematology - Uchino Branch Vegetable and flower growing, irrigation and fertilizer application Vegetable growing, varietal trial, grafting (watermelon) Vegetable growing, irrigation Publ.: Annual Report	Nanoka-machi, Niitsu, Niigata-pref. Dir.: H. Kataoka A. Nakashizuka M. Kobayashi T. Seko T. Nomoto K. Shiobara T. Kondō T. Tamura S. Watanabe S. Sakurai S. Tanabe H. Sakurai Y. Ikeda Y. Nakatomi Chief: M. Fujita A. Tamada K. Watanabe
29.2 Flowers/Fruit	Niigata University, Laboratory of Horticulture Faculty of Agriculture Physiology, flowering and breeding (Camellia, peony, tulip, bulbs) Physiology of fruit trees Ecology and physiology of flowers (Camellia) Physiology of flowers (bulbs) Publ.: Mem. Fac. Agr. Niigata Univ.	Kogane-chō, Niigata, Niigata-pref. Prof. dr. K. Hagiya Ass. prof. I. Kuroi S. Ishizawa W. Amaki
30. Ōita 30.1 General horticulture	Ōita Prefectural Agricultural Experiment Station Agronomy (rice) - Horticultural Division Pomology, soil management, chemical thinning Growing of European vegetables, replanting of vegetables (taro) Do. (legumes) Publ.: Annual Report	Minami-Ōita, Ōita, Ōita-pref. Dir.: R. Kashima M. Miyazaki/T. Ogata/ T. Imanaga S. Takakura K. Tachikawa/E. Tomonaga
30.2 Citrus	Ōita Prefectural Citrus Experiment Station Citrus growing Physiology, fruit quality of citrus Disease and pest control of citrus orchards, natural enemies Physiology, replanting, breeding of citrus Pest and disease control of citrus orchards Growing and storage problems Propagation Publ.: Annual Report	Nishinouchi, Tsukumi, Ōita-pref. Dir.: H. Yakushiji S. Nakamura T. Akita T. Shiraishi Y. Watanabe J. Sato T. Mimata
30.3 General horticulture	Ōita Research Station for Hot Spring Utilization in Agriculture	Tsurumi, Beppu, Ōita-pref.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ōita (30.3)	General horticulture, cytogenetics, plant breeding Vegetable growing, breeding Growing, breeding and propagation of tropical and subtropical ornamental plants, annual flower breeding Growing, propagation of ornamental trees and shrubs Vegetable growing, breeding Publ.: Plant List Res.Stat.	Dir.: dr.H.Itō dr.Y.Hitaka M.Takata/O.Ueyama T.Gotō/S.Satō C.Odawara/K.Nishimura
31. Okayama 31.1 General horticulture	Okayama Prefectural Agricultural Experiment Station Agronomy - Horticultural Division Processing of horticultural products, storage Irrigation Vegetable growing, breeding, seed growing -Kasaoka Fruit Tree Propagation Farm - Osa Branch Orchard management - Tsuyama Branch Fruit tree growing (grape, persimmon) Vegetable growing Publ.: Bull.Okayama Pref.Agr.Exp.Stat.(ann.)	Kitagata, Okayama, Okayama-pref. Dir.: Y.Hayashi Chief: H.Yumura/S.Kano R.Yamamoto S.Akita J.Inoue Y.Okada M.Morimoto S.Sugimoto
31.2 Fruit	Okayama Prefectural Agricultural Experiment Station, Branch of Pomology Breeding physiology of reproduction (peach, persimmon, grape) Varietal trials, growing (peach, persimmon, grape) Physiology, nutrition of fruit trees (peach, grape) Soil management of orchards (Japanese pear, grape) Physiology, chemical thinning, gibberellin (grape) Do. (peach, persimmon) Publ.: Annual Report	Tsuchida, Okayama, Okayama-pref. Dir.: T.Satō T.Iwata T.Tokimoto H.Fukai K.Yamabe S.Iwata
31.3 General horticulture	Okayama University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Growth chamber, infra-red analyser, ultra-violet analyser Floriculture, physiology, morphology (Morning Glory, bulbs) Nutrition of fruit trees (chestnut, grape) Vegetable growing, ecology and morphology, taxonomy (Brassica) Vegetable growing, flowering, fruit setting (pepper, tomato, muskmelon) Preservation and storage of horticultural products Publ.: Sci.Rep.Fac.Agr.Okayama Univ. (twice a year); List Sci.Res.Fac.Agr.Okayama Univ. (every 3 years)	Tsushima, Okayama, Okayama-pref. Prof.I.Yasuda/K.Yasui Prof.dr.N.Honda/M.Okazaki Prof.dr.S.Shibutani Ass.prof.T.Masuda/K.Kino-shita Ass.prof.T.Inokuchi
Okitsu	see 37.1 Shizuoka	
32. Ōsaka	Ōsaka Prefectural Technological Centre of Agriculture	Shakudo, Habikino, Ōsaka-pref.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ōsaka (32)	Pomology, cultural technique improvement (citrus, Japanese pear, grape)	Dir.: H. Iwata
32.1 General horticulture	- Pomology Section Pomology - Vegetable Section Vegetable growing, physiology Do., breeding Floriculture Publ.: Annual Report	Chief: J. Kikuchi/A. Nomura/ J. Watanabe/T. Jūri/Y. Okuda Chief: dr. H. Kishimoto M. Kototani/M. Tsuda/T. Yamada K. Mega/K. Daidō/S. Hara
32.2 General horticulture	Ōsaka Prefectural University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Infra-red analyser, Koito-tron (growth cabinet), Gas-chromatograph Growing and breeding of vegetables, physiology, CO ₂ and growth of vegetables (vegetable crops of Japanese origin, tomato) Physiology of salt tolerance of vegetable crops Pollen abortion, cytology and breeding (tomato, melon) Physiology, breeding (melon) Physiology of flowering, ecology (fig) Physiology and vine culture Do. (persimmon) Landscape architecture, site and regional planning Floriculture, physiology of flowering, ornamentals (rose) Processing and post-harvest physiology of horticultural products, utilization of horticultural products, radiation storage Freezing storage Post-harvest physiology Radiation storage Publ.: Bull. Univ. Ōsaka, Pref., Series B, Agr. and Biol. (ann.)	Taisen-chō, Sakai, Ōsaka-pref. Prof. dr. T. Imazu Ass. prof. dr. T. Osawa N. Fujishita Y. Oda Prof. dr. J. Hirai Ass. prof. dr. S. Nakagawa/ Y. Nanjyō N. Hirata Prof. dr. T. Kubo Ass. prof. Y. Sakanishi/H. Fukuzumi Prof. dr. K. Ogata Ass. prof. T. Iwata T. Murata K. Chachin
33. Saga	Saga Prefectural Experiment Station	Takagise-machi, Saga, Saga-pref.
33.1 Vegetables	Soil chemistry - Horticultural Division Physiology, ecology, breeding of vegetables (lotus) Vegetable ecology, nutrient absorption, weed killers Nutrient absorption, breeding (tomato, lotus) Vegetable growing Ecology, vegetable growing in high land areas (celery, lettuce, bean) Publ.: Annual Report	Dir.: M. Yoshimura Chief: dr. K. Minamikawa S. Kawasaki H. Saito T. Higuchi M. Tanaka
33.2 Fruit	Saga Prefectural Fruit Tree Experiment Station General horticulture Soil management Soil and fertilizer in fruit tree orchards Fruit tree growing Applied entomology Publ.: Annual Report	Teraura, Ogi-machi, Saga-pref. Dir.: M. Yoshioka Y. Koike/M. Yamamoto/ Y. Takagi H. Eguchi Y. Yamazaki/Y. Takayanagi/H. Toda/N. Tsuru/ T. Matsubara M. Seki/N. Matsuo/K. Kobayashi

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Saga (33)	Saga University, Laboratory of Horticulture, Faculty of Agriculture	Akamatsu-chō, Saga, Saga-pref.
33.3 General horticulture	Physiology of flowering (Perilla, fennel, cocklebur, sugar beet, Poinsettia) Physiology and breeding of vegetables (Allium) Serology of plant proteins (cucurbits) Publ.: Agr.Bull.Saga Univ. (twice a year)	Prof.dr.T.Shimada Ass.prof.dr.Y.Yamada S.Miyazaki
34. Saitama	Saitama Prefectural Agricultural Experiment Station	Ageojyuku, Ageo, Saitama-pref.
34.1 General horticulture	Agronomy, field crops - Horticultural Division Pomology, plant physiology, pest and disease control Pomology, plant physiology Plant physiology, peach growing Plant physiology (Japanese pear, persimmon) Plant physiology (grape, Japanese pear) Vegetable growing, plant physiology (cucumber, tomato, egg plant, strawberry) Vegetable breeding (cucumber, tomato) Vegetable breeding (strawberry, Chinese cabbage) Vegetable growing, plant physiology (cucumber, tomato) Vegetable growing and breeding (cucumber) Vegetable breeding (tomato) Vegetable breeding (strawberry, tomato) Vegetable breeding, canning Vegetable growing (strawberry) - Chichibu Branch Pomology, varietal trials (grape, chestnut) Pomology, varietal trials (peach) Pomology, varietal trials (chestnut) - Irumagawa Branch Varietal trials of vegetables (carrot, edible burdock, i.e. <i>Arctium Lappa</i> L.) Vegetable growing (carrot, edible burdock) Vegetable growing (tomato, cucumber) - Koshigaya Branch Floriculture (chrysanthemum, rose) Breeding of flowers (chrysanthemum, rose) Breeding of flowers (chrysanthemum, freesia, orchids) Breeding of vegetables (cucumber, Welsh onion, celery, strawberry, lettuce) Publ.: Annual Report	Dir.: R.Komatsuzaki Chief: T.Inose T.Ōtomo M.Kurihara B.Mukai K.Itami T.Kamihana C.Ōtsuka H.Mizumura S.Hibukawa K.Matsumaru J.Uematsu H.Hiruma T.Nakamura T.Furuya Chief: H.Tanzawa M.Minegishi K.Suzuki Chief: Z.Iriko I.Shiono/S.Morita M.Satō Chief: Y.Sanki R.Ikenoya C.Murai T.Saito/H.Kawakami/ I.Koyama
Sapporo	see 12.1 - 12.3 Hokkaido	
Sendai	see 24.1, 24.2 Miyagi	
35. Shiga	Shiga Prefectural Agricultural Experiment Station	Kuribayashi, Seta-chō, Kurita-gun, Shiga-pref.
35.1 General horticulture	Pathology (rice, barley, wheat) - Horticultural Division Pomology, soil management, soil fertility Fruit growing and breeding Ecology of noxious insects (chestnut, peach, Japanese pear, persimmon) Physiology, nutrition Vegetable seed growing	Dir.: Dr.S.Shimada Chief: K.Doi S.Sono R.Ōishi R.Murata R.Higo

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Shiga (35.1)	Vegetable growing and management Do., breeding Vegetable physiology Floriculture Publ.: Annual Report	T. Matsuda M. Kubo Y. Ueno/I. Hattori/I. Nishiyama I. Takishima
35.2 <i>General horticulture</i>	Shiga Prefectural Junior College, Laboratory of Horticulture, Faculty of Agriculture Vegetable growing, physiology of flowering, vernalization (cabbage, pea) Pomology, growth of trees and soil condition Vegetable growing, weed killers, aseptic culture Publ.: Sci. Rep. Shiga Pref. Jun. Coll. (ann.)	Shibukawa-chō, Kusatsu, Shiga-pref. Ass. prof. E. Nakamura S. Fukuda H. Otono
36. Shimane 36.1 <i>Fruit</i>	Shimane Agricultural College, Laboratory of Horticulture Equipment: Electron microscope, self-recording electrophotometer, phytotron (Koitoiron)	Nogi-fukutomi-chō, Matsue, Shimane-pref.
	Pomology, physiology, grafting, plant growth regulators (walnut, chestnut, grape) Pomology: plant nutrition, colour development of fruit (grape) Pomology: colour development of fruit (persimmon) Publ.: Bull. Shimane Agr. Coll. (ann.)	Prof. dr. S. Kōma Ass. prof. R. Naitō S. Sagane
36.2 <i>General horticulture</i>	Shimane Prefectural Agricultural Experiment Station Agricultural management - Horticultural Division Vegetable growing, breeding, male sterility (onion, melon, horse-radish) Vegetable growing and breeding Fruit tree growing - Arashima Branch Pomology - Hamada Branch Vegetable growing on sand hill areas, irrigation, breeding Entomology Fruit tree growing Publ.: Annual Report; Bull. Shimane Agr. Exp. Stat.	Fnya-chō, Izumo, Shimane-pref. Dir.: S. Bandai Chief: R. Ueno T. Saito/S. Omura/Y. Nakagawa T. Togano Chief: O. Takeshita/T. Ito/T. Sugitani Chief: S. Kadota/T. Hujita A. Machida K. Takahashi/G. Shinohara/ A. Miyagawa
37. Shizuoka 37.1 <i>General horticulture</i>	Horticultural Research Station (Ministry of Agriculture and Forestry) Okitsu Branch Food technology, processing of horticultural products - Laboratory of Citrus Disease Plant pathology, fungi, virus, bacteria - Laboratory of Citrus Insects Ecology of insects, insecticides - Laboratory of Fruit Tree Breeding Citrus breeding, plant physiology, rootstock, pruning of citrus Citrus breeding, plant physiology, nutrition and flower-bud differentiation	Okitsunakamachi, Shimizu, Shizuoka-pref. Dir.: Dr. S. Matsui Head: Dr. S. Yamada/T. Tanaka/S. Yamamoto/M. Koizumi Head: S. Okudai/R. Korenaga/K. Andō Head: Dr. T. Iwasaki M. Nishiura/S. Usui

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Shizuoka (37.1)	Do., meteorology (citrus) Do., cytology (citrus) Citrus breeding, plant physiology, plant growth regulators, storage of fruits (citrus) Citrus breeding and growing - Laboratory of Fruit Tree Growing Plant physiology, genetics, rootstock, soil-sickness, biometrics (citrus) Plant physiology, plant growth regulators (persimmon) Plant physiology, breeding, labour saving of citrus growing Breeding and growing (persimmon), plant growth regulators (citrus) - Laboratory of Horticultural Processing Processing fruit and vegetables, chemistry of leucoanthocyanin (persimmon, chestnut) Processing, canning, juice making, frozen food - Laboratory of Vegetable Breeding Disease resistance, genetics, biometrics (tomato, cucumber, strawberry) - Laboratory of Vegetable Growing Plant physiology, nutrition, deficiency of elements Water culture Plant physiology, gravel culture, economics of water under glass Glasshouse management Publ.: Bull. Hort. Res. Stat. (Min. Agr. For.) Ser. B, Okitsu (ann.)	A. Ōwada M. Iwamasa Y. Iba T. Kihara/F. Sasaki/ Y. Yamada Head: T. Ōhata T. Ikeda K. Hirose N. Yamamoto/M. Yagi/ N. Tominaga Head: Dr. S. Itō N. Murata Head: T. Kuriyama/Y. Sugawara/A. Kotani/H. Shimada Head: Dr. M. Kageyama T. Kondō T. Masaki/M. Aoki T. Higashi
37.2 Citrus	Shizuoka Citrus Experiment Station Equipment: Fluorescence X-ray analyser, spectrophotometer Rootstocks of oranges, ecology, defoliation and fruit drop - Chemistry Division Diagnosis of nutritional conditions, leaf analysis N-fertilizer application P₂O₅ application Abnormal defoliation of Satsuma orange - Cultural Division Breeding Hardiness, method of cold protection Labour-saving methods of harvesting Breeding of cold resistant varieties - Plant Protection Division Biological control of insects Effect of chemicals Ecology and methods of insect control Black spot of Satsuma orange - Izu Branch Pest control Breeding Plant protection Fruit drop during winter time and defoliation - Seien Branch Horticulture	Beppu, Komagoe, Shimizu, Shizuoka-pref. Dir.: C. Oka C. Oka Chief: K. Nakama T. Shirai T. Ishida Y. Takahashi Chief: T. Tachikawa M. Konakabara R. Takagi S. Hara Chief: H. Kurano Y. Matzunaga M. Nishino K. Inoue Chief: S. Ishikawa Y. Ueda T. Tsuchiya K. Yamatsu Chief: S. Yamaoka

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Shizuoka (37.2)	Effect of chemicals Quality of fruit (Japanese pear) Publ.: Rep. Shizuoka Citrus Exp. Stat. (ann.)	S. Nishigaya K. Fukuyo
37.3 General horticulture	Shizuoka Prefectural Agricultural Experiment Station Equipment: Growth chamber Agronomy, rice culture - Horticultural Division Breeding, transportation and storage research of vegetable products Cultivation methods (strawberry) Nutrition physiology, transportation and storage of vegetable products Breeding and cultivation of vegetables Ordinary and hydroponic cultivation methods Propagation methods, ornamental bushes - Enshu Horticultural Branch Vegetable cultivation Classification of melons, problems in glass-house cultivation Cultivation of European vegetables Varietal trials, cultivation of flowers (chrysanthemum, ornamental bulbs) Plant pathology Vegetable growing Publ.: Bull. Shizuoka Pref. Agr. Exp. Stat. (ann.) Techn. Bull. Shizuoka Pref. Agr. Exp. Stat. (irr.); Ann. Rep.; Farmer's Bull.	Kita-Andō, Shizuoka, Shizuoka-pref. Dir.: H. Ōkōchi H. Ōkōchi Chief: Dr. S. Shinohara K. Ninomiya G. Hazu T. Suzuki Y. Muramatsu K. Funakoshi Chief: S. Tamura S. Kamiya T. Kawaguchi H. Kurita K. Shōji S. Miwa
37.4 Botany	Shizuoka Prefectural Botanical Garden Cultivation of plants in a warm non-frost area all the year round, introduction of tropical and subtropical plants from foreign countries and their acclimatization to warmer areas of Japan. Genetics, plant breeding (citrus, watermelon) Floriculture Botany Plant pathology	Irōzaki, Minami-izumachi, Kamo-gun, Shizuoka-pref. Dir.: Dr. K. Furusato Dr. K. Furusato K. Hida/M. Matsuda H. Murata H. Nakamura
37.5 General horticulture	Shizuoka University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Isotope building Pomology, physiology, sunscald (peach) Plant nutrition, absorption of elements (muskmelon, tomato) Pomology, moisture problems (citrus)	Mitsuke, Iwata, Shizuoka-pref. Prof. dr. S. Okamoto Ass. prof. M. Masui E. Yuda
Takamatsu	see 17.1 Kagawa	
38. Tochigi	Tochigi Prefectural Agricultural Experiment Station Agronomy, field crops - Horticultural Division General tree fruit growing Nutrition of Japanese pear, fruit thinning of peach Nutrition of grape, climate of chestnut Growth and physiology of grape Physiology and variety of apple Culture and breeding of strawberry and Chinese cabbage	Imaizumi-chō, Utsunomiya, Tochigi-pref. Dir.: T. Edamura Chief: Y. Takahashi H. Sakamoto A. Aoki T. Nakada U. Kobayashi A. Kato

Sent/Nature of program	Institution and projects	Address and staff
Continuation of Tochigi (38.1)	Culture and breeding of tomato and onion Culture and breeding of cucumber and cabbage Culture for vegetable forcing General culture of vegetables Floriculture Breeding of Azalea	T. Owada H. Kawasato K. Endo O. Chio A. Yamanaka M. Akabane
38.2 General horticulture	Utsunomiya University, Laboratory of Horticulture, Faculty of Agriculture General horticulture, germination of seed (lily) Utilization of phytohormones on fruit growing Vegetable growing, sex expression (cucumber) Sterility (Amarayllus) Publ.: Bull. Coll. Agr. Utsunomiya Univ. (ann.)	Mine-machi, Utsunomiya Tochigi-pref. Prof. R. Aoki Ass. prof. S. Wakabayashi Ass. prof. K. Sekiya H. Sekiya
39 Tokushima 39.1 General horticulture	Tokushima Prefectural Agricultural Experiment Station Agronomy, breeding (rice, wheat) - Horticultural Division Vegetable breeding (cucumber, radish) Floriculture, breeding (lily) Physiology, weed killer (tomato, egg plant, carrot) Gravel culture (cucumber, onion) Soil and fertilizer, soil conditioner (cabbage, radish) Breeding of vegetables (melon) - Aizumi Horticultural Branch Vegetable growing, phytohormones (egg plant) Vegetable breeding (tomato, melon) Breeding, cultural improvement (egg plant, radish, cabbage, strawberry) Publ.: Bull. Tokushima Pref. Agr. Exp. Stat. (ann.)	Akuichō, Tokushima, Tokushima-pref. Dir.: S. Hara Chief: Y. Satō A. Sumitomo F. Fujii T. Jyōjima H. Machida E. Gotōda Chief: Y. Abe F. Kusaka K. Nii
39.2 Fruit	Tokushima Prefectural Fruit Tree Experiment Station Pomology - Section of Fruit Tree Growing Fruit tree growing (citrus, Mume) Fruit tree growing (citrus, peach) Fruit tree growing (Mume, chestnut) Fruit tree growing (citrus) Fruit tree growing (Mume, citrus) - Section of Horticultural Chemistry Nutritional chemistry, soil and manure (citrus) - Section of Plant Pathology and Entomology Phytopathology Phytopathology, physiology (citrus) Entomology, citrus scale - Iwakura Branch Fruit tree selection (citrus, chestnut) - Kamiita Branch Fruit tree growing (persimmon, Japanese pear, peach) Fruit tree growing (grape) Fruit tree growing (Japanese pear) Fruit tree growing (citrus) Fruit tree growing (persimmon) Publ.: Bull. Tokushima Pref. Fruit Tree Exp. Stat. (irr.)	Katsuura-machi, Katsuura-gun, Tokushima-pref. Dir.: Y. Adachi Chief: Y. Yamamoto K. Kurogami M. Nakagawa T. Manabe/N. Otoi S. Shibata Chief: H. Wada/ M. Horigane Chief: Dr. T. Miyakawa H. Yamato M. Kagawa Chief: K. Wakikawa Chief: S. Maeda Y. Tada H. Shioura A. Jozukuri K. Fukui

Seat/Nature of program	Institution and projects	Address and staff
40 Tokyo 40.1 Vegetables	Nihon University, Laboratory of Horticulture, College of Agriculture and Veterinary Medicine Equipment: Isotope chamber General horticulture, flowering and flower-bud differentiation (tomato, strawberry, cucumber) Publ.: Bull. Coll. Agr. and Vet. Med. Nihon Univ. (twice a year)	Shimouma 3, Setagaya-ku, Tokyo Prof. dr. T. Eguchi/B. Takahashi/K. Yoneda
40.2 General horticulture	Tamagawa University, Laboratory of Horticulture, Faculty of Agriculture Vegetable growing, breeding, biometrics, theory of seed growing in vegetables Pomology, grafting Floriculture, breeding and genetics, inheritance of double flowering character Floriculture (orchids) Publ.: Bull. Fac. Agr. Tamagawa Univ. (ann.)	Honmachida, Machida, Tokyo Prof. dr. Y. Yūkura Ass. prof. dr. S. Miki I. Hongo T. Matsui
40.3 General horticulture	Tokyo University, Laboratory of Horticulture, Faculty of Agriculture Equipment: Phytotron Post-harvest physiology with special reference to respiration and organic acids of fruit (tomato, pear, citrus) Nitrogen nutrition of vegetable crops Raising of vegetable seedlings in hot beds Minor element nutrition of citrus Publ.: Records of Res. Fac. Agr., Tokyo Univ. (ann.)	Yayoi-chō, Mukōgaoka, Bunkyo-ku, Tokyo Prof. dr. T. Sugiyama Ass. prof. M. Iwata K. Takahashi R. Ogata
40.4 Genetics	Tokyo University of Agriculture, Institute for Breeding Research Equipment: Phytotron, electron microscope, photo-electric spectrophotometer, ⁶⁰ Co and X-ray instrument, micro-manipulator. Genetics and breeding of flowering plants and vegetable crops Cytogenetics and breeding, plant growth regulators (Morning Glory, stocks) Vegetable breeding Chromosome study of succulent plants (Stapelia) Exotic plants - Izu Natural History Park, including Botanical Garden - Vegetable Plants Experimental Farm - Cold-climate Experimental Farm Publ.: Ann. Rep. Inst. Breeding Research	3-chōme, Tamagawayōga-machi, Setagaya-ku, Tokyo Dir.: Prof. dr. N. Kondō Prof. dr. N. Kondō/Ass. prof. M. Yamamoto K. Matsuoaka S. Ishimoto/K. Morita M. Kamanoi T. Mizonu 109 Yukawa Ito city, Shizuoka-pref. Cur. Bot. Garden: H. Iida Kamatori-machi, Chiba-pref. Nakakaruizawa, Kitasakugun, Nagano-pref.
40.5 General horticulture	Tokyo Agricultural University, Laboratory of Horticulture General horticulture, plant physiology Vegetable and flower growing Ornamentals, physiology of flowering Pomology, ecology (Japanese pear, grape, citrus)	4-chōme, Setagaya, Setagaya-ku, Tokyo Prof. dr. S. Matsubara Ass. prof. S. Yagisawa/ Ass. prof. S. Ninomiya Ass. prof. T. Ozawa T. Kawakami

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Tokyo (40.5)	Pomology, methods in orchard management General horticulture Publ.: J. Agr. Sci. (quarterly); Mem. Tokyo Agr. Univ.	S. Ōmori S. Hamaoka
40.6 General horticulture	Tokyo University of Agriculture and Technology, Institute for Agricultural Research on Rolling Land Agricultural economics Pomology Physiology and breeding of vegetable crops Publ.: Bull. Inst. Agr. Res. Rolling Land	Sawai-chō, Fuchūshi, Tokyo Dir.: Prof. S. Ōtani Prof. dr. H. Iwagaki Ass. prof. M. Matsumoto
40.7 General Horticulture	Tokyo University of Agriculture and Technology, Laboratory of Horticulture, Faculty of Agriculture Pomology Physiology and breeding of vegetable crops General growing of vegetable crops General growing of fruit trees	Sawai-chō, Fuchūshi, Tokyo Prof. dr. H. Iwagaki Ass. prof. M. Matsumoto N. Hakoda/M. Murakami S. Ianabe
40.8 General horticulture	Tokyo University of Education, Laboratory of Horticulture, Faculty of Agriculture Equipment: Greenhouse with cooling equipments by pad and fan system and air washer system Reproductive physiology (leguminous vegetables) Vegetative propagation (fruit trees, flowers) Physiology of flowering (chrysanthemum, ornamentals) Bolting behaviour (carrot) Publ.: Mem. Fac. Agr., Tokyo Univ. Educ. (ann.)	Komaba-chō, Meguro-ku Tokyo Prof. dr. Y. Inoue Prof. dr. T. Fujii M. Okada Y. Suzuki
40.9 General horticulture	Tokyo-To, Agricultural Experiment Station Soil and fertilizer - Horticultural Division Disease and pest control in horticulture Vegetable forcing (Chinese cabbage, turnip, radish) Physiology and ecology in vegetable growing (lettuce, cauliflower) Growing of vegetables, weed killers (lettuce, celery, cauliflower) Blanching and forcing of vegetables (udo, strawberry) Varietal trials and plant physiology (Japanese pear, persimmon) Breeding, physiology (tulip, freesia, cyclamen) Breeding, physiology (Iris, canna, daffodil) Breeding, physiology (Amaryllis, daffodil) Management of vegetable growing Soil-sickness caused by replanting (tomato, egg plant, cucumber) Types of cropping in vegetables Management of vegetable cropping Entomology, horticultural pests Disease and pest control in horticulture - Edogawa Branch Management of vegetable cropping Blanching and forcing of vegetables (udo, cucumber) Breeding of vegetables (tomato, cucumber, cabbage)	Fujino-chō, Tachikawa, Tokyo Dir.: Dr. S. Suzuki Chief: Dr. S. Motohashi K. Tasaka N. Iwami S. Ida T. Sekiguchi K. Ashikawa/S. Hijikata M. Matsumoto H. Tsurushima T. Kudō K. Tamura T. Nakausa S. Kurihara S. Hashimoto M. Nagasawa Z. Abe Chief: H. Kawakami N. Sawachi H. Maeda

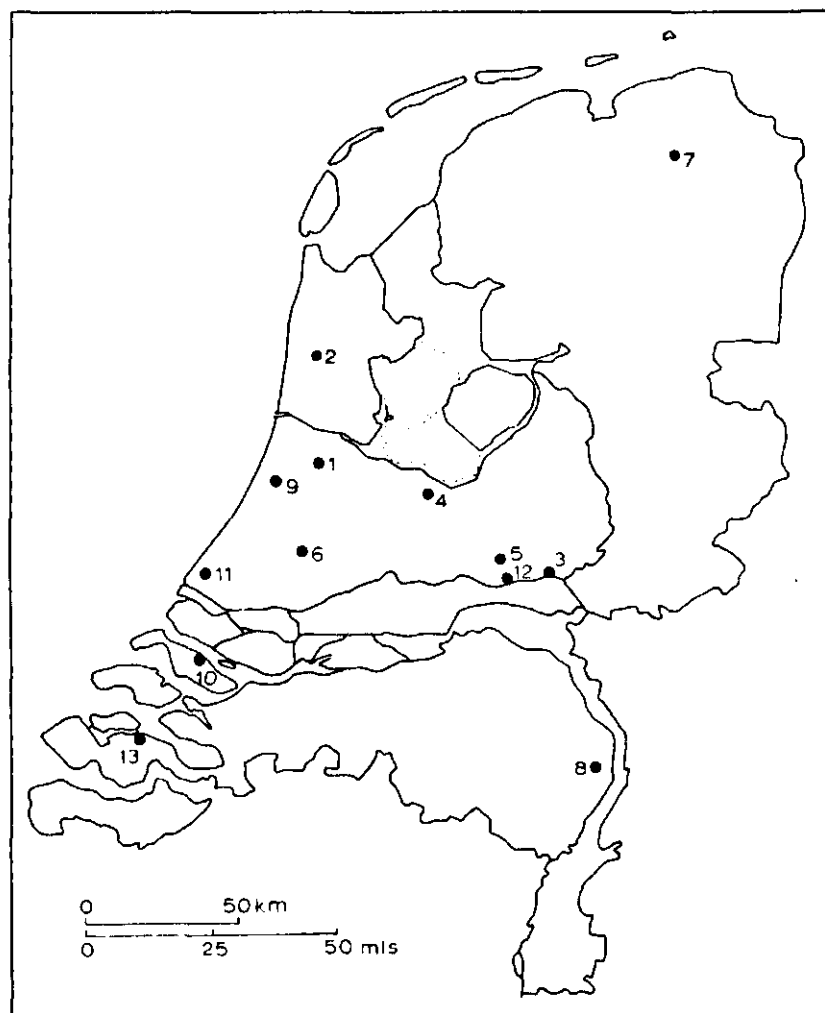
Seat/Nature of program	Institution and projects	Address and staff
Continuation of Tokyo (40.9)	Physiology and ecology in vegetable growing (lettuce, cauliflower) Floriculture, chemical sterilization of cultural instruments Soil and fertilizer Publ.: Annual Report	Y. Takahashi H. Tanaka T. Sawada
41 Tottori	Tottori Prefectural Experiment Station	Yoshinari, Tottori, Tottori-pref.
41.1 Vegetables	Agronomy Vegetable growing	Dir.: S. Kudo S. Miyazaki
41.2 General horticulture	Tottori Prefectural Agricultural Experiment Station, Saihaku Branch General horticulture Vegetable growing Disease and pest control Floriculture Publ.: Bull. Tottori Pref. Agr. Exp. Stat. (ann.)	Ōsawa, Watari-chō, Sakaminato Tottori-pref. Dir.: M. Nishimura Y. Negura/M. Funaba M. Nakahara T. Kondo
41.3 Fruit	Tottori Prefectural Fruit Tree Experiment Station Pomology, agricultural management Physiology, ecology, effect of bagging on the Japanese pear fruit, chemical protection of fruit surface injury Economical survey of Japanese pear growing, chemical cultivation of orchards Plant protection, black spot Physical investigation of orchard soils Plant physiology, ecology, varietal trials, chemical thinning Irrigation in sand hill cultivation (grape) Labour saving in persimmon growing Plant physiology, sugar content of fruit and wave-length of light Insect and pest control Physical character of orchard soil Growth of grape on sand hill area Publ.: Bull. Tottori Pref. Fruit Tree Exp. Stat. (irr.)	Matsugaoka, Akasaki-chō, Tohaku-gun, Tottori-pref. Dir.: A. Yamada K. Yoneyama M. Yamada H. Udagawa M. Uraki Y. Sato Y. Yamashita K. Urushibara/A. Tanaka N. Nanjyō H. Fukuda I. Sakamoto R. Hirota
41.4 General horticulture	Tottori University, Laboratory of Horticulture, Faculty of Agriculture Physiology, nutrition of fruit trees (persimmon, Japanese pear) Physiology of fertilization, storage of pollen (persimmon, grape) Floriculture, growing, breeding (Hippeastrum, Iris, Gladiolus) Publ.: Bull. Fac. Agr. Tottori Univ.	Yoshikata, Tottori, Tottori-pref. Prof. dr. S. Hayashi Ass. prof. I. Wakizaka M. Yamane
41.5 General horticulture	Tottori University, Sand Dune Laboratory, Faculty of Agriculture Floriculture, production of bulbs, irrigation of up-land and sand dune area (tulip, Gladiolus, Lycoris) Physiology, growing of vegetable crops (yam, melon) Floriculture, growing (tulip) Publ.: Bull. Sand Dune Lab., Tottori Univ.	Hamasaka, Tottori, Tottori-pref. Prof. dr. S. Tōyama Ass. prof. I. Sato Y. Takeuchi
42 Toyama	Toyama Prefectural Agricultural Experiment Station, Tonami Branch of Horticulture	Hanazono-chō, Tonami, Toyama-pref.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Toyama (42.1)	Floriculture, breeding (tulip) Growing of bulb flowers, breeding (tulip) Vegetable growing and breeding Do., polyploidy (squash) - Uozu Branch Pomology Disease and pest control Fruit tree growing Publ.: Bull. Tonami Branch Hort. Toyama Pref. Agr. Exp. Stat. (ann.)	Dir.: T. Toyoda K. Nishii/K. Tsutsui/ T. Ogura H. Nishikawa/K. Kida K. Ara Chief: T. Odake A. Taguchi H. Sadabe
43 Wakayama	Wakayama Prefectural Agricultural Experiment Station	Ota, Wakayama, Wakayama-pref.
43.1 General horticulture	Genetics of field crops, vegetable breeding - Horticultural Division Floriculture, management of greenhouses Breeding of ornamental plants Vegetable growing in greenhouses Vegetable breeding Physiology, vegetable growing in warm climates Cultural methods in vinyl house Publ.: Annual Report	Dir.: Y. Shiizaki K. Yamamoto M. Otani K. Hirohata H. Sakaguchi T. Nakasuji M. Naitō
43.2 Fruit	Wakayama Prefectural Fruit Tree Experiment Station Pathology and entomology of citrus - Cultural Division Abnormal defoliation of citrus, soil survey of orchards after paddy fields, survey of climatic conditions of orchards Stock-scion relationship, selection of productive citrus strains, prevention of fruit drop of citrus by gibberellin Selection of lemon strains, sod culture and soil management Orchard irrigation problems, abnormal defoliation of citrus Breeding of citrus by nucellar seedlings, physiology of flower bud differentiation and fruit setting, chemical fruit thinning - Pathology and Entomology Division Resistance of the citrus red mite to insecticides, control of citrus pests, prediction of occurrence of citrus pests Citrus plant viruses, bionomics and control of citrus diseases (scab, canker, melanose), forecasting of occurrence of citrus diseases Bionomics of the San José scale, natural enemies of citrus pests, forecasting of occurrence of citrus pests - Soil and Fertilizer Division Soil fertility and productivity of orange; improvement of P₂O₅ application to citrus orchards; screening of new fertilizers - Kihoku Branch Entomology, pest control in persimmon, natural enemies and biological control of insects Physiology, prevention of fruit drop of orange by gibberellin, soil conditioner	Oku, Kibi-chō, Arita-gun, Wakayama-pref. Dir.: T. Isigai Chief: S. Azuma Y. Kinoshita M. Ozaki E. Tomita J. Morimoto Chief: S. Hatta S. Yamamoto M. Matuura Chief: B. Yamamura/ A. Udo/S. Yamasaki Chief: H. Ueno M. Nakatani

Seat /Nature of program	Institution and projects	Address and staff
Continuation of Wakayama (43.2)	Artificial pollination, selection of new persimmon strain, screening of new herbicides for orchards Water management in persimmon orchards, soil improvement of orchards, breeding of new plum strain (P.mume) - Natsudaaidai Branch for natsudaaidai orange (Citrus natsudaaidai Hayata) Survey of new strains, rootstock problems, studies on fruit drop and granulation phenomena in winter Publ.: Annual Report	S.Yamashita Y.Matsuyama/M.Kadota Chief: O.Miki/ T.Shintani
44 Yamagata 44.1 General horticulture	Yamagata Prefectural Agricultural Experiment Station Entomology (rice) - Horticultural Division Vegetable growing and breeding Vegetable breeding Vegetable growing - Okitama Branch Fruit tree growing, physiology, ecology (grape, pear) - Sand Dune Branch Vegetable growing, breeding, mulching, irrigation Vegetable growing, breeding, varietal trials (melon), floriculture, irrigation, weed killers (tulip) Fruit tree growing, irrigation, stock-scion relationships, gibberellins (pear, grape) Publ.: Annual Report	Mikka-machi, Yamagata, Yamagata-pref. Dir.: Dr. K.Okazaki Chief: M.Kakizaki T.Aizawa T.Miura/H.Suzuki Chief: T.Suzuki Chief: K.Hayashi T.Umemoto/S.Itō S.Suzuki
44.2 General horticulture	Yamagata University, Laboratory of Horticulture, Faculty of Agriculture Vegetable growing and breeding (onion, bulb crops, Chinese cabbage) Physiological injury of fruit, selection of dwarf stock (apple) Surface injury of fruit (pome and vegetables) Publ.: Bull.Yamagata Univ., Agr.Sci. (ann.); Journ. of Yamagata Agr.and For. (ann.)	Shinyashikicho, Tsuruoka, Yamagata-pref. Ass.prof.dr.T.Aoba Ass.prof.dr.T.Tomana S.Watanabe
45 Yamaguchi 45.1 General horticulture	Yamaguchi Prefectural Agricultural Experiment Station Agronomy (rice, potato, beet) - Horticultural Division General floriculture Cultural improvement of fruit trees (Japanese pear, peach, chestnut, grape) General vegetable growing and breeding Floriculture (orchid, Gladiolus) - Hagi Citrus Branch Cultural improvement of citrus (Citrus natsudaaidai) Entomology - Tokusa Branch General vegetable growing Publ.: Annual Report	Mihori, Ōuchi, Yamaguchi, Yamaguchi-pref. Dir.: S.Nishimura Chief: M.Nomura K.Okamura/T.Teranuma H.Yoshiyama/S.Matsubara N.Sato Uenobara, Hagi, Yamaguchi-pref. Dir.: S.Utsui K.Nohara Tokusanaka, Ato, Abu, Yamaguchi-pref. Dir.: G.Kobayashi/ H.Hayashi

Seat/Nature of program	Institution and projects	Address and staff
45.2 <i>Citrus</i>	Yamaguchi Prefectural Agricultural Experiment Station, Oshima Citrus Branch Wind breaks for orchards, salt injury of citrus Disease and pest control of citrus orchard Citrus culture practice Method of soil and fertilizer investigation Publ.: Annual Report	Higashi-agenoshō, Tachibana-chō, Oshima-gun, Yamaguchi-pref. Dir.: S.Ogasawara Y.Inaba H.Ito H.Nakayama
45.3 <i>General horticulture</i>	Yamaguchi University, Laboratory of Horticulture, Faculty of Agriculture General Horticulture Vegetable growing Floriculture analysis of colour pigments of flowers (rose) Publ.: Bull.Fac.Agr.Yamaguchi Univ.	Ege, Chōfu-chō, Shimonoseki, Yamaguchi-pref. Prof.F.Yatomi Ass.prof.K.Koga K.Arizumi
46 <i>Yamanashi</i>	Suntory Research Institute of Crops for Brewing	Onta, Futaba-chō, Kitakoma-gun, Yamanashi-pref.
46.1 <i>Viticulture</i>	Grape breeding Grape growing and breeding Nutrition and physiological study on grapevine Ripe-rot disease of grape	Dir.: dr. H.Terami S.Chudō Dr.T.Hiroyasu Dr.K.Ishii
46.2 <i>General horticulture</i>	Yamanashi Prefectural Agricultural Experiment Station Equipment: Infra-red spectrometer, growth chamber Agronomy - Horticultural Division Vegetable growing, physiology, cultural improvement Vegetable growing, breeding, photo-periodism, ecological studies for high-land area Vegetable growing, physiology Floriculture Publ.: Bull.Yamanashi Pref.Agr.Stat.(ann.)	Shinohara, Ryuō-chō, Nakakoma-gun, Yamanashi-pref. Dir.: K.Marusugi K.Marusugi Chief: H.Yamamoto Dr.S.Iwama Y.Iguchi/A.Takayana A.Niitsu
46.3 <i>Fruit</i>	Yamanashi Prefectural Agricultural Experiment Station, Fruit Tree Branch Pomology, breeding, growth regulators, gibberellins (grape) Plant physiology, cultural improvement, nutrition (peach)	Manriki, Yamanashi, Yamanashi-pref. Dir.: T.Kishi T.Ōno
46.4 <i>General horticulture</i>	Yamanashi Prefectural Agricultural Experiment Station, Yatsugatake Branch Vegetable growing, plant physiology, cultural improvement (edible herbs, root vegetables) - Horticultural Division Fruit tree growing, plant physiology, irrigation	Kamijyō, Nagasaka-chō, Kitakoma-gun, Yamanashi-pref. Dir.: H.Kobayashi M.Tasaki
Yokohama	see 19.4 Kanagawa	

The Netherlands



1. Aalsmeer, 2. Alkmaar, 3. Arnhem, 4. Baarn, 5. Bennekom, 6. Boskoop, 7. Groningen, 8. Horst, 9. Lisse, 10. Middelharnis, 11. Naaldwijk, 12. Wageningen, 13. Wilhelminadorp

General Survey

The centre of agricultural research in the Netherlands is Wageningen (pop. 23.000), a town in which is established the State Agricultural University with two horticultural departments, namely the Horticultural Laboratory and the Department of Landscape Architecture, and in addition a great number of agricultural and horticultural institutions.

The first government agricultural experimental station in the Netherlands was set up in Wageningen in 1877, especially for carrying out research on fertilizers, feeding stuffs and seed. In the next decades were established the Plant Protection Service, the In-

stitute for Phytopathology and an extensive trial field system, all of which were of direct significance to horticulture. In 1936 the first scientific horticultural institute was founded in Wageningen, namely the Institute for Research on Storage and Processing of Horticultural Produce (IBVT). In 1943 and 1944 these were followed by the Institute of Horticultural Plant Breeding (IVT) and the Institute of Horticultural Engineering (ITT). In 1949 the Institute of Phytopathological Research (IPO) was added. In other cases one institute is responsible for the research work concerning a specified subject in both agriculture and horticulture, for example in biology (Arnhem), pedology (Bennekom near

Wageningen), soil fertility (Groningen), insecticides (Wageningen), plant diseases (Wageningen), application of atomic energy (Wageningen), land and water management (Wageningen).

These institutes are all established by the government, which means that their staff have the status of public servants and that the institutes have an autonomous character and are, therefore, independent of the Agricultural University. Nevertheless there is a pleasant and close co-operation between the institutes and the corresponding departments of the Agricultural University. It is generally held that research work in the University should be fundamental and free and in the institutes fundamental and applied, but that both should be dealing with specified current problems. It is difficult to draw a hard and fast line because individual interests of the professors may mean that fundamental projects are studied in the Agricultural University with specially provided equipment. This also applies to the other Government Universities.

Further "Wageningen" has some research institutes that render special services, namely the Plant Physiological Research Centre (CPO), the Service Institute for Applied Mechanics and Technical Physics in Agriculture (TFDL) and the Central Workshop (CW). The services rendered include special work on behalf of agricultural and horticultural research. These foundations are generally managed by representatives of the agricultural organizations in order to accelerate the dissemination of experimental results and to incorporate relevant results into agricultural practice. When co-ordination is one of the duties of the committee some public servants are also members of the committee. The institutes almost invariably receive more than 70 per cent of their funds from the government. The balance is provided from payments for services rendered and subsidies from trade and industry.

Research Stations. In each of the seven most important horticultural areas there are research stations for specialized branches of horticulture, there being one for floriculture (Aalsmeer), vegetable growing in the open (Alkmaar), arboriculture (Boskoop), mushroom growing (Horst), flowerbulb growing (Lisse), vegetable and fruit growing under glass (Naaldwijk) and fruit growing (Wilhelminadorp). At these stations applied research

is carried out for the whole country. This often consists in elaboration of results of research done by the institutes. An exception is plant growing, a field in which there is no institute but in which all research stations render integral, synthesizing services. To make the research work of the specialists more effective some of them may be drafted to research stations. There, they are in the centre of their particular horticultural field and thus should find a stimulating environment for their work.

With two exceptions, the research stations have sprung from regional experimental gardens, 40 of which during the course of time were laid out on the local initiative of growers. As these experimental gardens were confronted with the daily problems of the market and as they set a good example, they were eminently suited to serve as an advisory aid and provided investigation machinery for the regional extension officers. That some were promoted to the rank of research stations was due to the concentration of certain branches of horticulture and the need to link up the research work at the institutes with the existing experimental gardens and with horticultural practice. These research stations formally date from the fifties. They appear to supply a need, are highly praised by trade and industry and are half financed by them, the other half being paid by the government. They have in course of time been, or will shortly be, provided with modern buildings, glasshouses, cold stores and a phytotron.

Co-ordination. To obtain a good mutual adaptation of research programmes, a well-balanced total research machinery and, linked up with it, an effective application of available means, a number of organs has been set up. At the top is the National Council for Agricultural Research, consisting of representatives of trade and industry, of science (Agricultural University and Royal Academy of Sciences) and of the government; this council advises the Minister of Agriculture and Fisheries on subsidy budgets. The National Council which is affiliated to the Netherlands Organization for Applied Scientific Research (TNO) is in turn advised on fundamental affairs by the section committees, which are in principle composed of representatives of trade and industry, science and the government. Thus the committee deals with the budgets of all the horticultural institutes and experimental stations, studies

new developments and advises on urgent affairs falling outside the budget discussions. To ensure a better linking up of research, horticultural practice and the horticultural advisory service and to promote a close relation between research and advisory work, the Director of Horticulture is ex officio chairman of this section committee.

The Secretary guides the activities of four committees, namely for Fruit Growing, Vegetable Growing, Floriculture and Arboriculture. In these committees consideration is given to technical matters concerning research, programmes of institutions, etc. These committees consist of representatives of trade and industry, the director of the appropriate research station, three government horticultural advisers and a professor of the Agricultural University.

In addition to these three general organs, there are numerous committees and working parties, in which research workers meet to exchange experiences and discuss research programmes, prevent duplication and agree on what work each will do.

New developments which are not financially well-supported and which as yet do not fit into the programme of an existing organization are generally looked after and financed for some years by the National Council for Agricultural Research. For this purpose the Council has some funds of its own and may

appoint temporary staff to the Netherlands Organization for Applied Scientific Research (TNO). An example of this is the project of the harmonic control of pests and diseases.

Publications. A report of current research is annually published in Dutch in the series "Tuinbouwkundig Onderzoek" (Horticultural research in the Netherlands). The objective of these reports is mainly to stimulate the co-operation between research workers and to avoid any overlap of work. The reports are classified according to subject and have a provisional character.

The results of horticultural research are published in journals and in annual reports and the communications of the various horticultural institutions. The principal journals are: "Mededelingen van de Directie Tuinbouw" (monthly, for the Horticultural Advisory Service), in Dutch with English summaries; "Mededelingen van de Landbouwhogeschool" (journal of the Agricultural University), in Dutch with English summaries, and also, generally, articles in English; "Tijdschrift voor Planteziekten" (Journal of Plant diseases), fortnightly, in Dutch with English summaries, often articles in English; Netherlands Journal of Agricultural Science, quarterly, in English; Euphytica, Netherlands Journal of Plant Breeding, quarterly, in English.

Seat/Nature of program	Institution and projects	Address and staff
1. Aalsmeer 1.1 Floriculture	Proefstation voor de Bloemisterij/ <i>Research Station for Floriculture</i> Foundation with state grants. Phytopathology: fungical and bacterial diseases Phytopathology: virus diseases Soil science; physical and chemical quality of the soil and fertility Breeding: resistance, carnation, gerbera Physiology	Linnaeuslaan 2A, Aalsmeer Dir.: Dr. J. Wasscher Dr. G. Scholten Ir. F. A. Hakkaart Ir. R. Arnold Bik Miss Ir. L. Leffring Dr. ir. W. Sytsema
2. Alkmaar 2.1 Vegetables	Proefstation voor de Groenteteelt in de Volle Grond/ <i>Research Station for Vegetable Crops in the Open</i> Foundation with state grants; ca. 3,5 ha experimental fields. Mycology and virology Land and water management research Asparagus Witloof chicory and mechanization Nematology Onions Soil science Plant physiology Early potato breeding and vegetable plant production research Plant production research for canning industry Insect pests Plant production research Work analysis Weed control	Hoeverweg 6, Alkmaar Dir.: Ir. J. van Kampen Dep. dir.: Ir. H. Jonge Poerink Drs. J. J. M. van Bakel Ir. Th. J. Bredero Ir. A. A. Franken Ir. H. Jonge Poerink Ir. C. Kaai Ir. J. van Kampen Ir. J. H. Pieters Dr. W. A. Wiebosch J. Betzema Tj. Buishand J. Ph. van Driest J. P. Koomen J. A. Schoneveld J. G. Verlaat
3. Arnhem 3.1 Biology	Instituut voor Toegepast Biologisch Onderzoek in de Natuur (ITBON)/ <i>Institute for Biological Field Research</i> Foundation under supervision of the government. - Communities of the soil Soil fauna: general Soil fauna: worms Soil fauna: systematics Soil ecology Soil microbiology Soil mycology Influence of biocides - Game damage and game management Waterfowl and red deer Roedeer, seals and dissection Birds - Landscape ecology Landscape ecology, general Population dynamics Social insects - Pests Injurious birds Injurious forest insects Persistent insecticides in the animal community	Kemperbergerweg 11, Arnhem Dir.: Dr. A. D. Voûte Dep. dir.: Dr. J. van der Drift Dr. ir. J. A. van Rhee J. H. de Gunst G. Minderman Miss dr. J. Went Mrs. drs. H. M. Nagel-de Boois H. F. H. Blankwaardt J. A. Eygenraam Dr. J. L. van Haften Drs. W. J. Doude van Troostwijk Dr. R. J. van der Linde Ir. P. Gruys/Dr. H. M. den Boer Drs. E. T. G. Eltor Drs. C. W. Stortenbeker D. Doom Drs. P. Fuchs
4. Baarn 4.1 Phytopathology	Phytopathologisch Laboratorium "Willie Commelin Scholten"/ <i>Phytopathological Laboratory 'Willie Commelin Scholten'</i>	Javalaan 20, Baarn Dir.: Miss prof. dr. L. C. P. Kerling

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Baarn (4.1)	Foundation with relations to the Municipal and Protestant Universities of Amsterdam and the State University of Utrecht. Virology: interactions between plants and viruses, tissue-cultures Physiology, pathology Soil borne diseases Bacterial diseases of plants Virus transport Fundamental research of the Dutch elm disease Diseases caused by fungi Breeding and selection of elm clones resistant to the Dutch elm disease	Miss dr. D. H. Brants (Mun. Un. Amsterdam) Dr. H. H. Sol Dr. B. Schippers A. de Lange G. T. N. de Leeuw D. Elgersma J. van den Heuvel Ir. H. M. Heybroek (Forest Res. Stat. TNO, Wageningen)
5. Bennekom 5.1 Soil science	Stichting voor Bodemkartering (Stiboka) / <i>Soil Survey Institute</i> Foundation under supervision of the Government. - General Affairs Soil chemistry and physics Foreign countries Information Projects Administration - Application Department Arable land Grassland Horticulture Forestry Hydrology Regional research north Regional research east Regional research west Regional research south - Mapping Department Commissioned surveys Northern area Eastern area Western area Southern area Map coordination Cartography Publications Library - Research Department Soil classification Geology, paleobotany, diatoms research Mineralogy Historical geography Micropedology Regional research	Bovenweg 7, P.O. Box 10, Bennekom Dir.: Dr. ir. F. W. G. Pijls Dep. dir.: Ir. R. P. H. P. van der Schans Advisor: Ir. J. van der Linde Dr. H. W. van der Marel Dr. J. Bennema Ch. J. M. Kraanen Th. J. Bekking J. G. van Hall Head: Dr. J. C. F. M. Haans Dr. ir. L. A. H. de Smet Ir. E. J. van Zuilen Ir. J. G. C. van Dam Ir. K. R. Baron van Lynden Ir. P. van der Sluys Dr. ir. L. A. H. de Smet (acting) Ir. J. N. B. Poelman Ir. P. du Burck Dr. D. van Diepen Head: Ir. R. P. H. P. van der Schans Ir. G. J. W. Westerveld / Ir. A. F. van Holst Ir. B. van Heuveln Ir. J. C. Pape / Ir. J. M. Knibbe Ir. C. van Wallenburg Ir. J. M. M. van den Broek / Ir. M. F. van Oosten Ir. G. G. L. Steur J. P. Heerema J. J. Jantzen Ir. F. C. van Loenen Head: Dr. J. Schelling H. de Bakker Prof. dr. G. C. Maarleveld Dr. R. D. Crommelin Mrs. dr. A. W. Edelman-Vlam Dr. A. Jongerius Dr. I. S. Zonneveld
6. Boskoop 6.1 Arboriculture	Proefstation voor de Boomkwekerij / <i>Research Station for Arboreal Nursery Crops</i> Society with state-grants. Recent extension: a complex of special nursery glasshouses. Propagation Crossing and selection Weed control	Valkenburgerlaan 3, Boskoop Dir.: Ir. C. Dorsman Ir. B. C. M. van Elk Ir. F. Schneider H. J. van de Laar

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Boskoop (6.1)	Pest and disease control Home economics of the nursery industry Labour efficiency in the nursery industry	Ir. I. Blok J. F. B. M. Schupper H. L. van Loon
7. Groningen 7.1 Soil science	Instituut voor Bodemvruchtbaarheid (IB)/ <i>Institute for Soil Fertility</i> Foundation under supervision of the Government. - Department of Fertilization in Horticulture	Van Hallstraat 3, Groningen Dir.: Drs. P. Bruin Dep. dir.: Ir. R. Reuderink Head: Ir. J. van der Boon
8. Horst 8.1 Mush-rooms	Proefstation voor de Champignoncultuur/ <i>Mushroom Research Station</i> Foundation with state-grants. Economics of mushroom growing, general Practical growing methods; composting Microbiology and biochemistry of composting Publ.: "De Champignoncultuur" (10 issues p. year), in Dutch.	Venraysche weg 101, Horst Dir.: Drs. P. J. Bels Drs. P. J. Bels Mrs. dr. H. C. Bels-Koning Drs. J. P. G. Gerrits
9. Lisse 9.1 Bulbs	Laboratorium voor Bloembollenonderzoek/ <i>Bulb Research Laboratory</i> Practical work Virology Mycology Biochemistry Plant physiology Nematology Mycology and bacteriology Serology Electron microscopy	Heereweg 345, Lisse Dir.: Prof. dr. ir. P. K. Schenk Head: Drs. A. F. G. Slootweg Ir. C. J. Asjes/Ir. D. H. M. van Slogteren/Miss M. C. Cremer Dr. B. H. H. Bergman Drs. J. C. M. Beijersbergen Dr. G. A. Kamerbeek/Drs. W. J. de Munk Dr. G. Kooistra Dr. G. J. Saaltink Miss N. P. de Vos B. Kuyper
10. Middelharnis 10.1 Onions	Stichting Nederlandse Uien-Federatie/ <i>Foundation Dutch Onion Federation</i> Association of growers, trade and industry with research institutes to promote and co-ordinate research, growing and storing projects on onions, in near cooperation with the Ministry of Agriculture. During the last years especially the onion breeding projects have been extended to find neck rot and white rot resistant strains and onions of excellent keeping quality as well, by means of mutations. Leading and co-ordination of scientific research for onions and shallots, with special interest for breeding projects Growing and storing problems Crop growing	Hoflaan 34, Middelharnis Dir.: Ir. J. van Kampen, Hoeverweg 6, Alkmaar Dep. dir.: J. L. Koert D. Hooghiemstra/C. de Geus/ D. Hoek/J. Meijer
11. Naaldwijk 11.1 Glass-house crops	Proefstation voor de Groenten- en Fruitteelt onder Glas/ <i>Glasshouse Crops Research and Experimental Station</i> Foundation with state-grants. Planned: a new station including a phytotron and a number of special research glasshouses. Horticultural economics - Department of Crop Cultivation Cultivation and variety trials	Zuidweg 38, Naaldwijk Dir.: Ir. W. van Soest Research leader: Ir. Y. van Koot Ir. J. M. Jacobs Head: Dr. ir. G. P. Termohlen

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Naaldwijk (11.1)	Horticulture: cultivation of vegetable crops - Department of Pests and Diseases Chemical and biological control of pests and diseases Entomology: damage caused by insects and other arthropods Phytopathology: botrytis and other fungus diseases Phytopathology: virus diseases - Department of Physiology Growth regulation substances and photoperiodism Physiology: CO ₂ application Physiology: uptake of nutrients - Department of Soil Science Soil analysis and quality of irrigation water Evapotranspiration and irrigation methods Fertilizer experiments	Ir. A. A. N. Sweep Head: Dr. ir. L. Bravenboer Miss W. M. Th. J. de Brouwer Dr. K. Verhoeff Ir. A. Th. B. Rast Head: Dr. ir. P. J. A. L. de Lint Ir. N. van Berkel Ir. L. S. Spithout
12. Wageningen	Centrum voor Plantenfysiologisch Onderzoek (CPO)/Plant Physiological Research Centre	Bornsesteeg 47, P.O. Box 52, Wageningen Dir.: Dr. I. de Haan Dep. dir.: Dr. J. van Die
12.1 Plant physiology	Government foundation. Special physiological research projects on request of and in cooperation with research stations and institutions. Root exudates and crop residues Chemical regulation of growth and development Synthesis and translocation of organic nitrogen compounds in plants (tomato) Hydroponics and mineral nutrition Incompatibility of scion and rootstock (Cucurbita), translocation of organic substances in plants Research on growth promoting substances	Miss drs. S. de Boer Dr. J. Bruinsma Dr. J. van Die A. A. Steiner Dr. H. C. M. de Stigter
12.2 Preservation and Processing	Instituut voor Bewaring en Verwerking van Tuinbouwproducten (IBVT)/Institute for Research on Storage and Processing of Horticultural Produce Foundation under supervision of the Government. - Economical Department Economics, management, statistics - Processing Department General problems Canning, freezing, microbiology Dehydration, concentration - Special Research Department General problems Biochemistry Biology Radiation research - Storage Department General problems Grading, packing, transport Storage - Technical Department Physics Refrigeration and heating	Dr. H. Veen Haagsteeg 6, P.O. Box 17, Wageningen Dir.: Ir. T. van Hiele Dep. dir.: L. de Vos Drs. P. Greidanus Ir. L. Gersons Ir. E. Steinbuch Ir. J. C. Mettievier Meyer L. de Vos Ir. S. B. Thung/ Miss ir. Chr. E. M. Berkholst Drs. O. L. Staden Ir. W. S. Duvekot Ir. N. Stenvers Dipl. ing. H. F. Th. Meffert Ir. F. H. Fockens
12.3 General horticulture	Instituut voor Biologisch en Scheikundig Onderzoek van Landbouwgewassen (IBS)/Institute for Biological and Chemical Research on Field Crops and Herbage	Bornsesteeg 65 and 67, P.O. Box 14, Wageningen Dir.: Prof. dr. ir. G. J. Vervelde

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.3)	Foundation under supervision of the Government. Weed control in horticulture Green manuring Soil biology	Dr. ir. J. L. P. van Oorschot/ D. van Staalduine Dr. ir. W. A. P. Bakermans Dr. ir. J. Doeksen
12.4 Land and water management	Instituut voor Cultuurtechniek en Waterhuishouding (ICW)/ <i>Institute for Land and Water Management</i> Netherlands Government Foundation. - General Affairs Publications Library Administration - Department of Economics Regional economics Farm economics - Department of Land Development Projects Execution techniques Grassland Arable land Horticultural areas - Department of Land Division Planning, design and execution techniques Parceliation research Farm and traffic research Physical planning - Department of Soil Improvement Sandy soils Peat soils Clay soils - Department of Special Research Physics Mathematics Laboratory - Department of Water Management Hydrogeology Hydrology Water consumption Water supply Soil aeration Water discharge Water management in horticulture Regional water management	Prinses Marijkeweg 17 P.O. Box 35, Wageningen Dir.: Prof. dr. ir. C. van den Berg Dep. dir.: Ir. W. C. Visser Ir. E. W. Schierbeek Drs. ir. L. F. Abell G. M. Green Head: Ir. C. Bijkerk Drs. L. J. Locht Ir. G. C. Meijerman Head: Ir. C. Bijkerk Ir. A. J. Flach Ir. J. A. Kester Ir. C. G. J. Oostrom Head: Ir. C. Bijkerk Ir. C. van Gelderen Ir. J. W. Righolt Ir. P. Spijk Head: Ir. G. P. Wind Dr. ir. F. A. M. de Haan Ir. A. P. Hidding Head: Ir. W. C. Visser Dr. L. F. Ernst Ir. Ph. Th. Stol Ir. W. P. Stakman Head: Ir. W. C. Visser Dr. N. A. de Ridder Dr. ir. J. Wesseling Dr. ir. P. J. Rijtema Ir. A. J. Hellings Ir. J. W. Bakker Ir. J. Bon Dr. ir. J. F. Bierhuizen/Ir. Th. J. Bredero/Ir. C. J. van der Post/ Ir. G. G. M. van der Valk Ir. J. J. Kouwe/Ir. J. A. van 't Leven
12.5 Phytopathology	Instituut voor Plantenziektenkundig Onderzoek (IPO)/ <i>Institute of Phytopathological Research</i> Foundation under supervision of the Government. Recent developments: methods for application of biochemistry in virus research. - Department of Agricultural Aviation Research and advice on agricultural aviation i.e. spraying against insects, fungi and weeds; research on aerial spraying techniques - Department of Biochemistry and Application of Radioactive Isotopes Biochemistry of root exudates Use of radioactive isotopes as tracers Biochemical differences between healthy and diseased plants	Binnenhaven 12, Wageningen Dir.: Dr. J. G. ten Houten Dep. dir.: Dr. H. J. de Fluiter Miss M. C. Kerssen Drs. C. Kliffen J. W. P. Noordink Dr. J. H. Venekamp

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.5)	- Department of Entomology Integrated control of pests and diseases, transmission of virus diseases in straw-berries Transmission of virus diseases by leafhoppers, integrated control in orchards Influence of the condition of plant nutrition on the development of sucking insects, in particular Aphids Research on the integrated control of pests in orchards, in particular Tortricids Thrips in agricultural crops Gall midges in horticultural crops, cereals and tree nursery crops Biology and control of <i>Napomyza lateralis</i> Fall. in chicory, the carrot rustfly (<i>Psila rosae</i>) and Aphids in lettuce Influence of the condition of plant nutrition on the development of phytophagous mites Integrated control of fruit tree red spider mites in orchards; biology and behaviour of predatory bugs Behaviour and control of the onion fly (<i>Hy-lemia antiqua</i>) Aphidology - Department of Mycology Storage rot in cabbage and soil sickness of carrot Studies in rhizosphere mycoflora Common scab of potatoes Diagnosis of bacterial plant diseases, methods for testing toxicity of bacterial preparations used as insecticides Resistance of potatoes to <i>Phytophthora</i> Fungal diseases of floricultural crops, in particular of carnation, freesia and gerbera <i>Fusarium</i> and <i>Peronospora</i> in peas and diseases in seedbeets Control of neck rot and white rot of onion and studies in rhizosphere mycoflora Footrot of endive and tomato, <i>Botrytis</i> of vegetables under glass, in particular of tomato - Department of Nematology Biology and control of nematodes of vegetables Research on anatomical changes of plant tissues caused by nematode attack and behaviour of these eelworms Biology of the potato root eelworm and possibilities of control by systemic nematicides Population dynamics, relation between nematode density and damage, biology of stem nematodes, nematodes transmitting plant viruses - Department of Plant Disease Resistance Research and advisory work on plant disease resistance in horticultural crops Research on the genetic relationship between races of yellow rust and the resistance genes of wheat and barley Development of test methods for plant disease resistance, in particular to club root in crucifers, downy mildew in lettuce and neck rot in onion	Dr.H.J.de Fluiter Dr.H.H.Evenhuis Drs.P.Harrewijn Drs.D.J.de Jong W.P.Mantel W.C.Nijveldt Drs.L.F.van 't Sant Drs.J.J.H.Storms M.van de Vrie D. Hille Ris Lambers (advisor) Drs.J.M.M.van Bakel Ir.J.H.van Emden Ir.R.E.Labruyère Drs.H.P.Maas Geesteranus Dr.J.C.Mooi Dr.G.Scholten Dr.ir.J.van der Spek G.M.Tichelaar Dr.K.Verhoeff Ir.C.Kaai Miss dr.C.H.Klinkenberg Ir.H.den Ouden Dr.ir.J.W.Seinhorst Ir.N.Hubbeling Ir.R.W.Stubbs Dr.F.Tjallingii

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.5)	Research and advisory work on plant disease resistance in agricultural crops: Fusarium in cereals - department of Research on Air Pollution Problems Research on gaseous and solid particle air pollution and their effects on plant growth Service research in particular cases of air pollution - Department of Virology Susceptibility of the potato to virus diseases in relation to the age of the plant Test methods for the presence of leafroll, Y^N and other viruses in the potato tuber Virus diseases of leguminous crops, diagnosis of virus diseases Virus diseases of chrysanthemum and carnation Soil-borne viruses and their transmission by nematodes Serology of virus diseases Virus diseases of currants and pome fruits Therapy of virus diseases by means of meristem culture Virus diseases of vegetables, in particular of tomato	Ir. E. Ubels Ir. F. H. F. G. Spierings Ir. A. van Raay Dr. ir. A. B. R. Reemster Dr. ir. J. A. de Bokx Dr. ir. L. Bos Ir. F. A. Hakkaart Dr. ir. H. A. van Hooff D. Z. Maat F. A. van der Meer Miss drs. F. Quak Ir. A. Th. B. Rast
12.6 Atomic sciences	Instituut voor Toepassing van Atoomenergie in de Landbouw (ITAL)/<i>Institute for Atomic Sciences in Agriculture</i> Foundation under supervision of the Government with Euratom contract. Equipment: Radiochemical department with A and B laboratories, counting rooms and a waste treatment installation; Radiobiological department with a 300 and 3000 Curie Cs¹³⁷ gamma source, an X-ray machine, an electron generator and the BARN (Biological Agricultural Reactor of the Netherlands). Problems concerned with radiation-induced changes in plants, food preservation by means of ionizing radiation, behaviour of specific radio-nuclides in soil, plants and animals forming the "food chain" and the use of radioactive substances in biological research. Mutation breeding Dosimetry Cytology Radio chemistry Health physics Food technology Plant physiology Cytogenetics Reactor physics Soil sciences Physics Chemistry Biochemistry	Keyenbergse weg 6, P.O. Box 48, Wageningen Dir.: Dr. ir. D. de Zeeuw Ir. C. Broertjes K. H. Chadwick, M. Sc./Drs. K. Puite Dr. R. M. Ecochard/ir. G. Sauer Dr. M. J. Frissel Drs. H. Hekman Ir. J. G. van Kooy Ir. R. R. Contant/E. Levi, M. Sc./ Dr. ir. A. Ringoet Dr. D. de Nettancourt Drs. W. F. Oosterheert Ir. P. Poelstra Dr. R. V. Rechenmann Ir. F. Stoutjesdijk Miss drs. H. L. Teyema
12.7 Horticultural engineering	Instituut voor Tuinbouwtechniek (ITT)/<i>Institute of Horticultural Engineering</i> Foundation under supervision of the Government.	Dr. S. L. Mansholtlaan 10, Wageningen Dir.: Dr. ir. E. W. B. van den Muyzenberg

Seat/Nature of Program	Institution and projects	Address and staff
Continuation of Wageningen (12.7)	Equipment: various types of glasshouses and heating systems; permanent exhibition of machinery and equipment. - Department of Economics - Department of Glasshouses and Heating Technical research Air conditioning Heating of hothouses Physics Application of electricity Architecture and construction - Department of Horticultural Research Glasshouses Implements and machinery Plastics - Department of Implements and Machinery - Department of Organization and Work Study Organization Work Study - Department of Testing of Horticultural Equipment Publications	Dep.dir.: Ir. E. J. Doedens Drs. S. Kostelijk Ir. B. J. Heijna Ir. R. Koppe/J. Arkenbout P. A. Spoelstra Dipl. Phys. J. A. Stoffers A. van Drenth J. C. Spek Dr. ir. G. H. Germing Ir. E. W. M. Verhey Ir. J. A. Sondern Ir. F. Moltzer/Ir. H. C. P. de Vries Drs. H. K. Krijgsman Drs. R. Vissia C. Wegenaar P. van Gemenen
12.8 Breeding	Instituut voor de Veredeling van Tuinbouwgewassen (IVT)/ <i>Institute of Horticultural Plant Breeding</i> Foundation under supervision of the Government. - Department for Special Research Embryology Floral biology Cytology Physiology Mathematical statistics, biometrics and climate ecology Phytochemistry Disease resistance testing Taxonomy of ornamental plants and street trees Identification, research on varieties Variety testing - Department of Variety and Breeding Research Tomatoes, cucumbers Disease resistance in tomatoes Pulses Leafy vegetables Brassicas, onions and root crops Floral biology and Botrytis resistance in onions Herbs Tree fruits Small fruits Ornamentals Bulbs Arboriculture	Dr. S. L. Mansholtlaan 15, Wageningen Dir.: Dr. ir. O. Banga Dep.dir.: Ir. J. van der Harst Drs. J. P. Braak Ir. Y. O. Kho A. E. Zeilinga Ir. L. Smeets Ir. J. H. A. Ferguson/Miss F. Garretsen Drs. J. W. de Bruyn A. C. van der Giessen Dr. B. K. Boom Ir. B. Kiès/J. A. Leemans W. Koopmans Ir. E. Kooistra Ir. N. Hogenboom Ir. E. Drijfhout Dr. J. A. Huyskes Ir. M. Nieuwhof Ir. Q. P. van der Meer Ir. G. Elzenga Dr. T. Visser Miss dr. ir. H. G. Kronenberg Dr. L. D. Sparnaay Ir. J. P. van Eijk Ir. F. Schneider (stationed at Boskoop [6])
12.9 General horticulture	Landbouwhogeschool/ <i>State Agricultural University</i> Horticultural departments and departments partly dealing with horticulture: a. Afdeling Tuin- en Landschapsarchitectuur/ <i>Department of Landscape Architecture</i> Cooperates closely with various regional and	De Dreyen 7, Wageningen

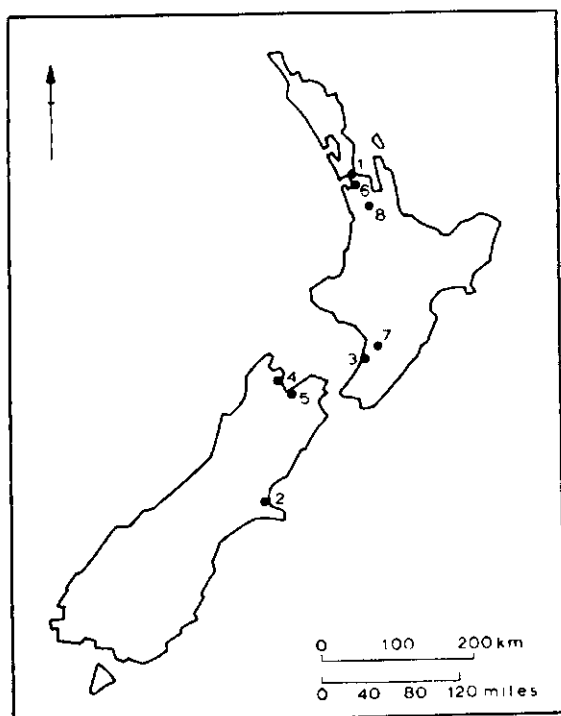
Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.9)	municipal planning offices and with the design staff of the Zuiderzee Reclamations. Courses in European landscape, history of garden art, technique of outlay and upkeep, garden and park planning and design City and regional planning Art appreciation Graphic techniques Folklore and historical rural architecture Toponymy of field names b. Laboratorium voor Fytopathologie/<i>Laboratory for Phytopathology</i> - Department of Nematology Population studies Replanting problem trees Nematicides Taxonomy and morphology Tagetes effects Potato cyst eelworm Host-parasite relationships Predation of nematodes - Department of Phytopathology International therapy of plants, including use of antibiotics Epidemiology Partial soil sterilization Phytoalexins c. Laboratorium voor Landbouwscheikunde/<i>Laboratory for Agricultural Chemistry</i> Soil and crop analysis in relation to horticulture d. Laboratorium voor Plantenfysiologisch Onderzoek/<i>Laboratory of Plant Physiological Research</i> Principal interest in photobiological problems. A new laboratory department, including equipment for controlled environment, is under construction. - Formative effects of light Leaf growth of lettuce as a formative phenomenon Studies on measuring phytochrome Photoperiodism in relation to spectrum, day-length and light intensity, mainly in <i>Hyoscyamus</i> Effects of light and kinetin in <i>Lemna</i> Photoperiodism in <i>Pinus silvestris</i> Effects of light intensity on growth and development of various plant types under controlled conditions and in field experiments; some problems of leaf growth in relation to season; photoperiodicity of tuber formation in potato and some other plants - Photosynthesis Photosynthesis and phosphate metabolism Composition of the pigment-protein system Photosynthesis of crop plants Morphogenesis of the photosynthetic apparatus Photosynthesis and carbohydrate metabolism of virus-attached leaves	Dir.: Prof.dr.ir.J.T.P.Bijhouwer Prof.ir.A.Kraayenhagen Drs.E.R.Meijer F.Aldenberg Drs.J.de Kleyn Mrs.dr.A.W.Edelman-Vlam Rinnenhaven 9, Wageningen Dir.: Prof.dr.A.J.P.Oort Dr.M.Oostenbrink Ir.H.Hoestra Ir.J.van Berkm¹⁾ Drs.P.A.A.Loof Ir.R.Winoto Suatmadji¹⁾ Ir.H.M.Nollen¹⁾ J.J.'s Jacob Ravi Datt Sharma¹⁾ Dr.J.Dekker/Miss dr.Q.M.van Andel/Dr.H.M.Dekhuyzen/Dr.A.Fuchs Dr.J.C.Zadoks Drs.J.G.Rollen Miss drs.A.Elshove De Dreyen 3, Wageningen Dir.: Prof.dr.A.C.Schuffelen Ir.J.C.van Schouwenburg Generaal Foulkesweg 72, Wageningen Dir.: Prof.dr.E.C.Wassink Ir.J.Bensink Dr.C.J.P.Spruit Dr.ir.P.J.A.L.de Lint Ir.J.Rombach Ir.J.H.Wiersma (in cooperation with the Forestry Department) Prof.dr.E.C.Wassink/ Dr.D.W.Lindeman Dr.W.Lindeman Drs.G.H.M.Kronenberg Dr.ir.P.Gaastra Ir.G.A.Pieters Drs.J.L.Verhoeks

1) guest worker

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.9)	Energy conversion problems in mass cultivation of algae - Transpiration Certain environmental factors in relation to water uptake and transpiration e. <i>Laboratorium voor Plantensystematiek en -geografie/Laboratory for Plant Taxonomy and Plant Geography</i> Ecological and taxonomical research: ornamental plants Taxonomical research: ornamental plants Taxonomical research: tropical flora Ecological research Biologisch Station/<i>Biological Station</i> Ecological research. Botany Zoology f. <i>Laboratorium voor Tuinbouwplantenteelt/Horticultural Laboratory</i> New laboratory building and phytotron completed in 1965. Genetics, plant physiology: breeding, mutations, flowering (cyclamen, peas, <i>Silene armeria</i>) Breeding, physiology of flowering (ornamentals, begonia) General management Endogenous rhythms Biochemistry, gibberellins Ecology: flowering of bulbous plants Physiology: growth regulators, rooting, tissue culture Pomology: juvenility, pruning, flower formation Growth and development of vegetables and ornamentals (lettuce, sprouts, <i>Petunia</i>) Cytogenetics and breeding (<i>Delphinium</i>, <i>Clematis</i>) Growth and development of spinach Vernalization in vitro Parthenocarpic fruit growth by gibberellins after early night frosts Vegetable breeding and growing: mutations, artificial light (tomato) g. <i>Laboratorium voor Virologie/Laboratory of Virology</i> Viruses of ornamental plants Mechanism of virus infection Biochemistry of viruses Electron microscopy Viruses transmitted by aphids Virus diseases of insects Recovery of plants from virus infection	Prof. dr. E. C. Wassink/ Drs. J. S. Wesselius Dr. ir. P. J. C. Kuiper/F. Kuiper Generaal Foulkesweg 37, Wageningen Dir.: Prof. dr. H. J. Venema Drs. K. J. W. Hensen/Mrs. N. E. Nannenga-Bremekamp Prof. dr. H. C. D. de Wit/Miss dr. G. J. H. Amshoff/J. J. Bos/ Ir. F. J. Breteler/Dr. A. J. M. Leeuwenberg/Ir. J. J. F. E. de Wilde Miss ir. J. G. Bakker/Drs. E. C. J. Ott Kampsweg 27, Wijster (Dr.) Dr. J. J. Barkman Dr. P. J. den Roer Haagsteeg 3, P.O. Box 30, Wageningen Dir.: Prof. dr. ir. S. J. Welensiek Prof. dr. ir. J. Doorenbos Ir. F. S. Riemer Ir. J. P. M. Bink Dr. ir. J. van Bragt Dr. ir. E. J. Fortanier Miss dr. C. J. Gorter Dr. ir. H. Jonkers Miss dr. ir. H. G. Kronenberg Dr. ir. R. A. H. Legro Ir. J. E. Parlevliet Ir. R. L. M. Pierik Dr. ir. A. Varga Dr. ir. K. Verkerk Binnenhaven 11, Wageningen Dir.: Prof. dr. ir. J. P. H. van der Want Dr. D. Noordam Miss dr. J. Dijkstra Dr. A. van Kammen/Ir. D. Brouwer Ir. T. S. Ie Ir. D. Peters Ir. M. B. Ponsen Ir. E. Rhoda Baruch
12.10 Plant protection	Plantenziektenkundige Dienst (PD)/ <i>Plant Protection Service</i>	Geertjesweg 15, Wageningen Dir.: Dr. N. van Tiel

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wageningen (12.10)	- Horticultural crops: Bulbs Flowers Fruit Nursery stock	Head: Ir. P. H. van de Pol Ir. C. N. Silver Ir. R. Zandvoort Ir. C. A. R. Meyneke Ir. P. J. Taconis
12.11 Engineering	Stichting Technische en Fysische Dienst voor de Landbouw (TFDL)/Service Institute for Applied Mechanics and Technical Physics in Agriculture Foundation under supervision of the Government. Assistance to any state-granted research institution on machinery, electronics and physics, device and development of methods, apparatus and tools. Electron microscopy Electronics, general technics	Dr. S. I. Mansholtlaan 12, Wageningen Dir.: Drs. A. M. K. van Beek Miss drs. C. van der Scheer Ir. G. Borel
13. Wilhelminadorp	Proefstation voor de Fruitteelt in de Volle Grond/Research Station for Fruit Growing in the Open	Kerkstraat 45, Wilhelminadorp Dir.: Ir. G. S. Roosje
13.1 Fruit	Foundation with state grants. Soil science Economics Entomology Phytopathology Small fruit Acarology Top fruit Physiology	Ir. P. Delver Ir. R. K. Elema Drs. P. J. de Jong Dr. D. Mulder/Ir. G. S. Roosje Ir. B. Roelofsen M. van de Vrie Ir. S. J. Wertheim Dr. J. Tromp

New Zealand



1. Auckland, 2. Christchurch, 3. Levin, 4. Motueka, 5. Nelson, 6. Otahuhu, 7. Palmerston North, 8. Te Kauwhata.

Seat/Nature of program	Institution and projects	Address and staff
1. Auckland	Fruit Research Division (Department of Scientific and Industrial Research)	Private Bag, Auckland Dir.: J. D. Atkinson M. Agr. Sc.
1.1 Fruit	Orchard practices, storage, pomology, processing, virus studies, physiology. Physiological and virus disorders of fruit trees Phosphate metabolism Plant nutrition Pomology Plant growth substances Fruit and vegetable processing Tree physiology and cool storage Biochemical factors influencing storage quality Rootstock and variety investigations of pome fruits Fruit culture and cold storage Biochemistry of fruits	J. D. Atkinson M. Agr. Sc. R. L. Bieleski M. Sc., Ph. D. E. G. Bollard B. Sc., Ph. D. / A. R. Ferguson B. Sc. W. E. Booth B. Sc. R. M. Davison M. Sc., Ph. D. D. A. Heatherbelt B. Sc. / G. Strachan B. Sc. D. I. Jackson M. Agr. Sc. D. S. Letham M. Sc., Ph. D. D. W. McKenzie M. Sc., Ph. D. C. A. S. Padfield H. B. Wright B. Sc., Ph. D.
1.2 Plant protection	Plant Diseases Division (Department of Scientific and Industrial Research) Virus diseases of fruit trees and grape vines Fruit tree diseases Fungous taxonomy, plant pathogens Fungous taxonomy: Ascomycetes Bacterial diseases and taxonomy, Xanthomonas, Erwinia, legume culture Vascular pathogens, Stereum purpureum Fungous physiology, tissue culture Virus diseases Pathology, plant protection chemicals Potato diseases, soil borne diseases Fungous taxonomy: Basidiomycetes Soil borne diseases, soil fumigation Bacterial pathology Entomology; insecticides; insecticide resistance Vascular pathogens, Verticillium wilts Tobacco and hop diseases Vegetable pathology, soil borne diseases	Private Bag, Auckland Dir.: E. E. Chamberlain M. Sc., Ph. D. E. E. Chamberlain M. Sc., Ph. D. P. J. Brook M. Sc., Ph. D. Mrs. S. Davison B. Sc., S. A. Menzies B. Agr. Sc. Miss J. M. Dingley M. Sc. D. W. Dye B. Agr. Sc., Ph. D. M. H. Dye M. Sc., Ph. D. Mrs. R. F. Elliot M. Sc. P. R. Fry M. Sc., Ph. D. / A. D. Thomson M. Sc., Ph. D. K. M. Harrow M. Agr. Sc. B. T. Hawthorn M. Agr. Sc. R. F. R. McNabb, M. Sc., Ph. D. F. E. Newhook M. Sc., Ph. D. / G. I. Robertson B. Sc. D. A. Shackleton M. Agr. Sc. D. Spiller B. Sc., Ph. D. J. R. Taylor B. Agr. Sc., Ph. D. Miss E. E. Walker M. A. A. G. Watson B. A.
2. Christchurch	Crop Research Division (Department of Scientific and Industrial Research)	Lincoln, Private Bag, Christchurch Dir.: H. C. Smith M. Agr. Sc., Ph. D.
2.1 Vegetables	Potato breeding; potato virus diseases; potato blight; brassica breeding; club-root, aphid and virus resistance; carrot and tomato breeding for virus resistance. Plant pathology Potatoes Brassicas Vegetable Station Breeding and selection in brassicas, onions, peas, tomatoes, carrots	H. C. Smith M. Agr. Sc., Ph. D. C. M. Driver M. Agr. Sc. T. P. Palmer M. Agr. Sc. Lincoln, Private Bag Christchurch Ir. H. J. Giesen

Seat/Nature of program	Institution and projects	Address and staff
2.2 <i>General horticulture</i>	Lincoln College Horticulture Department: Physiology of root initiation in cuttings, photoperiodism in ornamentals Crop spacing, orchard management factors, integrated control of orchard pests Plant Science Department: Foliar absorption of minerals; root excretion of minerals; root penetration in soils; mineral movement in woody stems; nitrogen fixation in non leguminous plants Agricultural Ecology Department: Resistance of insects to chemicals; control of leaf miners; action of systemics against aphids; biology of predators of orchard pests Agricultural Economic Research Institute: Economics of production in fruit and vegetable industry; locational problems in tomato processing; marketing and market relationships for fruit and vegetables. Biochemistry Department: Mode of action of growth retardants New Zealand Agricultural Engineering Institute: Design and building of sampling equipment	Lincoln College, Canterbury, Christchurch S. Challenger B.Sc. (Hort.), N.D.H. G.F. Thiele B.Agr.Sc. (Hort.) T.M. Morrison, M.Sc., Ph.D. R.A. Harrison, D.Sc., F.R.E.S. Prof. B.P. Philpott M.Com., M.A., A.R.A.N.Z. A.J. Wicken M.A., Ph.D., A.N.Z.I.C. Prof. J.R. Burton B.E.
3. Levin 3.1 <i>Plant protection</i>	Levin Horticultural Laboratory (Department of Agriculture) Diagnostic centre for Horticulture Division; investigation of problems in the field. Plant pathology and nematology Entomology Plant pathology Botany Therapeutants Zoology, entomology	P.O. Box 1, Levin G. Grandison B.Sc. D.C.M. Manson B.Agr.Sc./ L.G. Morrison B.A., B.Sc., B.Agr.Sc., D.P.A. Dr. R.B. Marlatt Ph.D. R.H. Powell M.A. D.A. Slade M.Agr.Sc. (Hort.) Miss M.A. Ward B.Sc. Agr.
3.2 <i>General horticulture</i>	Levin Horticultural Research Station (Department of Agriculture) Experimental work at present mainly on vegetable crops, particularly on nutrition and weed control, glasshouse tomato crops and berry fruits; apple pruning; propagation of roses. Weed control Irrigation Plant nutrition Berry fruit Outdoor vegetables Glasshouse crops	Kimberley Road, Levin Superintendent: W.R. Boyce M.Sc. W.R. Boyce J.S. Dunn B.Sc. H.R. G. Minard B.Sc. L.A. Porter M.Agr.Sc. (Hort.) A.B. Webster B.Sc. Hort., N.D.H. R.A.J. White B.Sc. Hort.
4. Motueka 4.1 <i>Hop</i>	Hop Research Station (Department of Scientific and Industrial Research) Breeding, plant management, technology of drying	Riwaka, R.M.D., Motueka R.H.J. Roborgh Dr. Agr.
4.2 <i>Tobacco</i>	Tobacco Research Station (Department of Scientific and Industrial Research)	R.D. 3, Motueka Dir.: R. Thomson N.D.A.

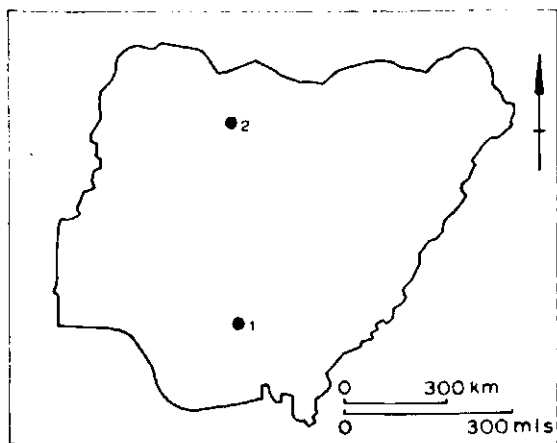
Seat/Nature of program	Institution and projects	Address and staff
Continuation of Motueka (4.2)	Tobacco agronomy Tobacco breeding	R. Thomson N. D. A. D. S. C. Wright M. Agr. Sc.
5. Nelson	Cawthron Institute (Department of Scientific and Industrial Research)	P. O. Box 175, Nelson
5.1 Fruit	Founded by a bequest and supported by grant aid from DSIR. Soil surveys, field experiments Hop and fruit diseases Soils and pot cultures Tomato and apple experiments Biochemistry, fruit investigation Biochemistry of disease resistance in plants Chemistry, fruit and tobacco investigations	Dir.: C. R. Barnicoat D. Sc., Ph. D., F. R. S. E. T. Chittenden T. B. C. Christie M. Sc. Miss E. B. Kidson D. Sc. D. J. Stanton J. R. L. Walker Ph. D. M. E. V. Taylor Ph. D./ L. N. Gibbins Ph. D. Miss J. Watson M. Sc.
5.2 Entomology	Entomology Division (Department of Scientific and Industrial Research) Coccids Biological control Integrated control, orchard mites General parasite survey Codlin moth Leaf roller moth Biological control of insects Nematodes	P. O. Box 223, Nelson Dir.: J. M. Hoy M. Agr. Sc. J. M. Hoy M. Agr. Sc. B. B. Given M. Sc. E. Collyer B. Sc., Ph. D. E. W. Valentine B. Agr. Sc., D. I. C. T. G. Wood B. Sc., Ph. D. W. P. Thomas M. Sc. R. A. Cumber B. Sc., Ph. D., D. I. C. Ir. W. Wouts/G. S. Grandison B. Sc.
6. Otahuhu	Vegetable Station (Department of Scientific and Industrial Research)	Robinson Road, Otara Auckland
6.1 Vegetables	Breeding and selection for yield, uniformity, disease resistance in brassicas, onions, beans, peas, tomatoes, carrots; post harvest physiology investigations. Vegetable breeding Post harvest physiology	D. E. Yen M. Agr. Sc. P. A. Schippers D. Agr. Jocelyn M. Wheeler M. Sc.
7. Palmerston North	Massey University of Manawatu, Department of Horticulture	Palmerston North Prof.: J. A. Veale, M. Sc., Ph. D., D. I. C., M. I. Biol.
7.1 General horticulture	Environmental physiology of crop production; physiology of root initiation on cuttings; bud, fruit and seed physiology; apical dominance; mechanisms controlling food storage; orchard management studies; apiculture; post harvest physiology and senescence; polyphenols. Studies in the physiology of juvenility, senescence, apical dominance, runner production, leaf shape and flowering of <i>Eryngium vesiculosum</i> Studies of the natural growth regulators which control root formation in cuttings, their seasonal distribution as affected by the environment Effect of various soluble salt concentrations on the growth and fruitfulness of glasshouse tomato plants; effect of environment on the growth, development and fruitfulness of some vegetable and berry fruit plant species	Prof. dr. J. A. Veale M. Richards B. Sc., N. D. H. K. J. Fisher M. Agr. Sc.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

NZ 7.1 - 8.1

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Palmerston North (7.1)	Development of semi-dwarfing rootstock for stone fruit; possible relationship between changes in polyphenol levels and flowering; possibility of developing codlin moth resis- tant strains of apples	K. C. Hockey N. D. H. / J. M. Wilson B. Agr. Sc.
8. Te Kauw- hata 8.1 Viti- culture	Te Kauwhata Research Station (Department of Agriculture) Grape production and wine making techniques	P. O. Box 19, Te Kauwhata A. McKissock M. S.

Nigeria



1. Enugu, 2. Samaru.

General Survey

The Institute for Agricultural Research and special services, Samaru, has its administrative headquarters and its chief research station at Samaru (11°10'N; 7°39'E). Samaru is situated some eight miles to the north-west of Zaria on the main Zaria-Sokoto road. It lies at about 2,250 ft above sea level on the undulating plains of Hausaland, the general level of which is occasionally broken by bare, upstanding 'inselbergs' of granites and other ancient rock. The natural vegetation is Northern Guinea Savanna, but the area has long been cultivated on a bush fallowing system and this has resulted in a landscape of farmed parkland, with small villages and hamlets scattered across the plains.

Samaru was chosen in 1922 as the Headquarters of the Department of Agriculture in the Northern Provinces after a first site, selected at Maigana near Zaria in 1910, had proved to be too wet, too small and even inaccessible at times. Research work began in 1924 when a botanist was posted to Samaru. By 1927 a chemistry laboratory had been built and the staff of the station included two botanists. A herd of 36 cows and 4 bulls was established at Samaru in that year. In the following year, experiments with cotton and ground-nuts and mixed farming were well under way and two local farmers adapted a system of mixed farming as a result. In 1931, a training course was started for the Nigerian staff and experiments included observations on the four-year rotation of guinea-corn, ground-nuts, cotton and fodders. By 1933 the senior staff of the station were five in number: an assistant director of agriculture, a superintendent of agriculture, a botanist, a chemist and a schoolmaster. By this time Samaru was one of 12 Agricultural Stations which had been established in the Northern

Provinces. Soil conservation work was undertaken at Samaru and Shika in 1938 and during the war years the Zaria area was important in the production of pork and sugar: an attempt to grow wheat to help the war effort ended in failure.

At the end of the war the staff numbered about six, and despite the fact that the Headquarters of the Northern Provinces moved to Kaduna in 1947, this had doubled by 1950; the staff then being the assistant director of agriculture, two agricultural engineers, two mechanical demonstrators, two botanists, two members of ECGC staff (one of whom was an entomologist and the other a cotton breeder) and two members of staff of the School of Agriculture. Two years later with the appointment of an agronomist the number of sections had risen to five, namely, Agronomy, Botany, Chemistry, Cotton (Breeding and Entomology) and Pasture, and the number of senior officers to sixteen.

The Research and Specialist Services Division developed from the work being carried out at Samaru during the years 1953 to 1955. Research at outstations was also initiated during this period: the Pasture Section moved from Samaru to the Shika Stock Farm in 1954, and officers were posted to Kano, Katsina, Kabbia and Mokwa to extend the coverage of investigations. The Agricultural Engineering Section, however, although centred in Samaru, was retained within the Field Services Division. In 1955 a plant pathologist was appointed and the Soil Survey Section was initiated in 1957 in order to map the various soils of Northern Nigeria. 1960 saw the Agricultural Engineering Section join the Research Division of the Ministry of Agriculture.

On 4 October, 1962, the Research Division of the Ministry of Agriculture at Samaru, Kano,

Mokwa and Shika became a semi-autonomous Institute within the new Ahmadu Bello University. At this time there were 60 senior officers working in 12 sections, namely: Agricultural Engineering, Agronomy, Animal and Pasture, Botany, Chemistry, Cotton Breeding, Crop Physiology, Entomology, Grain Legumes, Library, Plant Pathology and Soil Survey. Since the setting up of the Institute for Agricultural Research as part of the Ahmadu Bello University, further reorganization has taken place and a new Soil Science Section has been formed and an Agricultural Economics Section is planned.

The work of the Institute

1. Agricultural Engineering Section

This section grew from work originally undertaken to carry out soil conservation measures both in Samaru and elsewhere. From 1947 tractors were introduced for use on unit and experimental farms and on ploughing schemes throughout Northern Nigeria. The large central workshop that was set up in 1948 to maintain and repair this equipment is now incorporated in the Estate Management Section and the Agricultural Engineering Section is concerned solely with research into the design of ox-drawn implements and the testing of mechanical implements. Work on improving cultivation techniques has led to new designs of equipment, while crop drying, particularly in the riverain provinces, is receiving attention at present.

2. Agronomy Section

The Agronomy Section was formed in 1952 and took over responsibilities for investigation into soil fertility from the chemist and for crop husbandry from the botanist. Research has gone on into the effect of fertilizers, manurial trials, rotation studies, spacing and plant population studies, etc., and in crop physiology. Both short term and long term trials have been embarked upon, and fertilizer recommendations have been made for all the major crops of Northern Nigeria.

3. Botany Section

The Botany Section is concerned with the introduction and improvement by plant breeding of the more important crops grown in Northern Nigeria: cereals, ground-nuts, soyabeans, sesame, tree crops and minor horticultural crops that are of local importance, including sugar-cane, vegetables and tobacco. Studies in crop physiology, formerly incorporated in the Cotton Section, have been extended to food crops. Research into grain legumes, which was temporarily suspended due to staff shortages, has been resumed recently under the control of this section.

4. Cotton Breeding Section

Since American upland cotton was introduced into Northern Nigeria in 1912, work has gone on to produce new varieties of cotton that give high yields and a consistent quality of

lint which can both be used locally and find a ready market overseas. A new strain, Samaru 26C, was developed by 1939 and in more recent years an improved variety, Samaru 26J, has been developed and has now completely replaced 26C in Northern Nigeria.

5. Entomology Section

Apart from work in connection with the locust swarms of the early 1930s, this section concentrated its attention first on cotton pests and their control and later on stem borers of sorghum. Work has been done and is continuing on the aphid vector of rosette disease of ground-nuts, pests on citrus and cowpeas and on the storage of cereals. Recommendations for control measures are continually being passed on to the farmer, and a large-scale cotton spraying scheme is to be initiated in the coming season.

6. Estate Management Section

This recently-formed section is responsible for the upkeep of station buildings and quarters, the engineering workshop, the maintenance of transport and farm machinery and for cultivations on the Samaru farms.

7. Plant Pathology Section

The Plant Pathology Section is responsible for research on important plant diseases, routine identification of diseases and measures for their control. Work has been done on the use of seed dressings against covered smut of guinea-corn, early planting and close spacing to control disease of ground-nuts (in conjunction with the entomologist) and resistance to red-rot of sugar-cane. More recently much work has been devoted to the problem of aflatoxin in ground-nut kernels, bacterial blight of cotton, coffee rust, late blight of potatoes and stem rust of wheat.

8. Soil Science Section

This section has evolved from the former Chemistry Section, which since 1927 had carried out investigations into, and routine analysis of, soil and plant material. The value of local fodder materials for animal nutrition was also investigated. With the setting up of the Soil Survey Section and the Agronomy Section, the number of routine analyses of soil samples increased considerably and the main burden of this work was accepted by the Chemistry Section. However, the need has been felt for more fundamental research into soil, water and nutrient relationships, and the separation of this work into a new section, staffed by a soil physicist, soil chemists and an agro-meteorologist has marked an important advance in this direction. Analysis of soils from Agronomy Section experiments and estimation of quality of irrigation waters are still important aspects of the section's work: routine soil analyses are now being done within the Soil Survey Section using staff from this Section.

9. Soil Survey Section

Since its formation in 1955, the Soil Survey

Section has surveyed and mapped some 90,000 sq miles of Northern Nigeria at reconnaissance level and has undertaken some 26 detailed and semi-detailed surveys. Vegetation surveys have also been carried out and new methods of assessment of vegetation have been tested.

Priority in the survey work has been given to areas of potential development, particularly to the area served by the Bornu railway extension.

10. The Institute Library and Publications

The Institute library now contains some 4,400 books, 5,000 pamphlets, 450 microfilms and 420 current journals. The closest co-operation is maintained with the main Ahmadu Bello University library. Publications of the In-

stitute include the series of Samaru Research Bulletins, Soil Survey Bulletins, Technical Reports and a monthly agricultural Newsletter.

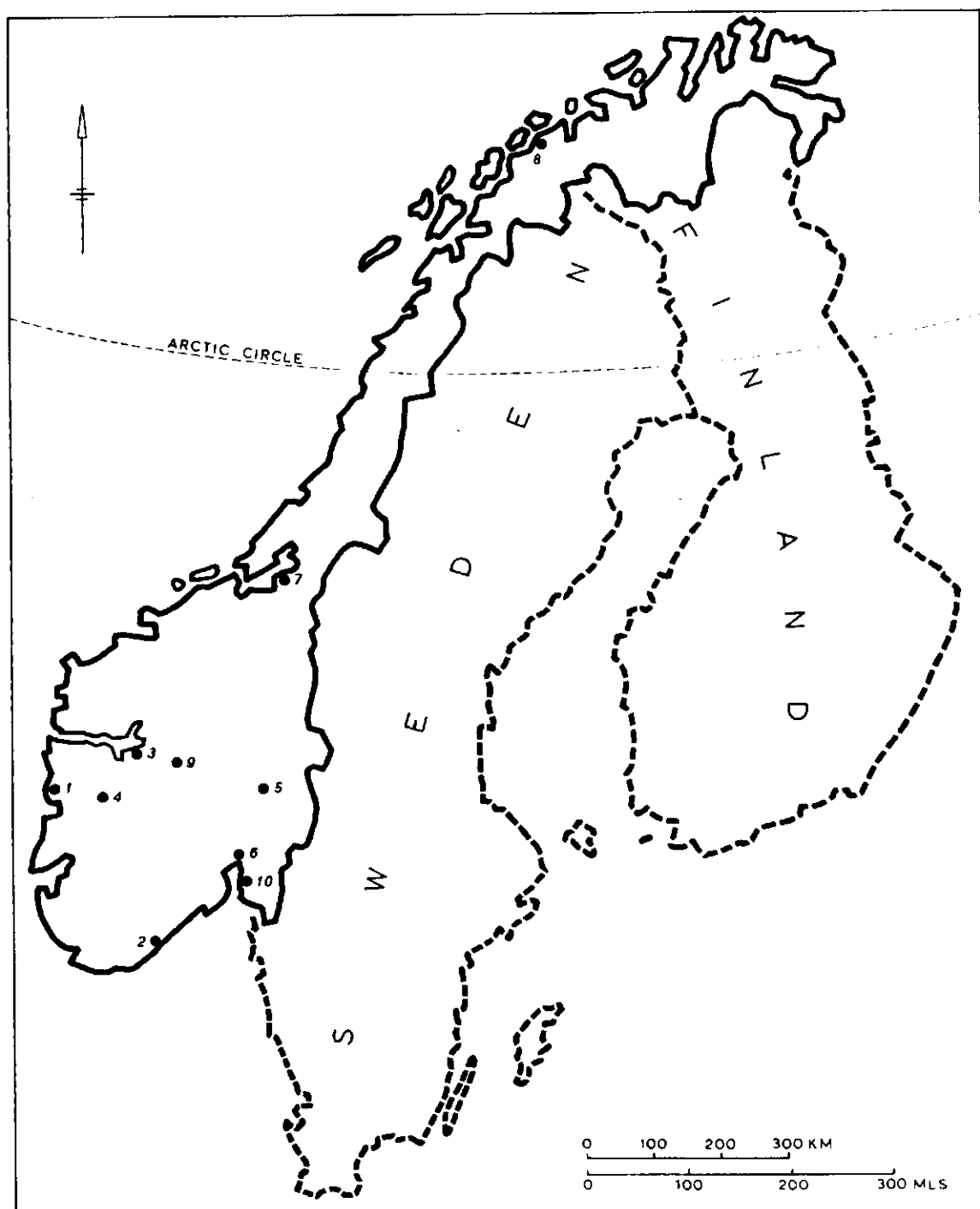
11. Outstations

There are three outstations of the Institute at Kano, Mokwa and Shika. At *Kano* work is being done on ground-nuts and sorghum; at *Mokwa* the improvement of benniseed, soyabeans, sunflower and castor and on the entomology and pathology of ground-nuts, including the problem of aflatoxin and methods of crop drying; *Shika* is the home of the Animal Husbandry and Grassland Section and work includes calf rearing, beef production, tick control, animal nutrition and grassland investigations. In addition two unit farms have been established at Shika to demonstrate the practical implications of research recommendations.

Seat/Nature of program	Institution and projects	Address and staff
1. Enugu 1.1 General horticulture	Market Gardening Section, Agricultural Division, Ministry of Agriculture The section produces and distributes vegetable and flower seeds; tests various vegetable crops; develops improved methods of growing them; trains private gardeners as well as government staff in vegetable production and demonstrates good husbandry. Extension work and training	P.M.B. 1094, Enugu, Eastern Nigeria, Officer in charge: Miss F. D. Metcalf N.D.H. I. W. Stewart/J. O. Uzo
2. Samaru 2.1 General horticulture	Institute for Agricultural Research and Special Services, Ahmadu Bello University - Administration - Agricultural engineering - Agronomy - Animal husbandry and Grassland - Botany - Cotton breeding - Crop physiology Cotton physiology - Entomology Cotton entomology - Faculty of Agriculture Plant Science Soil science Animal science Agricultural economics Crop production Agricultural botany - Library and publications - Plant pathology Cotton pathology - Soil science	P.M.B. 1044, Samaru, Zaria, Northern Nigeria Dir.: Prof. H. S. Darling Ph.D. Asst.: Mrs. A. R. Henson Assoc. dir.: Dr. D. M. Ramsay Ph.D. Secr.: R. F. Wyatt Fstate manager: D. H. Hancock Admin. off.: M. A. Abodunrin/J. A. Forson Stores off.: A. F. Igboin Station manager: F. U. Onyejekwe Head: D. W. M. Haynes Head: P. R. Goldsworthy D. A. S., P. T. A. Head: J. H. Davies/K. E. Carling/Ir. P. N. de Leeuw/R. J. Haggard Ph.D./L. E. Iduma Head: D. L. Curtis D. T. A./D. J. Andrews D. A. S., D. T. A./W. M. Steele D. A. S./O. A. Inyang Head: R. C. Faulkner (ECGC)/G. R. Jones (ECGC) K. J. Frown (ECGC) Head: G. H. Caswell B. Sc. A. R. C. S. (Ass. dir.)/Dr. M. A. Choyce D. I. C. (Ass. dir.) D. J. de B. Lyon Dean: Prof. R. V. Olson M. Sc. Ph.D. (USAID) Prof. H. S. Darling Ph.D. Prof. J. A. Hobbs M. Sc. Ph.D. (USAID)/B. W. Bache, Ph.D. Prof. R. A. Koch M. Sc. Ph.D. (USAID) Prof. J. R. Sjo Ph.D./Miss Prof. E. H. Whetham P. D. Walton M. Sc. P. M. Cartwright Ph.D. Miss P. M. J. Edwards (Librarian)/R. L. Story (Publications officer) Head: Miss M. A. Keay, M. Sc. Ph.D. M. Dransfield, Ph.D. (ECGC)/A. S. Fatmi, M. C. (Superintend. technician) Head: J. M. Kowal M. Sc. Ph.D. M. W. Walter (agric. meteorolo-

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Samaru (2.1)	Soil science (cont.) - Soil survey - Scientific Liaison Section Soil science Entomology Agronomy Extension advisory - ARS/AID/OCTA West African Cereals Project Plant pathology - FAO/UNSF Rima-Sokoto Valley project soil chemistry Kano Research Station Mokwa Research Station Shika Research Station	gist)/R. G. Heathcote/A. J. Bennett/O. T. Eshett/B. D. Lodam Head: G. M. Higgins D. A. S., D. T. A. (Ass. dir.)/P. R. Tomlinson/drs. K. Klinkenberg/ir. J. Valette/W. A. Hope/ir. F. H. Hildebrand/W. B. Ipinmidun Head: C. T. Pyne M. Sc. A. A. Jarma O. C. Onazy A. Abdullahi S. D. Samuelson (USAID) Leader: O. J. Webster M. Sc., Ph. D. (USAID) M. C. Futrell M. Sc. Ph. D. (USAID) J. W. Dewis Kano W. C. Stonebridge D. A. S. / D. A. Guymer D. A. S. / D. A. Abifarin M. Sc. Mokwa J. U. Ohiaeri (manager)/G. B. A. Udok (admin. officer)/C. Harkness D. A. S., D. T. A. /ir. H. A. van Rheenen/J. L. Palmer/D. MacDonald D. A. S., D. T. A. /J. A. Brook D. A. S., D. T. A. Shika Manager: J. Henson A. I. Agr. E.

Norway



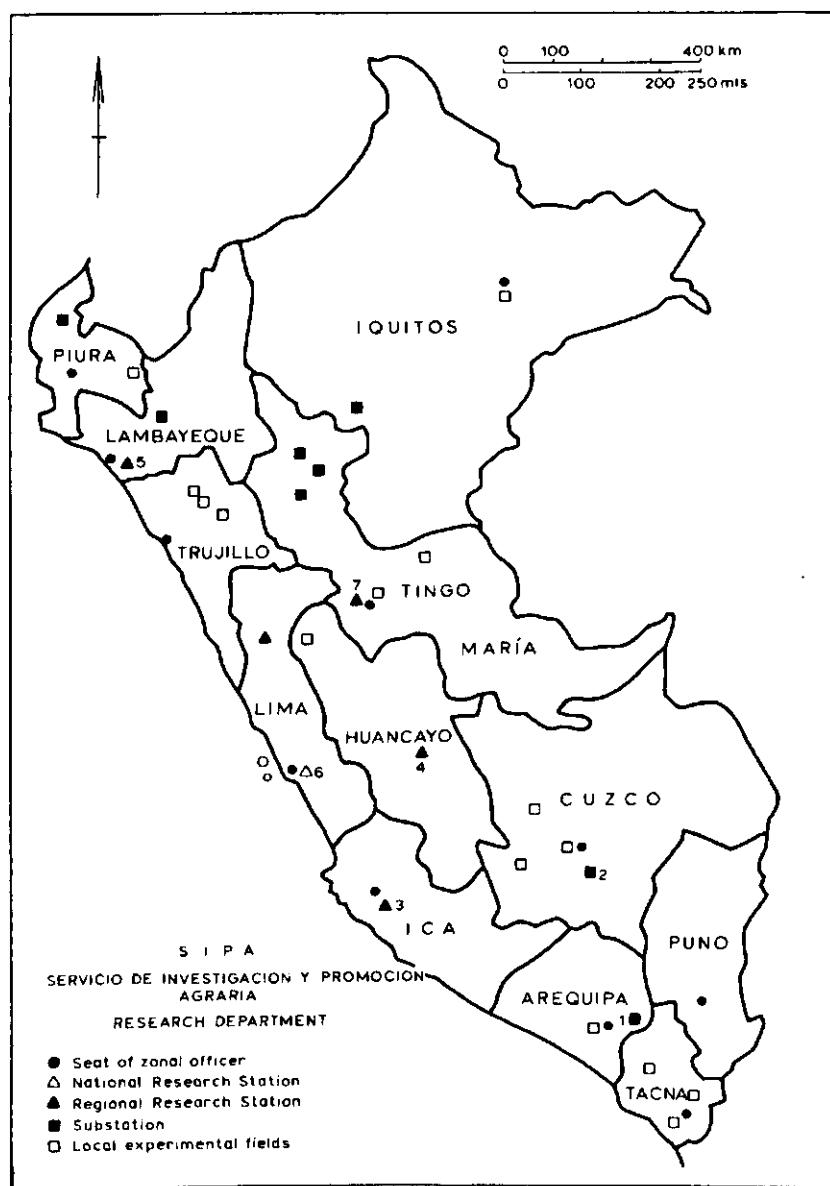
1. Bergen, 2. Grimstad, 3. Hermansverk, 4. Lofthus, 5. Nes på Hedmark, 6. Oslo, 7. Stjørdal,
8. Tromsø, 9. Volbu, Valdres, 10. Vollebekk.

Seat/Nature of program	Institution and projects	Address and staff
1. Bergen	Universitetets Botaniske Hage/ <i>University Botanical Garden</i>	P.O.Box 2637, Bergen
1.1 <i>Botany</i>	Horticultural studies on a very restricted scale.	Dir.: Dr.K.Faegri
2. Grimstad	Statens Forsöksgård Landvik/ <i>State Experiment Station Landvik</i>	Grimstad
2.1 <i>Vegetables</i>	Research on vegetable crop and seed production. Vegetable crop and seed production Seed and vegetable production Seed production	Dir.: Dr.ph.K. Aamlid Dr.ph.K. Aamlid J. Vik J. Havstad
3. Hermansverk	Statens Forsöksgård Njøs/ <i>State Experiment Station Njøs</i>	Hermansverk
3.1 <i>Fruit</i>	General research on fruit production, cultivars, rootstocks. General pomology, fruit cultivars, rootstocks	Dir. (until febr. 1966): E. Kvaale Scientific officer: E. Kvaale
4. Lofthus	Ullensvang Forsöksgård/ <i>Ullensvang Research Station</i>	Lofthus
4.1 <i>Fruit</i>	Local fruit research for Hardanger and western Norway. General fruit production, fruit tree nutrition General fruit production	Dir.: Dr.agr. K.Oland Dr.agr. K.Oland J.Ystaas
5. Nes på Hedmark	Statens Forsöksgård Kise/ <i>State Experiment Station Kise</i>	Nes på Hedmark
5.1 <i>Fruit</i>	General pomology; winter hardiness in fruit crops; cultivar trials in small fruits; management in orchard crops; growth-climate relationship in fruit crops; irrigation trials and water requirement investigations in tree fruit and small fruit crops. General pomology, winter hardiness in fruit trees General pomology	Dir.: J.Thorsrud J.Thorsrud A.Hjeltnes
6. Oslo	Norges Landbruksøkonomiske Institutt/ <i>Norwegian Institute of Agricultural Economics</i>	Rosenkrantzgt 8, Oslo
6.1 <i>Economics</i>	Agricultural economics, farm management Horticultural economics, fruit production	Dir.: A.Eskeland A. Eskeland L. Apold
6.2 <i>Botanics</i>	Universitetets Botaniske Hage/ <i>Botanical Garden of the University of Oslo</i> Governmental institution. Taxonomy, geography, morphology and anatomy of vascular plants. Phytogeography, reproductive biology, embryology, taxonomy Taxonomy of vascular plants, ecology and phytosociology Plants of economic importance Publ.: Nytt Magasin for Botanikk (together with the Botanical Museum); Seed list; Catalogue of the garden plants. Universitetets Botaniske Museum/ <i>Botanical Museum of the University of Oslo</i>	Trondheimsyn 23 B, Oslo Dir.: Prof.dr.R.Y.Berg Prof.dr.R.Y. Berg P.Sunding A.M.Sunding
7. Stjørdal	Statens Forsöksgård Kvithamar/ <i>State Experiment Station Kvithamar</i>	Trondheimsvn. 23 B, Oslo 5 Stjørdal Dir.: J.Roll-Hansen

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Stjördal (7.) 7.1. Vegetables	Cultivation and fertilizing of vegetable crops, extension service on greenhouse crops. Production of vegetable crops, especially in relation to soil and nutrition Vegetable crop production Vegetables and small fruits Extension service on greenhouse crops	J. Roll-Hansen E. Weydahl M. Flønes J. Stene
8. Tromsø 8.1 Botanics	Den Botaniske Avd., Tromsø Museum/Tromsø Museum, Botanical Division	Tromsø
9. Volbu, Valdres 9.1 General agriculture	Statens Forsøksstasjon for Fjellbygdene/ State Experiment Station for mountain farming	Volbu, Valdres
10. Vollebekk 10.1 Economics	Institutt for Driftslaere of Landbruksøkonomi Department of Agricultural Economics and Farm Management General agricultural economics Horticultural economics Work studies in horticulture	Vollebekk Head: Prof. O. Aresvik Prof. O. Aresvik docent/K. Aksnes M. Barvik
10.2 Engineering	Landsbruksteknisk Institutt/The Norwegian Institute of Agricultural Engineering Farm mechanization Horticultural engineering	Vollebekk Head: Prof. Ø. Haugen Prof. Ø. Haugen A. Nordby/R. Holmøy
10.3 General horticulture	Norges Landbrukshøgskole, Hagebruksavdelinga/ The Agricultural College of Norway, Division of Horticulture The division of horticulture includes the following departments: a. Institutt for Blomsterdyrking/Department of Floriculture General glasshouse crops production, soils and fertilizers Glasshouse climate, plant irradiation Flowering and regeneration in plants Growing media, storage of flowers and cuttings Glasshouse crops advisory service b. Institutt for Dendrologi og Planteskole-drift/Department of Dendrology and Nursery Management Dendrology and nursery management Cultivation and breeding of roses; winter storage of nursery crops; soil and fertilizing effects Dendrology; species and cultivar trials; vegetative propagation Phenological observations Plant propagation and nursery management, container growing c. Institutt for Fruktdyrking/Department of Pomology General pomology and fruit tree nutrition Processing; fruit products Fruit storage, post-harvest physiology Pruning and training, fruit growth and development Breeding of small fruit; cultivars	Vollebekk Head: Prof. dr. E. Strømme Prof. dr. E. Strømme Dr. T. Kristoffersen O. M. Heide J. Øydvin G. Sandved Head: O. Reisaeter O. Reisaeter A. Lundstad M. Sandved J. Ratta E. Rjervestrand Head: Prof. B. Ljones Prof. N. Ljones K. Valset R. Landfald P. Husabø J. Øydvin

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Vollebekk (10.3)	Fruit composition, storage of soft fruit d. Institutt for Grønsakdyrking/<i>Department of Vegetable Crops</i> Genetics and breeding of vegetable crops; vegetable crops; vegetable production Breeding of vegetable crops, especially resistance breeding Vegetable production Post-harvest physiology, handling, storage and transport of vegetables Vegetables for canning and freezing Vegetable cultivar trials and production of vegetables in controlled climate Soil science and nutrition in relation to vegetables for the canning industry Nutrition and soil science Plant physiology e. Institutt for Hagekunst/<i>Department for Landscape Architecture</i> Landscape architecture	S. Vestrheim Head: Prof. A. R. Persson Prof. A. R. Persson G. Weisæth F. Hovde/J. Vaagan J. Apeland O. Røeggen E. Myklebust S. Vasaasen G. Balvoll H. Raugerød Head: A. Hjeltne/M. Bruun/E. Gabrielsen/O. Skage
10.4 Seed testing	Statens Frøkontroll/<i>State Institute of Seed Control</i> Branch station Testing agricultural, horticultural and forest tree seeds and seed potatoes	Vollebekk, Ås (near Oslo) Trondheim O. Dilling Larsen
10.5 Plant protection	Statens Plantevern/<i>Norwegian Plant Protection Institute</i> a. Botanisk avdeling/<i>Department of Plant Pathology</i> General mycology and plant pathology Plant virology Plant pathology, agricultural crops Mycology, plant pathology, fruit crops Plant pathology, forage crops Plant virology Plant pathology b. Ugrasbiologisk Avdeling/<i>Department of Weed Control</i> General weed biology and control Weed control in agricultural crops Wild oats Weed control in horticultural crops Weed control in forestry and forest nurseries c. Zoologisk Avdeling/<i>Department of Entomology</i> General and applied entomology Plant nematology Cold hardiness in insects; bioassay; insects on stored products General and applied entomology, fruit and vegetable crops Applied entomology, agricultural crops Applied entomology; greenhouse crops; small fruit Fruit insects and ecology Biochemistry and insecticides	Vollebekk Dir.: J. Fjeldalen Head: H. Røed H. Røed A. Bjørnstad E. Førsund/L. R. Hansen H. Gjaerum Dr. L. Sundheim T. Munthe L. Semb/K. Årsvoll Head: T. Vidme T. Vidme A. Bylterud/Dr. P. Jakobsons M. Fykse O. Lode K. Lund-Høie Head: J. Fjeldalen J. Fjeldalen M. Støen L. Sømme G. Taksdal T. Rygg C. Stenseth T. Edland J. Stenersen

Peru



General Survey

Peru is for the sake of investigations divided into 12 agricultural zones (see map), being regional macro-units. Investigations have started in the most important zones. There are 5 Agricultural Experiment Stations in Peru supervised by the Servicio de Investi-

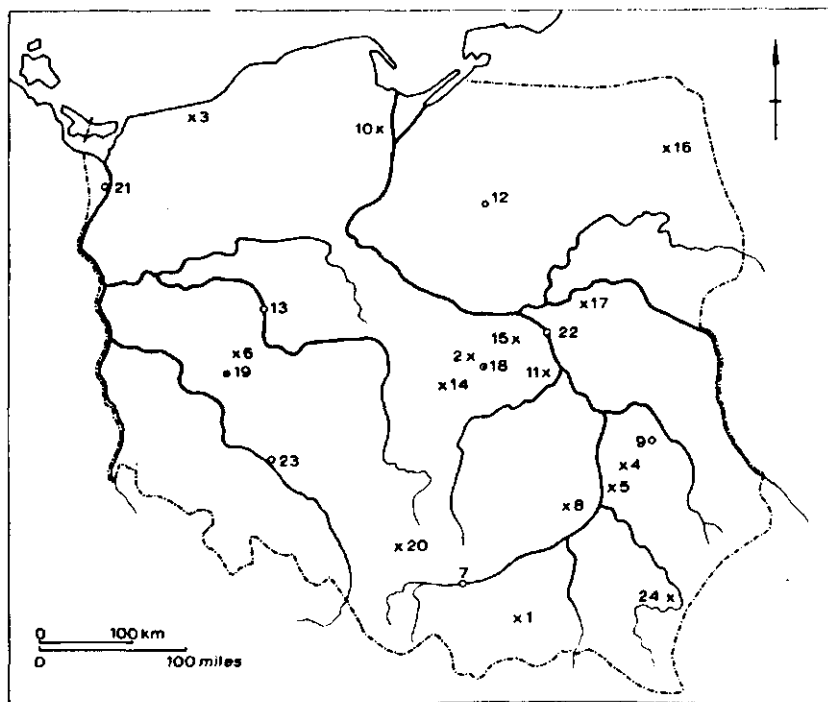
gación y Promoción Agraria (SIPA) of the Ministry of Agriculture, situated at La Molina (main station), Tulumayo, Lambayeque, Junin and Ica. Substations are situated at 5 places and experimental fields at 19 places (see map).

Seat/Nature of program	Institution and projects	Address and staff
1. Arequipa 1.1 Vegetables	Sub-Estación Experimental Agrícola del SIPA (vide 6.2)/ <i>Experimental Substation of SIPA</i> Onion and garlic Agronomy	Arequipa Chief: Ir. L. A. Juárez Ir. L. Guillén Ir. A. Medina
2. Cuzco 2.1 Breeding	Sub-Estación Experimental Agrícola del SIPA/ <i>Experimental Substation of SIPA</i> Potatoes Potatoes: seed stock production Entomology	Cuzco Chief: Ir. O. Aragón Ir. C. Vise Ir. H. Vargas Ir. A. Villacosta
3. Ica 3.1 Viticulture	Stación Vitivinícola Nacional del SIPA/ <i>Station for Viticulture and Oenology of SIPA</i> Wine technology and grape production Vitis vinifera	Ica Chief: Ir. R. Guerra Ir. G. Zattler
4. Junin 4.1 General agriculture	Estación Experimental Agropecuaria del SIPA/ <i>Experimental Station for Agriculture and Cattle of SIPA</i> - Department of Phytopathology and Entomology - Department of Genetics Potatoes Potatoes: seed production Potatoes: plant breeding	Junin Chief: Ir. C. Esquivel Ir. R. Yaya Ir. P. López Ir. G. Javier Ir. M. Sosa
5. Lambayeque 5.1 General agriculture	Estación Experimental Agropecuaria del SIPA/ <i>Experimental Station for Agriculture and Cattle of SIPA</i> - Department of Agricultural Engineering - Department of Agronomy and Soils - Department of Genetics Plant breeding - Department of Phytopathology and Entomology	Lambayeque Chief: Ir. P. Contreras Ir. M. A. Salas Ir. O. Quinones/Ir. M. Carmen Cuba Ir. L. Castillo Ir. M. Arellano
6. Lima 6.1 General horticulture	Estación Experimental Agrícola de La Molina/ <i>Agricultural Experiment Station La Molina</i> Botany - Department of Agricultural Engineering Irrigation - Department of Agronomy Food crops, oil containing plants: soya Food crops: sweet potatoes, cassava Field labour, oil containing plants Vegetable crops and herbicides - Department of Entomology Toxicology Nematodes: taxonomy Entomology: taxonomy Citric nematodes Fruit fly Nematodes Entomology: biological assays and toxicology Entomology: special problems in maize - Department of Experimental Statistics - Department of Fruits and other Horticultural Crops Tropical and subtropical fruits Pome fruits Agronomy	La Molina, Lima Dir.: Ir. R. Crespo Techn. Secr.: Ir. A. Quevedo Dr. R. Ferreyra (Cons.) Ir. C. Molestina/Ir. M. Garmendia Ir. R. Vargas Saco Ir. E. Delgado Ir. R. Montalvo Ir. A. Corrales Chief: Ir. J. Simón Ir. A. Martín Ir. M. Delgado/Ir. C. García Ir. J. Gómez Ir. A. Ramos Ir. P. Palao/Ir. J. Franco Ir. C. Olivares Ir. J. Campos Ir. L. Ramirez/Ir. A. Chávez Ir. G. de la Rocha Ir. J. R. Franciosi Ir. V. H. Rivadonaira

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Lima (6.1)	- Department of Genetics Beans Potatoes - Department of Phytopathology Beans and fruit trees Virus, fruit trees Phytophthora of avocado and red pepper Phytopathology of cereals Mycology - Department of Plant Physiology Growth analysis and water relations - Department of Soils and Manure Fertilization Soil analysis Soil fertility Soil physics Isotopes and soil fertility Soil salinity - Department of Technical Agriculture Agricultural technology Chemical pharmacy Chemistry	Chief: Ir. D. Mendez Ir. O. Voysest Ir. F. de la Puente Chief: Ir. V. Revilla Ir. S. Dongo Ir. S. Osorez Ir. L. Vargas Ir. M. Rondon Ir. T. A. de Icochea Ir. M. Bravo Chief: Ir. F. Quevedo Ir. D. de Villanueva/Ir. C. Torres Ir. C. Valverde Ir. L. Chang Ir. J. Lugo Ir. F. Garcia Chief: Ir. R. Luna de la Puente D. Velásquez de Medina Mrs. A. Salinas
6.2. General horticulture	Servicio de Investigación y Promoción Agraria (SIPA) del Ministerio de Agricultura/ <i>Service of Investigation and Extension of the Ministry of Agriculture</i> - Experimental Division - Department of Coordination of National Projects Breeding of potatoes Beans Experimental statistics, experimental designs Planning - Consultant Mission of North Carolina Soils Plant pathology Seed production Agricultural economics Publ.: Informe Anual de la División de Experimentación; Boletines Tecnicos; Divulgaciones Agropecuarias; Informes Internos	Casilla 2791, La Molina, Lima Dir.: Dr. A. Grobman Nat. supervisor: M. Segura J. Christiansen S. Bocanegra Ir. J. R. Arroyo Ir. A. Carughi Dir.: Dr. A. J. Coutu Dr. McColium Dr. J. L. Apple A. D. Stewart T. K. White
6.3 General horticulture	Universidad Agraria, La Molina, Facultad de Agronomía/Agricultural University La Molina, Faculty of Agronomy Belongs to the Ministry of Education. The university is divided into 7 faculties. The Faculty of Agronomy has 7 departments: - Department of Crops Agricultural engineering - Department of Entomology Insecticides - Department of Horticulture Marketing Fruit production - Vegetables - Propagation of ornamentals, fruit and forest trees - Department of Pastures	Universidad Agraria, Apartado 456, Lima Rector: Dr. O. Olcese Vice-rector: Ir. C. Vidalón Dean: Ir. M. Rodriguez Secr.: Ir. M. Soto Chief: Ir. E. Skrabonja Ir. J. Zender Chief: Ir. I. Combe Ir. F. Cisneros Head: Prof. Ir. J. Recerra Acting Head: Ass. prof. Ir. C. Morin Ass. prof. Ir. M. Holle/Prof. Ir. A. Montes/Ir. G. Buschbeck Ass. prof. Ir. C. Medina Chief: Ir. A. Florez

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Lima (6.3)	- Department of Phytopathology Horticultural crops - General phytopathology - Department of Plant Breeding Potatoes Fruits - Department of Soils Salinity Soil mapping - Publ.: Anales Científicos; Universitas; Revista Agronomía.	Chief: Ir. R. Postigo Mrs. Ir. T. Ames de Icochea/ Ir. M. Soto Ir. J. Fernandez Chief: Ir. J. Calzada Ir. C. Ochoa Ir. V. Bautista Chief: Ir. M. Rodríguez Ir. M. Arca Ir. A. Zavaleta
6.4 General horticulture	Zona Andina del Instituto Interamericano de Ciencias Agrícolas (IICA) de la Organización de los Estados Americanos (OEA)/ <i>Andean Zone of the Interamerican Institute of Agricultural Sciences of the Organization of American States</i> Activities in the Andean Zone countries (Bolivia, Columbia, Ecuador, Peru, Venezuela): higher agricultural education; agriculture of arid regions; Andean food crops; Center of Agrarian Reform (Peru). Irrigation engineering Soils Botany Communication Home Economics Special crops Textbooks and teaching material Publ.: Informe Trimestral; Boletín de la Zona Andina	Apartado 478, Lima Dir.: Ir. E. Blair Ir. E. Blair Dr. W. Forsythe Dr. J. León R. Beltrán/F. Sánchez Miss A. L. Díaz Ir. J. Rea Miss M. de la Cruz
7. Tulumayo	Estación Experimental Agrícola del SIPA/	Tulumayo
7.1 General horticulture	<i>Agricultural Experiment Station of the SIPA</i> Tropical soils - Department of Arboriculture Cocoa - Department of Agronomy and Soils Tropical crops - Department of Economy - Department of Entomology and Phytopathology Entomology Plant pathology - Department of Horticulture	Chief: Ir. J. del C. Muro Superintendent: J. Burgos Ir. C. Hurtado/Ir. J. Paredes Ir. F. Coral Ir. L. A. Córdova Ir. O. Vargas Ir. L. Licerias/Ir. F. Wong Ley Ir. R. Figueroa/Ir. J. Robles

Poland



• Colleges of Agriculture • Research Institutes x Field Stations

1. Brzezna, 2. Dabrowice, 3. Dworek, 4. Gorna Niwa, 5. Konkowola, 6. Kornik, 7. Krakow, 8. Lipowa, 9. Lublin, 10. Miobadz, 11. Nowa Wies, 12. Olsztyn - Kortowo, 13. Poznan, 14. Prusy, 15. Reguly, 16. Siejnik, 17. Sinoeka, 18. Skierniewice, 19. Slupia Wielka, 20. Swierklaniec, 21. Szczecin, 22. Warszawa, 23. Wroclaw, 24. Zadbrowy.

General Survey

The Polish Academy of Sciences - Since its creation in 1952, the Polish Academy of Sciences/*Polska Akademia Nauk* is the highest authority as far as science is concerned in Poland. It is responsible for planning all the research work of the country, especially in pure science. The recently created Committee for Science and Technology/*Komitet Nauki i Techniki* is responsible for applied sciences.

The Polish Academy of Sciences has its own Research Institutes but none of them is concerned directly with horticulture.

In the Department of Agriculture and Forestry of the Polish Academy of Sciences there are two Commissions: 1. Commission of Pomology and 2. Commission of Vegetable Crops and Floriculture. These Commissions are responsible for planning and co-ordinating all horticultural research work in Poland. They are composed of all the most prominent Polish horticulturists.

The Research Institute of Pomology. The bulk of horticultural research in Poland is being done at the Institute under the Ministry of Agriculture. Until 1950 there was only one very large Institute of Agriculture in Pulawy, but it became too large and unwieldy and so

in 1950 and 1951 it was split into ten smaller institutes. One of them is the Research Institute of Pomology. It was organized in 1951 at Skierniewice by Dr. S.A. Pieniazek, who is still its director. The Institute had a modest beginning since pomological research had not developed much at the Institute of Agriculture in Pulawy.

Very few trained pomologists survived the war; just two pomologists with Ph.D. degrees were left in the whole country in 1945. Since then many young research workers have been trained at home and abroad. Out of the Institute's 97 staff members 47 have studied for at least one year abroad, 35 of them in the United States of America.

A European Pomological Conference. The Research Institute of Pomology maintains fairly extensive relations with horticultural research institutions in other countries. In May 1956 the Institute organized a European Pomological Conference at Skierniewice with pomologists attending from 14 European countries, both Eastern and Western. A number of foreign students from Europe and America have worked at the Institute, some of them for a period from one to four years. FAO decided to send to the Institute at Skierniewice foreign students holding FAO fellowships for specialized studies. The students going there



Research Institute of
Pomology at Skiernie-
wice

are required to speak either Russian or English, since these two foreign languages are known to all the members of the Institute's staff.

Skierniewice and its eleven Field Stations. The Research Institute of Pomology at Skierniewice has laboratories and greenhouses and 30 ha of experimental orchard adjoining the Institute's buildings. In addition, the 11 Field Stations situated in the most important fruit growing districts of the country belong to the Institute, viz.:

1. Dabrowice near Skierniewice, area 146 ha, orchards 85 ha.
2. Nowa Wieś near Grójec, area 174 ha, orchards 67 ha.
3. Sinołeka near Siedlce, area 336 ha, orchards 115 ha.
4. Górna Niwa near Puławy, area 30 ha, orchards 12 ha.
5. Lipowa near Sandomierz, area 179 ha, orchards 49 ha.
6. Brzezna near Nowy Sącz, area 293 ha, orchards 54 ha.
7. Swierklaniec near Katowice, area 400 ha, orchards 109 ha.
8. Miłobadz near Gdansk, area 365 ha, orchards 85 ha.
9. Dworek near Koszalin, area 229 ha, orchards 60 ha.
10. Prusy near Skierniewice, area 217 ha, orchard 75 ha.
11. Zadabrowie near Przemyśl, area 257 ha, orchard 40 ha.

The research work of the Institute is conducted mainly at Skierniewice at present but an increasingly greater part is being done at the Institute's Field Stations. There are only 3 to 8 members of the scientific staff at each Field Station and they work under the general guidance of the Field Station's director and the heads of the Institute's divisions at Skierniewice.

Other Institutes. Some research work concerning pomology is also being done at other Institutes under the Ministry of Agriculture. The Institute of Plant Protection in Poznań is concentrating mainly upon the problems of pest and disease control of field crops but many of its research workers are also concerned with pests and diseases of fruit plants. In principle, the Fruit Plant Protection Division of the Research Institute of Pomology

works on control of fruit pests and diseases, and the Institute of Plant Protection deals with more fundamental problems in entomology and phytopathology. There is, however, much overlapping of the work of both institutions. Some problems related to fruit growing are also studied at the Institute of Agricultural Economics in Warsaw and the Institute of Agricultural Mechanization in Warsaw.

Vegetable Crops. The leading institution for the vegetable research work is the Research Institute of Vegetable Crops in Skierniewice. This Institute, being the 11th Research Institute of the Ministry of Agriculture, has been created by decree of the Council of Ministers on September 1st, 1964.

Until now the centre of vegetable research work of the Ministry of Agriculture was the Department of Vegetable Crops of the Institute of Soil Science and Plant Cultivation at Skierniewice, directed by Prof. Dr. Emil Chroboczek. This Department of Vegetable Crops was reorganized in a national Research Institute of Vegetable Crops and Prof. Dr. Emil Chroboczek has been appointed its director.

The creation of the special Research Institute offers better possibilities of a research and extension work in the vegetable industry, because of the increased budget and larger staff as the former Department of Vegetable Crops had in an agricultural Institute.

Some of the vegetable research work was and is still done by other research institutes of the Ministry of Agriculture, namely:

1. The Institute of Plant Breeding and Acclimatization of Plants in Warsaw which is responsible for the breeding of vegetables at the Experimental Station at Radzików near Rżoniec.
2. The Institute of Plant Protection in Poznań.
3. The Institute of Mechanization and Electrification of Agriculture in Warsaw.

4. The Institute of Agricultural Economics in Warsaw.

The Research Institute of Vegetable Crops, when its organization is completed, will be able to serve the country as the centre of research and extension work in vegetable crops, but there will be needed a close co-operation with the institutes mentioned above, the leading research institutions in their fields, in which the vegetable industry is highly interested.

Variety trials. The Ministry of Agriculture has organized 68 Variety Trial Stations in places with different climatic and soil conditions; from this number 24 Stations are carrying out also variety trials with vegetable plants. The main Variety Trial Station Słupia Wielka near Poznań is equipped also with greenhouses and hotbeds for trials with varieties of vegetables.

Ornamental crops. Ornamental horticulture research is not well developed in the Institutes of the Ministry of Agriculture. Both in the Institute of Soil Science and Plant Cultivation, and in the Institute of Plant Breeding and Acclimatization there are some small Departments of Floriculture. Their work is based on two Field Stations, Puławy and Smolice. The latter, directed by Dr. S. Woycicki, is more developed than the former.

Colleges of Agriculture. A considerable part of horticultural research work is carried out by the horticultural departments of the Colleges of Agriculture. There are 7 Colleges of Agriculture in Poland with 14,000 students, namely in Warsaw, Kraków, Lublin, Wrocław, Poznań, Szczecin and Olsztyn. The Central College of Agriculture in Warsaw with over 4,000 students is the largest.

In two of these Colleges, Warsaw and Poznań, there are separate Faculties of Horticulture; horticultural students follow, from the "freshman year", a curriculum different from agricultural students. In these two Colleges there are separate Departments of Pomology, of Vegetable Crops and of Flori-

culture. In addition, at the Central College of Agriculture in Warsaw, a section of Landscape Architecture is in operation with two Departments, the Department of Landscape Architecture and the Department of Arrangement and Conservation of Landscape Architecture. Departments of Genetics, Pest and Disease Control, Soil Management and Fertilization, attached to the Faculties of Horticulture in Warsaw and Poznań, specialize in research work relating to horticultural problems.

In the other five Colleges of Agriculture (Lublin, Kraków, Wrocław, Szczecin and Olsztyn) there are no faculties of horticulture. However, there are Departments of Horticulture in the Faculties of Agronomy, which work mainly on problems of pomology and vegetable crops. The Horticultural Departments of the Seven Colleges of Agriculture in Poland are rather small and are mainly occupied with teaching but they also carry out some research work. There is normally one professor in the Department, some of them with 2, others with 2 to 5 assistants. Each College of Agriculture has several Field Experiment Stations for research work and for training students. These Stations are administered by the Presidents of the Colleges, and the Horticultural Departments have the opportunity to carry out their research work there.

Publications. The results of horticultural research work in Poland are published in a number of periodicals. There are the Polish Agricultural Annuals/*Roczniki Nauk Rolniczych* published by the Polish Academy of Sciences. Each institute publishes its own annual for instance: "Experimental Work of the Research Institute of Pomology". The Institute of Vegetable Crops, (Institute of Soil Science and Plant Cultivation) publishes the Bulletin of Vegetable Crops/*Riuletyn Warzywniczy*. Each College of Agriculture has its own Scientific Journal/*Zeszyty Naukowe*. The articles in these publications have English and Russian summaries.

Seat/Nature of program	Institution and projects	Address and staff
1. Brzezna 1.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Small fruits, variety studies; pest and disease control; economy of fruit growing; beekeeping. Experimental orchard (40 ha). Fruit growing on the mountains and hills Entomology: integrated control in the orchards Nematodes Fruit growing and economy of fruit growing Small fruits Beekeeping	Poczta Podegrodzie, powiat Nowy Sacz Dir.: J. Caputa J. Caputa E. Niemczyk Dr. A. Szczygier E. Makosz S. Wierzbicki M. Jabłoński
2. Dabrowice 2.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Fruit breeding; small fruits, orchard soil management; pest and disease control; beekeeping. Experimental orchard (60 ha). Pomology Pest and disease control	Powiat Skierniewice, koło Skierniewic Dir.: S. Parynow S. Parynow/H. Domańska E. Cichosz
3. Dworek 3.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Orchard soil management; pest and disease control; variety studies. Experimental orchard (20 ha). General pomology Pest and disease control	Poczta Borkowice, powiat Koszalin Dir.: T. Myszk T. Myszk/M. Groniek E. Szczypińska
4. Górna Niwa 4.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Dwarf rootstocks and beekeeping. Experimental orchard (8 ha). Beekeeping Pomology	Poczta i powiat Puławy Dir.: B. Jabłoński B. Jabłoński A. Fabiański
5. Konstawola 5.1 Fruit	Sekcja Sadownicza Rolniczego Rejonowego Zakładu Doswiadczałnego w Konstawoli/ <i>Pomology Section of the Regional Agricultural Experiment Station at Konstawola</i> Belongs to the Ministry of Agriculture. Nurseries, small fruits, roses Currants, walnuts Raspberries, cherries Strawberries, gooseberries Stembuilders for fruit trees	Poczta Konstawola, pow. Puławski, woj. Lubelskie Head: T. Marzec T. Marzec J. Kluczynska I. Przygodzka M. Purtak U. Skorupska
6. Kórnik 6.1 Arboriculture	Zakład Dendrologii i Arboretum Kórnickie <i>Polskiej Akademii Nauk/Institute of Dendrology and Kornik Arboretum of the Polish Academy of Sciences</i> Dendrology; tree breeding; tree physiology and anatomy; seed dormancy; maintenance of the Arboretum. Dendrology and tree breeding	Kórnik near Poznań Dir.: Prof. dr. S. Białobok Prof. dr. S. Białobok

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kórnik (6.1)	Taxonomy and geography of trees and shrubs in Poland Taxonomy and geography of exotic trees Poplar breeding Tree genetics Growth regulators in trees Wood anatomy Seed dormancy Ornamental shrubs	Dr. K. Browicz/Dr. M. Gostyńska-Jakuszczyńska Dr. W. Bugaj/Dr. H. Chylarecki Dr. Z. Pohl/Dr. Z. Stecki Dr. T. Przybylski/Dr. M. Giertych Dr. M. Tomaszewski Dr. A. Hejnowicz Dr. B. Suszka Dr. J. Poszwińska
7. Kraków 7.1 General horticulture	Katedra Ogrodnictwa Wyższej Szkoły Rolniczej w Krakowie/Department of Horticulture of the College of Agriculture in Kraków Experimental orchard (24 ha). Small fruit, pomology Vegetable crops Fruit and vegetable processing Phytochemistry Pomology	ul. 29-go Listopada 48, Kraków Head: Ass. prof. dr. M. Łucka Ass. prof. dr. M. Łucka Ass. prof. dr. M. Kozłowska/ M. Poniedziółek Dr. K. Kropp/M. Kropp Dr. L. Markiewicz W. Poniedziółek
8. Lipowa 8.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/Experiment Station of the Research Institute of Pomology at Skierniewice Variety studies, pest and disease control, orchard soil management. Experimental orchard (20 ha). General pomology Pest and disease control	Poczta i powiat Opatów Kielecki Dir.: H. Zdyb H. Zdyb/S. Sointa Z. Chrzanowska
9. Lublin 9.1 General horticulture	Katedra Ogrodnictwa Wyższej Szkoły Rolniczej w Lublinie/Department of Horticulture of the College of Agriculture in Lublin Pomology, rootstocks, intensive methods of fruit production Polyploids of pharmacological plants Vegetable crops, onions Ornamental plants Small fruits; herbicides in horticulture General pomology Vegetable crops	ul. Akademicka 10, Lublin Head: Prof. dr. S. Zaliwski Prof. dr. S. Zaliwski Dr. T. Zderkiewicz Dr. M. Kossowski Dr. J. Szendel Dr. J. Lipecki J. Wieniarska S. Łukasik
10. Miłobadź 10.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/Experiment Station of the Research Institute of Pomology at Skierniewice Nursery problems, variety studies, orchard soil management, pest and disease control. Experimental orchard (40 ha). General pomology and nurseries Small fruits Pest and disease control Nurseries	Powiat Tczew, Miłobadź Dir.: W. Michalski W. Michalski K. Chrościcki K. Dronka J. Kozyra
11. Nowa Wieś 11.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/Experiment Station of the Research Institute of Pomology at Skierniewice Variety studies; orchard soil management; fruit growing economics; pest and disease control. Experimental orchard (50 ha). General pomology Pest and disease control Orchard machinery	Poczta i powiat, Nowa Wieś Dir.: F. Gajewski E. Gajewski/M. Mrozowski T. Mrozowska Inż. B. Kieturakis

Seat/Nature of program	Institution and projects	Address and staff
12. Olsztyn 12.1 General horticulture	Katedra Ogrodnictwa Wyższej Szkoły Rolniczej w Olsztynie/ <i>Department of Horticulture of the College of Agriculture in Olsztyn</i> Experimental orchard (30 ha); vegetable crops (5 ha). Vegetable crops Vegetable chemistry	Olsztyn-Kortowo Head: Ass. prof. dr. D. Wanic K. Niewiadomska/W. Kryńska/ D. Koter Z. Kawecki
13. Poznań 13.1 Plant protection	Instytut Ochrony Roślin/ <i>Institute of Plant Protection</i> Belongs to the Ministry of Agriculture. Protection of all agricultural crops. Entomology Pests of pear orchards Plum pest Nematodes of vegetable crops Bacterial diseases of vegetable crops Virus diseases of vegetable crops Pests of pea crops Pests of vegetable crops Aphids on vegetable crops Vegetable crop diseases Diseases of tomatoes Diseases of Brassica crops Spray residues on fruit Experimental farm Winnagora Pests of vegetable crops	ul. Grunwaldzka 189, Poznań Dir.: Prof. dr. W. Wegorek Prof. dr. W. Wegorek P. Wojnarowska A. Studziński Dr. A. Wilski K. Adamczyk A. Jakusz F. Kagan Reguły, poczta Piastów, koło Warszawy: Dr. J. Obarski/Z. Krzyżewski T. Kamińska S. Czyżewska/H. Tomaszewicz S. Wiślicki Dr. Z. Maciejowska Prof. dr. T. Stobiecki Powiat Środa, woj. poznańskie R. Rudny
13.2 Entomology	Katedra Entomologii Wyższej Szkoły Rolniczej w Poznaniu/ <i>Department of Entomology, College of Agriculture in Poznań</i> Entomology Orchard pests Leafhoppers, vectors of virus diseases Bees and bumble bees Biology of aphids	ul. Dąbrowskiego 159, Poznań Dir.: Prof. dr. W. Wegorek Prof. dr. W. Wegorek S. Burdajewicz W. Nowacka Dr. F. Wójtowski Dr. M. Karczewska
13.3 Plant pathology	Katedra Fitopatologii Wyższej Szkoły Rolniczej w Poznaniu/ <i>Department of Phytopathology, College of Agriculture in Poznań</i> Virus diseases of potato and of forage plants Diseases of horticultural plants, especially bacterial wilt of carnation Virus diseases of ornamental plants	ul. Wojska Polskiego 71c, Poznań Head: Dr. W. Błaszcak Dr. W. Błaszcak Dr. T. Glaser Z. Fiedorow, M. Sc.
13.4 Floriculture	Katedra Roślin Ozdobnych Wyższej Szkoły Rolniczej w Poznaniu/ <i>Department of Floriculture of the College of Agriculture in Poznań</i> Rootstocks, roses; peat-mineral mixtures as substratum in cultivating ornamental plants Chemical weed control in ornamental plants Growth substances Peat-mineral mixtures as substratum in cultivating ornamental plants	Dąbrowskiego 159, Poznań Head: Prof. dr. W. Oszkinis Prof. dr. W. Oszkinis Dr. K. Grabowski Inż. J. Krauze Inż. Z. Haber
13.5 Fruit	Katedra Sadownictwa Wyższej Szkoły Rolniczej w Poznaniu/ <i>Department of Pomology of the College of Agriculture in Poznań</i> Experimental orchards (80 ha).	Marcelin, Poznań Head: Ass. prof. dr. J. Wierszyński

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Poznań (13.5)	General pomology, growth substances, biology of seeds Small fruits Mineral nutrition Growth substances Virus diseases Fruit varieties Stone fruits: bacterial diseases	Ass.prof.dr.J. WierszyŃski Dr.C.Katulska Dr.T.HoŹubowicz M.Ugolik Dr.Z.Rebandel M.Mackowiak W.Babilas
13.6 Plant protection	Katedra Techniki Ochrony Roslin WyŹszej Szkoły Rolniczej w Poznaniu/ <i>Department of Plant Protection Technique of the College of Agriculture in Poznań</i> Control of pests and diseases of ornamental plants; control of onion mildew; physical properties of pesticides Control of mildews in greenhouses Control of <i>Hylemyia cilicrura</i>	Dabrowskiego 169, Poznań Head: S.Alvin S.Alvin S.Bzdziuch W.Czarnik
13.7 Vegetables	Katedra Warzywnictwa WyŹszej Szkoły Rolniczej w Poznaniu/ <i>Department of Vegetable Crops of the College of Agriculture in Poznań</i> Crop rotation; soil management; green manuring; heavy application of mineral fertilizers; irrigation Chemical weed control; biology of tomato flowering; growth regulators; mineral fertilizers in the greenhouse; vegetables for canning and freezing Hydroponics; peats; trace elements in growing vegetables under glass Evaluation of vegetable varieties; mushroom growing Vegetable seed production; short covering with foil tents Hydroponics, hotbeds	ul.Dabrowskiego 159, Poznań Head: Ass.prof.Z.Borna Ass.prof.Z.Borna K.Golińska-Noszczyńska Dr.T.Pudelski M.Gapiński A.MaŹachowski A.KoŹodziejczyk
14. Prusy	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i>	Poczta Głuchów, powiat Skierniewice Dir.: F.Kemula
14.1 Fruit	Variety studies; research in nursery problems and orchard soil management. Experimental orchard (25 ha). Pomology, nurseries Nurseries Pomology Pest and disease control	F.Kemula A.Grzymała M.Piatkowski I.Staszek
15. Reguły	Zakład DoŹwiadczalny Instytutu Warzywnictwa/ <i>Experiment Station of the Institute of Vegetable Growing at Skierniewice</i>	Poczta Piastów, koło Warszawy Dir.: Ir.E.Stechman
15.1 Vegetables	Utilization of town refuse and peat composts for fertilization of the soil; irrigation; growing vegetables on muck soil; proper utilization of glass in the production of vegetables and flowers and for breeding work. Experiment Station, with the farm of Michałowiec: 327 ha. Utilization of peat Fertilization of onions and cauliflowers Utilization of town refuse Growing of vegetables on muck soil Herbicides on muck soil	J.Duch M.Mijas E.Jaszczołt A.Radzikowska B.Zawadzki

Seat/Nature of program	Institution and projects	Address and staff
16. Siejnik 16.1 Fruit	Sekcja Sadownicza Rolniczego Rejonowego Zakładu Doswiadczalnego w Siejniku/<i>Pomology Section of the Regional Agricultural Experiment Station at Siejnik</i> Belongs to the Ministry of Agriculture. Research in nurseries; variety studies. Experimental orchard (40 ha). Rootstocks, general pomology, winter injury of fruit trees in north-eastern Poland	Poczta i powiat Olecko, Siejnik Head: Dr. Anna Korsak Dr. Anna Korsak
17. Sinołeka 17.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/<i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Biennial bearing; variety studies; orchard soil management; pest and disease control; fruit growing economics; storage of fruit. Experimental orchard (80 ha). General pomology, fruit storage, economics General pomology Economics Pest and disease control	Poczta Bojmie, powiat Minsk Mazowiecki, Sinołeka Dir.: Inż. S.M. Cegłowski Inż. S.M. Cegłowski S. Mackowiak Z. Łyko B. Dawydko/L. Cegłowska
18. Skierniewice 18.1 Fruit	Instytut Sadownictwa/<i>Research Institute of Pomology</i> Belongs to the Ministry of Agriculture. Fruit breeding; fruit growing; control of pests and diseases; fruit storage and fruit suitability for freezing and processing; economics of fruit growing, beekeeping. Equipment: 2 laboratory buildings, 6 greenhouses (2,400 are), orchard 35 ha, 11 field experiment stations. Fruit tree physiology, biennial bearing, orchard soil management Organization, economics Publ.: Prace Instytutu Sadownictwa (Experimental Work of the Research Institute of Pomology), Biuletyn Pszczelniczy (Bulletin of Beekeeping). a. Department of Fruit Breeding Variety trials and nurseries. Genetics, embryo-cultures Nursery, rootstocks Variety trials Breeding, variety trials Nursery Black currant and apricot breeding Varietal resistance to diseases b. Department of Fruit Growing Economics Costs of fruit production Costs of nursery production Organization of fruit farms c. Department of Fruit Pest and Disease Control Entomology, chemical control Phytopathology, apple scab Biological control of insects Spider mite control Insect control	ul. Pomologiczna 22, Skierniewice Dir.: Prof. dr. S.A. Pieniazek Dep. dir.: S. Niwicki Prof. dr. S.A. Pieniazek S. Niwicki Dr. S.W. Zagaja (Head) A. Czynczyk A. Jackiewicz/ A. Wojniakiewicz W. Dziecioł Z. Grzyb Inż. K. Somorowski A. Basak Dr. J. Grochowski (Head) Staszewski K. Chariampowicz Dr. R. Łeski (Head) Dr. Z. Borecki Dr. S. Wiackowski/Dr. E. Niemczyk/G. Bakowski Dr. Z. Suski Dr. W. Łeska/Dr. M. Koślińska/ S. Predki

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Skierniewice (18.1)	Toxicity of insecticides Virus diseases Bacterial diseases Phytopathology Biochemistry Chemical control of insects Botanical studies in fungi d. Department of Fruit Processing Suitability of fruit varieties for processing Canning of fruit Freezing of fruit e. Department of Fruit Storage Post-harvest physiology of fruits Storage fungus diseases of fruits Fruit storage Post-harvest physiology of fruit f. Department of Orchard Agrotechnique Biennial bearing, nutrition, growth substances Mineral nutrition Soil problems Biennial bearing, weed control Pruning and training of trees Replant problems Soil management Orchard economy and mechanization Mechanization of spraying Mechanization in the orchard g. Department of Small Fruits Variety trials; breeding; nutrition Virus problems Weed control h. Department of Beekeeping Beekeeping economics Biology of bees Pollination of plants; honey and nectar production Chemistry of honey Beekeeping i. Laboratory of Biochemistry and Radioisotopes Biochemistry Radioisotopes Plant physiology j. Laboratory of Botany Plant anatomy k. Laboratory of Fruit Tree Physiology (former Laboratory of Fruit Tree Physiology of the Plant Physiology Institute of the Polish Academy of Sciences). Physiology of crotch angle formation in trees Winter rest and winter resistance of trees; endogenous growth substances Growth substances and annual bearing Plant physiology Sad Pomologiczny/<i>Pomological Orchard</i> Preliminary evaluation of fruit varieties.	S. Smolarz Dr. B. Zawadzka/Dr. W. Basak A. Burkowicz J. Cimanowski E. Muszyńska Z. Nowakowski W. Zagaja W. Lenartowicz (Head) W. Płocharski J. Romaniuk F. Lange (Head) Dr. H. Borecka I. Guzewska J. Machnik Dr. Z. Soczek (Head) Dr. W. Kłossowski Dr. K. Słowik I. Kaźniewska A. Mika B. Słowik M. Mackiewicz Dr. Z. Cianciara B. Bera T. Wojniakiewicz K. Smolarz (Head) D. Sobczykiewicz J. Gwoźdecki Prof. dr. L. Bornus (Head) Prof. dr. A. Demianowicz/ Dr. C. Zmarlicki Prof. dr. Z. Demianowicz Dr. Curyło/Dr. W. Zalewski M. Gromisz/Z. Soczek Dr. R. Antoszewski (Head) J. Czapski U. Dziecioł/E. Lis J. Wiśniewska (Head)/ B. Machnik Dr. L. Jankiewicz (Head) Dr. J. Pieniązek Dr. M. Grochowska B. Borkowska Pocztą i powiat Skier-niewice J. Kleparski (manager)

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Skierniewice (18.1)	Pomology m. Scientific Liaison Section Extension service Extension, mineral nutrition Experiment design; statistical methods Extension, publications Extension Publications Library Planning	Inż. J. Lachman M. Unruh (Head) Dr. J. Włodek Dr. K. Szczepański T. Cichosz Z. Gromisz J. Suska/K. Durska W. Drózd Z. Zajdler
18.2 Vegetables	Instytut Warzywnictwa/Research Institute of Vegetable Crops Belongs to the Ministry of Agriculture, organized September 1st, 1964 by the Department of Vegetable Crops of the Institute of Soil Science and Cultivation of Plants at Puławy. Laboratories, greenhouses, frames, hotbeds, rooms with deep freezing equipment, common storages, canning pilot plant. In 1965 a considerable extension will be given to the equipment (i.a. 12 types of greenhouses, for studying the problems of construction, heating, ventilation, soil disinfection, etc. 2 Experiment Stations: Skierniewice (18.3) and Regul (15.1). Biology, nutrition and storage of vegetable plants Organization of production, extension work Publ.: Biuletyn Warzywniczy (Bulletin of Vegetable Crops Research Work); Zeszyt Warzywniczy Roczników Nauk Rolniczych (Vegetable Crops Volume of the Agricultural Annals). 11 Departments: a. Biology of Vegetable Plants Growing substances b. Economy of Production and Marketing Production centers of vegetables and fruits for processing and export Costs of vegetable production Prices of vegetable crops Economy of investments in vegetable industry Vegetable export problems Mathematical methods (linear programming) c. Field Vegetable Production Plant physiology Crop rotation, herbicides Soils and irrigation Herbicides Vegetable production on muck soils d. Greenhouse Vegetable Production and Mushroom Growing Evaluation of greenhouse types and greenhouse management Peat in greenhouse plant production Mushrooms e. Organization of Research and Extension Work Institutes publications	ul. 22 Lipca 3/5, P.O. Box 69, Skierniewice Dir.: Prof. dr. E. Chroboczek Dep. dir.: W. Lenkiewicz Prof. dr. E. Chroboczek W. Lenkiewicz Head: L. Kwiatkowska-Leska Dr. Z. Gertych (Head) B. Kostecka K. Ożarowska/M. Przedpełska J. Prąglowski B. Mioduszeński J. Szklarska Dr. H. Skąpski (Head) H. Fajkowska J. Jagoda H. Potaczek J. Rumpel Dr. J. Skierkowski (Head) J. Karasińska K. Siekierzyński Head: L. Macewicz

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Skierniewice (18.2)	Plans of research work f. Plant Breeding and Seed Production Genetics and breeding of onions and red beets F₁ hybrids of field cucumbers Breeding for disease resistance of beans Cucumber breeding Breeding and seed production of cabbage plants g. Plant Nutrition Fertilizer needs of soils and plants Fertilization of tomatoes Microbiology of soils and composts Micronutrients Salt concentration in soils h. Plant Protection Insects as viruses vectors; ecological factors in plant protection research work Downy mildew of onions, tomato diseases Nematology Soil fungi Aphidology Onion smut, viruses Toxicology i. Storage and Marketing Long term storage Short term storage Cold storage j. Vegetable Crops Engineering Mechanization of harvesting vegetable crops Mechanization of greenhouse work k. Vegetable Evaluation for Processing Organic acids and chlorophyll Ascorbic acid; carotene; minerals Growing vegetables for processing Canning and freezing technology	M. Sienkiewicz R. W. Doruchowski (Head) B. Pinchinat-Miernik J. Gabryl J. Bazant J. Hoser Dr. O. Nowosielski (Head) H. Stupnicka Z. Maciejewska B. Nowosielska A. Szpakowska Dr. J. Narkiewicz-Jodlo (Head) W. Rondomański Dr. M. Brzeski L. Dutkiewicz B. Nawrocka W. Macias J. Szwejd Dr. A. Kepka (Head) J. Daszewski Ir. A. Radoliński K. Viscardi (Head) Ing. A. Krokowski J. Bakowski (Head) H. Michalik M. Gałaj R. Achman
18.3 Vegetables	Warzywniczy Zakład Doświadczalny Instytutu Warzywnictwa w Skierniewicach/Experiment Station of the Institute of Vegetable Crops at Skierniewice 2 greenhouses, hotbeds. Irrigation, mechanization, fertilization of vegetable crops etc. Economy of production of vegetable crops Administration of the experimental fields	Skierniewice, woj. Łódzkie Dir.: Ir. K. Twardowski Z. Barańska A. Charzewski
19. Slupia Wielka	Centralna Stacja Doświadczalna Oceny Odmian/Central Experimental Establishment for Estimation of Varieties	Sroda Wlkp., Slupia Wielka Head: Inż. P. Rudy Dir. sci. departments:
19.1 Control of vegetable varieties	Belongs to the Ministry of Agriculture. Evaluation of productivity, preparation of descriptions, control of purity and originality of cultivated varieties. Research department: Field experiments, experiments in frames and glasshouses with vegetable varieties. Department of plant varieties: preparation of descriptions, testing on purity and originality of vegetable varieties, etc. Laboratory: chemical and technological quality research of vegetable varieties.	M. Wojciechowicz Head of laboratory: Dr. K. Latawiec

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Słupia Wielka (19.1)	The station is conducting this work in several stations all over Poland, under different conditions of climate and soil. The results of the experiments are the basis for inclusion in the "State Register of Original Plant Varieties" and in the "List of Selected Varieties" of the varieties, introduced by Polish Breeding Stations.	
20. Swierklaniec 20.1 Fruit	Zakład Naukowo-Radawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Small fruit, variety studies, orchard soil management, pest and disease control. Experimental orchard (90 ha). General pomology Pomology Phytopathology Entomology	Powiat Tarnowskie Gory, Swierklaniec Dir.: W. Bystydzieński W. Bystydzieński E. Bochnacka K. Bystydzieńska Z. Golik
21. Szczecin 21.1 General horticulture	Katedra Ogrodnictwa Wyższej Szkoły Rolniczej w Szczecinie/ <i>Department of Horticulture of the College of Agriculture in Szczecin</i> Vegetable crops; physiology and storage of seeds Pomology, storage of fruits	ul. Janosika 8, Szczecin (Head) Dr. W. Ostrowski
22. Warszawa 22.1 Entomology	Katedra Entomologii Wydział Ogrodniczy Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Entomology, Horticultural Faculty of the Warsaw Agricultural University</i> Plant feeding mites and aphids and stored products mites	ul. Rakowiecka 8, Warszawa Head: Ass. prof. J. Boczek Ass. prof. J. Boczek/Dr. J. Dmoch/E. Janiszewska-Cichocka/D. Kropczyńska
22.2 Plant pathology	Katedra Fitopatologii. Wydział Ogrodniczy Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Phytopathology, Horticultural Faculty of the Warsaw Agricultural University</i> Phytopathology, smut fungi, virus diseases Smut fungi Disease resistance in tomatoes Diseases of Cruciferae	ul. Rakowiecka 8, Warszawa Head: Prof. dr. J. Kochman Prof. dr. J. Kochman J. Tomala-Bednarek B. Leski C. Zamorski
22.3 Genetics	Katedra Genetyki Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Genetics of the Warsaw Agricultural University</i> Genetics of hybrid vigor Maize breeding and smut resistance Effects of ionizing radiation in plants	Ursyńów, Warszawa 25 Head: Ass. prof. H. Bańkowska Ass. prof. H. Bańkowska Dr. J. Bojanowski S. Muszyński
22.4 Landscape design	Katedra Projektowania Terenów Zielonych Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Landscape Architecture of the Warsaw Agricultural University</i> Landscape architecture	Ursyńów, Warszawa Head: W. Niemirski W. Niemirski/L. Lawin/ E. Bartman
22.5 Floriculture	Katedra Roslin Ozdobnych Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Floriculture of the Warsaw Agricultural University</i> Plant physiology; morphology of development; mineral nutrition	Ursyńów, Warszawa Head: Prof. dr. S. Woycicki Prof. dr. S. Woycicki

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Warszawa (22.5)	General floriculture, production tulip and hyacinth bulbs Growth substances General floriculture, mineral nutrition, lily of the valley Morphology of development General floriculture	W. Slachetko W. Dłuzewska H. Chmiel Z. Zawadzka Z. Pindel
22.6 Fruit	Katedra Sadownictwa Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Pomology of the Warsaw Agricultural University</i> Orchards in College estates (180 ha). Pomology; plant physiology; biennial bearing; orchard soil management; winter rest Breeding; variety studies Root system; mineral nutrition Growth substances Pruning General pomology Beekeeping, mating of queen bees Pomology	Ursynów, Warszawa Head: Prof. dr. S. A. Pieniazek Prof. dr. S. A. Pieniazek Ass. prof. dr. A. Rejman Dr. A. Sadowski F. Jaumien F. Kempski A. Golisz Dr. J. Woyke K. Pliszka
22.7 Soil science	Katedra Uprawy i Nawożenia Roli. Wydział Ogródniczy Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Soil Management and Fertilization, Horticultural Faculty of the Warsaw Agricultural University</i> Mineral nutrition of horticultural plants Microelements Organic fertilization, composts	ul. Rakowiecka 8, Warszawa Head: Dr. W. Majewska Dr. J. R. Starck Dr. A. Kropisz
22.8 Landscape design	Katedra Urządzania i Konserwacji Tereńów Zielonych Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Arrangement and Conservation of Landscape Architecture of the Warsaw Agricultural University</i> Arrangement and conservation of landscape architecture	Ursynów, Warszawa Head: Prof. dr. A. Zielonko Prof. dr. A. Zielonko/ Dr. A. Bartosiewicz
22.9 Vegetables	Katedra Warzywnictwa Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie/ <i>Department of Vegetable Crops of the Warsaw Agricultural University</i> The department, which was moved from Skiernewice to Warsaw-Ursynów, is now under organization. The department is making use of Krobów, the experiment station of the Warsaw Agricultural University, near Grójec (1 ha glass surface). Biology of vegetable plants, fertilization and storage problems Growing vegetables for processing; growth substances in onions Herbicides Biology, chemistry and growing methods of horseradish Isotopes	Ursynów, Warszawa Dir.: Prof. dr. E. Chroboczek Prof. dr. E. Chroboczek Dr. H. Woyke Dr. H. Kozaczenco D. Dabrowska A. Lewandowska
22.10 Vegetables	Zakład Hodowli Roslin Warzywnych Instytutu Hodowli i Aklimatyzacji Roslin w Warszawie/ <i>Department of Vegetable Crops Breeding of the Institute of Plant Breeding and Acclimatization in Warsaw</i> Tomatoes, spinach and cucumbers	ul. Górskiego 7, Warszawa Head: Dr. I. Paszkowska Dr. I. Paszkowska

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Warszawa (22.10)	Peas, tomatoes, spinach Onions, spinach Tomatoes Peas Beans	S. Rozegnał Z. Mazurkiewicz J. Styczynska M. Rudzinska O. Schmidt
22.11 Floriculture	Zakład Pożyln Ozdobnych Instytutu Hodowli i Aklimatyzacji Roslin w Warszawie/ <i>Department of Floriculture of the Institute of Plant Breeding and Acclimatization in Warsaw</i> Research on breeding ornamental plants. Breeding of roses, iris, tulips Research Station Smolice Breeding of begonias, pelargonium, cyclamen and annuals Breeding of Hydrangea and Freesia Research Station Radzików Breeding of gladioli, dahlias and carnations	ul. Górskiego 7, Warszawa Head: Prof. dr. W. Oszkinis Prof. dr. W. Oszkinis pow. Krotoszyn, woj. Poznańskie S. Schmidt Z. Patyna pocz. Rżonice k. Warszawy B. Grabowska/K. Mynett
23. Wrocław 23.1 General horticulture	Katedra Ogrodnictwa Wyższej Szkoły Rolniczej w Wrocławiu/ <i>Department of Horticulture of the College of Agriculture in Wrocław</i> Teaching and research in horticulture. Experimental orchard (20 ha). Vegetable crops Nurseries, fertilization of fruit trees Small fruits Fruit varieties	ul. Cybulskiego 34, Wrocław Head: Dr. A. Hellwig Dr. A. Hellwig/Dr. E. Ruczak/ M. Osinska/R. Mutor/W. Szpond W. Wojtkiewicz A. Wojtkiewicz J. Czudzak
24. Zadąbrowie 24.1 Fruit	Zakład Naukowo-Badawczy Instytutu Sadownictwa/ <i>Experiment Station of the Research Institute of Pomology at Skierniewice</i> Variety studies; orchard soil management; costs of fruit production.	Poczta Orły, powiat Jarosław Dir.: J. Krauze

Spain — Espagne



1. Almeria, 2. Aranjuez, 3. Barcelona, 4. Benicalap, 5. Burjasot, 6. La Coruna, 7. Logrono, 8. Madrid, 9. Malaga, 10. Murcia, 11. Santa Cruz de Tenerife, 12. Villaviciosa, 13. Tortoso, 14. Zaragoza.

Sommaire général

En Espagne, la recherche horticole, comme la recherche agronomique dans son ensemble d'ailleurs, relève essentiellement de l'Institut National des Recherches Agronomiques qui dépend lui-même de la Direction Générale de l'Agriculture du Ministère de l'Agriculture.

L'Institut a son siège central à Madrid, où se trouvent réunis divers centres, stations et services. Il comporte, en outre, un vaste réseau de stations expérimentales situées dans les zones les plus représentatives du point de vue agricole. Chacune de ces stations étudie les problèmes agricoles propres à la région où elle est implantée.

Un grand nombre de ces stations consacrent leurs travaux de recherche à des productions horticoles: cultures légumières, arbres fruitiers à pépins ou à noyau. Dans les régions favorables à leur culture, un accent particulier est mis sur les agrumes qui jouent un rôle de première importance dans l'économie agricole espagnole.

Dans d'autres cas, ces stations partagent leur activité de recherche en horticulture avec des sujets très voisins tels que la floriculture et l'amélioration des plantes ornementales, l'application de nouvelles techniques d'irrigation ou la mise en valeur des régions subtropicales de la Péninsule Ibérique.

Très récemment et à conséquence du Plan de Développement Économique initié l'année 1964, ont été créés dans le domaine horticole et fructicole des nouveaux centres et stations d'expérimentation, de recherches et d'essais pour l'horticulture, les cultures des fruits et des plantes ornementales, appartenant à l'Institut National de Recherches Agronomiques pour s'étendre sur tout le territoire national, surtout dans ces zones où l'horticulture et les cultures fruitières sont déjà d'une remarquable importance, ou dans ces cas-là où l'on prévoit un développement rapide de ces cultures. Ces stations sont en voie de création et l'on espère qu'elles peuvent commencer à fonctionner au cours de cette année.

Il existe toutefois d'autres services. Le Bureau d'Enregistrement des Variétés (catalogue des variétés) par exemple, à côté de son travail spécifique d'identification et d'essai des variétés fruitières et horticoles à l'inscription, poursuit des travaux qui sont en relation plus ou moins directe avec cette spécialité. Dans sa Section de Nutrition et de Physiologie végétale sont réalisées des expériences de culture sur solutions nutritives en milieu inerte, faisant surtout appel à des plantes potagères et ornementales. Les effets de carence et d'excès en oligo-éléments y sont également l'objet d'études, à l'aide d'un matériel comprenant encore des espèces horticoles.

Ce Bureau d'Enregistrement est élargi, en conséquence du Plan de Développement, d'une nouvelle section, chargée de l'inspection et du contrôle des pépinières d'arbres fruitiers, ainsi que de la certification variétale et sanitaire de greffes et porte-greffes pour fruits à pépins, à noyau et agrumes.

Une autre section des services centraux établis à Madrid, la Section d'Amélioration de l'Utilisation des Produits Agricoles, effectue des essais sur les espèces horticoles surtout à l'aide de substances stimulantes de croissance; diverses hormones végétales et acide gibbérellique; ces essais ont porté sur la pomme de terre, les haricots, la tomate, le poivron, l'ail, l'oignon, la citrouille et les choux.

Ainsi que le montre un simple examen des travaux poursuivis par les différentes stations expérimentales en matière de recherche

horticole, l'un des problèmes essentiels qu'on s'applique à résoudre est celui de l'isolement, de l'identification et de la description des divers types ou peuplements locaux qui se trouvent cultivés dans les régions d'Espagne à vocation horticole, tant en ce qui concerne les fruits que les légumes. Une autre question importante est celle de l'étude de l'adaptation des variétés étrangères et de l'obtention de nouvelles variétés à partir de celles-ci, par sélection ou hybridation, avec le souci cependant d'apporter des caractères d'intérêt positif grâce au matériel indigène.

En ce qui concerne en particulier les arbres fruitiers, l'obtention de meilleures affinités entre le greffon et le porte-greffe, en vue d'un plus grand rendement et d'une meilleure adaptation sur les différents sols espagnols, présente également un très grand intérêt.

Par ailleurs, l'obligation d'expérimenter de nouvelles souches résistant aux maladies de virus ou à des conditions géologiques extrêmes, s'est surtout exercée dans le domaine des agrumes.

Pe même, en ce qui concerne l'arboriculture fruitière, on s'est dernièrement attaché à la sélection, à l'amélioration et à l'étude culturale d'espèces qui, bien que ne tenant qu'une place restreinte dans la production globale, peuvent être appréciées sur le marché extérieur en raison de leur qualité et de la situation privilégiée de l'Espagne; l'avocat, l'anone, le kaki, les manguiers, etc.

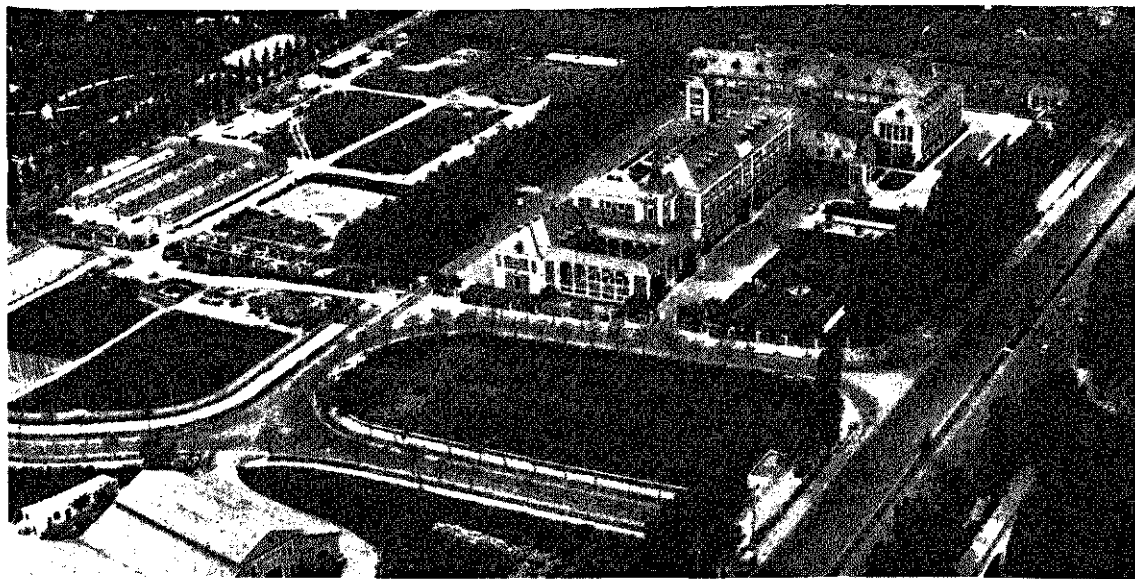


Photo aérienne du quartier générale de l'Institut National de la Recherche Agronomique à Madrid

Un autre aspect de la recherche horticole en Espagne, qui prend une importance spéciale, est celui qui est consacré à l'étude de la conservation des fruits et des produits horticoles en général, ainsi qu'à la technologie. Il faut finalement souligner l'importance qui, d'une façon générale, s'affirme en ce qui concerne les cultures tant horticoles que fruitières, dans tout le pays. Ce développement est la conséquence de l'augmentation rapide des surfaces irriguées grâce à la mise en oeuvre de nouveaux plans d'irrigation. De vastes possibilités sont ainsi offertes à la culture, sur ces nouvelles parcelles, de plantes pouvant trouver un débouché facile et financièrement rentable sur les marchés. La vulgarisation de ces cultures est de plus en plus grande, de même qu'est de plus en plus grand l'intérêt du cultivateur espagnol de connaître de nouvelles variétés et espèces horticoles.

Publications. L'Institut National de Recherches Agronomiques, par l'intermédiaire de son Service des Publications, fait connaître tous les expériences et travaux de recherches considérés comme intéressants, par le canal de deux publications:

- des Annales trimestrielles qui recueillent les travaux, essais et expériences à caractère pratique et susceptibles d'applications relativement étendues.

- des Bulletins semestriels (juin et décembre) qui reprennent les travaux de recherches pures ou les travaux qui, bien que ne présentant pas de possibilité d'application pratique immédiate, sont cependant d'intérêt agronomique évident.

Chacun de ces deux types de publication peut être obtenu, par voie d'échange de publications analogues, des centres de recherches ou organismes qui les demandent à l'Institut National d'Investigations Agronomiques, Chef de la Section de Publications, Avda. Puerta de Hierro, s/n Madrid 3, Espagne.

Par ailleurs, la Station Expérimentale de "Aula Dei", du Conseil Supérieur de Recherches Scientifiques, publie également les résultats de ses expériences dans une publication intitulée: "Annales de la Station Expérimentale de Aula Dei", sans périodicité fixe. On peut demander cette publication à l'adresse suivante: Station Expérimentale de Aula Dei. Bibliothèque. Apartado 202. Zaragoza, Espagne.

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-majors
1. Almeria 1.1 <i>Acclimation</i>	Instituto de Aclimatacion de Almería, Consejo Superior de Investigaciones Cientificas (CSIC)/ <i>Institut d'Acclimatation d'Almeria, Conseil Supérieur de Recherches Scientifiques</i>	Calle G. Segura, Almería Dir.: Ir. M. Mendizábal
2. Aranjuez 2.1 <i>Horticulture générale</i>	Estacion de Horticultura y Jardinieria (INIA)/ <i>Station Expérimentale d'Horticulture et de Jardinage paysagiste (INIA)</i> a. Causes de dégénérescence du fraisier dans cette zone (virose, dégénération physiologique, etc.) et expériences intéressant l'augmentation de la résistance naturelle de cette plante; b. étude et sélection du genre <i>Pelargonium</i> (variétés ornementales); c. influence du sexe sur la production dans la culture de l' <i>Asparagus officinalis</i> . Plantes ornementales, jardinage paysagiste, physiologie de l'asperge et de la fraise Physiologie et génétique des plantes horticoles, problèmes de résistance et de reproduction	Aranjuez Dir.: Ir. R. Barrera Riber Ir. R. Barrera Riber Ir. J. Bustamente y García de Arboleya
3. Barcelona 3.1 <i>Géologie, biologie végétale</i>	Departamento de Barcelona del Instituto de Edafología y Biología Vegetal (CSIC)/ <i>Département de Barcelona de l'Institut de Géologie et Biologie Végétales (CSIC)</i>	Facultad de Farmacia, Barcelona 14 Dir.: L. Miravittles
3.2 <i>Horticulture générale</i>	Estacion de Horticultura, Centro de Horticultura y Fruticultura (INIA)/ <i>Station d'Horticulture, Centre Expérimental d'Horticulture et des Cultures Fruitières (INIA)</i> 3 Sous-stations: Floriculture, Cultures fruitières et Cultures maraichères.	Barcelona
3.3 <i>Viticulture, Oenologie</i>	Estacion de Viticultura y Enología, Centro de Horticultura y Fruticultura (INIA)/ <i>Station de Viticulture et Oenologie, Centre Expérimental d'Horticulture et des Cultures Fruitières (INIA)</i> Adaptation et rendement de variétés de vigne; essais sur multiplication et rejuvenissement de la vigne; essais sur industrialisation et processus biochimiques de l'obtention de vins.	Amalia 21, Villafranca del Panades, Barcelona Dir.: Ir. J. Ma. Vidal Barraquer/Ir. R. Alentorn Vila
3.4 <i>Fruits</i>	Servicio de Fruticultura y Flayotecnica (SADR)/ <i>Service des Cultures Fruitières et d'Oléotecnique</i> Expérimentation avec pommier, poirier, pêcher, prunier, cerisier et noisetier sur porte-greffes, clones et populations, résistance écologique à insectes et maladies, floraison, pollinisation, interfertilité et autostérilité; contrôle de la production de porte-greffes et variétés clonales afin de divulguer nouveaux systèmes de taille et de production rationalisée.	Servicios Técnicos de Agricultura de la Diputacion Provincial de Barcelona, Urgel 187, Barcelona-11 Dir.: Ir. F. J. Riera
4. Benicalap 4.1 <i>Horticulture générale</i>	Estación de Horticultura (INIA)/ <i>Station Expérimentale d'Horticulture (INIA)</i> a. Pommes de terre: Recherches sur l'adaptation et le rendement des variétés de pommes de terre indigènes et importées, en collabo-	Luis Braille 1, Benicalap, Valencia Dir.: Ir. J. Cornejo

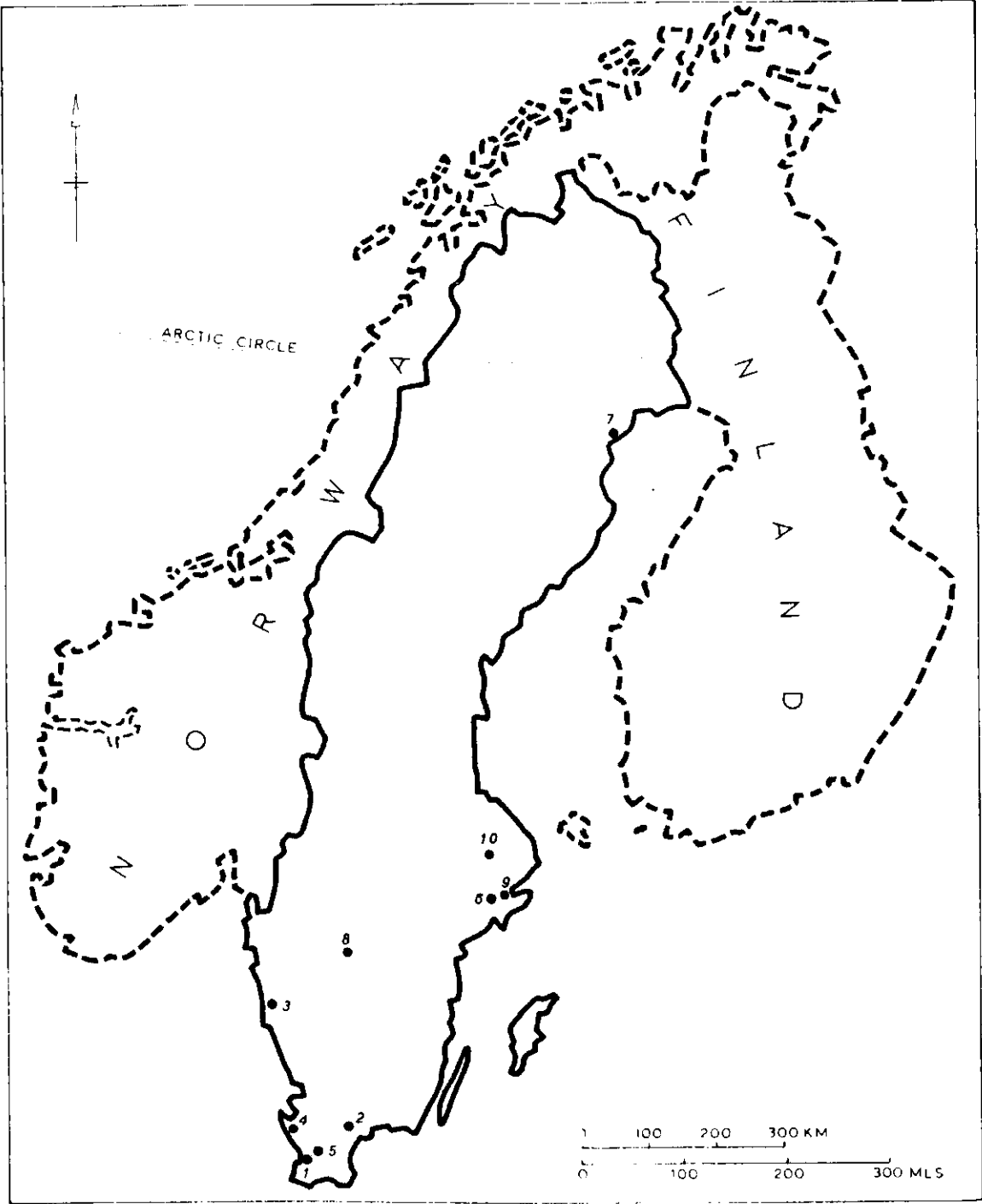
Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation de Benicalap (4.1)	ration avec le Registre des Variétés; testage de la pomme de terre indigène, en collaboration avec l'Institut National des Semences de choix; sélection de clones provenant d'hybridations, destinées à obtenir de nouvelles variétés, en collaboration avec la "Estación de Mejora de la Patata" (<i>Station expérimentale d'amélioration de la pomme de terre</i>) établie à Vitoria (Alava). b. Tomate: Sélection généalogique des hybrides et séparation des lignées en variétés indigènes et étrangères; vérification de l'augmentation du rendement par hétérosis. c. Oignon: Sélection des lignées obtenues par autofécondation dans la variété locale "Grano" et par polycroisement des lignées obtenues; essais avec hybrides d'oignon provenant de matériel américain (Beltsville). d. Arachide: Sélection et multiplication de la variété "Virginia" et essais d'adaptation d'autres variétés provenant des États-Unis et du Sénégal. Expériences de fumures. Sélection de variétés et de lignées entre des types locaux mal définis du poivron et de l'aubergine. Collection de variétés de roses en collaboration avec le Registre des Variétés.	Ir. J. Cornejo Ir. J. L. Gascó Pérez-Caballero
5. Burjasot 5.1 Citriculture	Estación Naranjera de Levante (INIA)/<i>Station Expérimentale pour la citriculture du Levant (INIA)</i> Caractérisation de variétés de l'oranger et du citronnier. Expériences sur les engrais azotés de l'oranger. Processus de maturation des agrumes. Étude de nouveaux porte-greffes pour les agrumes à des fins phytopathologiques. Changement du système racinaire des agrumes grâce à de nouvelles méthodes, comme l'affranchissement, greffe de racine, greffe par approche, etc., en relation avec le sol, l'état et l'âge de la plante et les époques convenant au mieux à l'opération. Traitement au froid des agrumes, congélation et emmagasinage des fruits et légumes verts. Physiologie de l'oranger: nutrition, maturité des fruits, résistance par greffage Pépinières de citrus, résistance aux maladies et aux insectes Conserves de fruits, procédés industriels de la transformation des agrumes Délimitation des variétés et production sélectionnée de porte-greffes et de greffes	Gueipo de Llano 105, Burjasot, Valencia Dir.: F. González-Sicilia Ir. E. González-Sicilia Ir. N. Díaz Caballero Ir. J. Macho-Quevedo Bará Ir. C. P. Nieves Abascal/ Ir. P. Veyrat García
6. La Coruña 6.1 Fruits	Estación de Fruticultura (INIA)/<i>Station Expérimentale des Cultures fruitières (INIA)</i> Essais de rendement et typification des porte-greffes et des greffes en variétés de pommier et de poirier; essais sur systèmes de taille et traitements. Conservation et industrialisation de pommes et poires.	Centro de Galicia; Bergondo (Lugar de Ros), Apartado 10, La Coruña

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
7 Logroño 7.1 Fruits	Estación de Fruticultura (INIA)/<i>Station Expérimentale des Cultures Fruitières (INIA)</i> a. Détermination du coefficient de variation que peuvent présenter les porte-greffes homogènes afin de les comparer avec la variabilité que présentent les types commerciaux obtenues à partir de la semence. b. L'influence des greffes intermédiaires en combinaison avec ceux où le porte-greffe et la variété commerciale présentent une incompatibilité. Un pareil essai a été entrepris en employant les variétés commerciales des pêchers "Sneed" et "Bonvicini" avec des greffes intermédiaires des pruniers "Brompton Mussel commun" et "San Julian" et le porte-greffe "Mirabolano". c. Essais comparatifs de porte-greffes pour la variété "Sneed" du pêcher, greffée sur divers porte-greffes du prunier, en particulier du "Reine Claude Verte". Influence et compatibilité entre porte-greffe et greffe chez les arbres fruitiers, spécialement cognassier, prunier et pêcher; problèmes généraux de la culture des arbres fruitiers à pépins et noyau; comportement, identification et adaptation des variétés	Avenida de Navarra 24, Logroño Dir.: Ir.F.Martínez Zaporta Ir.F.Martínez Zaporta
8. Madrid 8.1 Agriculture générale	Instituto Nacional de Investigaciones Agronomicas (INIA)/<i>Institut National d'Investigations Agronomiques (INIA)</i> Relevant de la Direction Générale de l'Agriculture du Ministère de l'Agriculture. Station expérimentales situées dans les zones agricoles.	Avda. de Puerta de Hierro, Madrid 3
9. Málaga 9.1 Economie	Centro Experimental Económico Agrario (CSIC)/<i>Centre Expérimental d'Economie Agronomique (CSIC)</i>	"La Mayora", Málaga Dir.: D.Wimberg
9.2 Horticulture générale	Estación de Cultivos Subtropicales(INIA)/<i>Station Expérimentale des Cultures Subtropicales</i> Physiologie végétale et alimentation des variétés de haricots, tomates et artichauts Problèmes généraux des espèces fruitières subtropicales: avocatier, corossolier, etc. Comportement, acclimatation et reproduction des espèces horticoles et fruitières régionales	Puerto del Mar 26, Málaga Dir.: Ir.E.Mira Ir.R.P.Félez Ir.F.Grana Enciso/ Ir.A.Herrera Munoz
10. Murcia 10.1 Géologie, biologie	Centro de Edafología y Biología Aplicada del Segura (CSIC)/<i>Centre de Géologie et Biologie Appliquée du Segura (CSIC)</i>	Universidad de Murcia Murcia Dir.: O.Carpena
10.2 Horticulture générale	Estación de Horticultura y Fruticultura (INIA)/<i>Station Expérimentale de l'Horticulture et des Cultures Fruitières (INIA)</i> Piment: Sélection et fixation des diverses variétés de piments exclusivement employées à la fabrication de poudre de piment, propres à cette zone (Familliete, Tres Cascos, Bona et Albar); étude des caractéristiques du fruit	Alberca 33, Murcia Dir.: Ir.M.Pascual Jimenez

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation de Murcia (10.2)	et la valeur de ses parties pour l'industrie des condiments; culture de piment en rotation avec le coton; les fumures; l'irrigation; le travail du sol; les parasites; les procédés d'industrialisation (séchage, mouture, etc.). Fruits à noyau: apricotier, pêcher et prunier. Etude descriptive des variétés locales et de leur typification à partir de l'établissement de plantations et des vergers; analyse des rapports avec le sol et des conditions les plus favorables suivant le type de terrain et des porte-greffes; étude des qualités pour la conservation de chaque variété et de leurs jus; étude de l'établissement de pépinières avec certificat d'authenticité de la variété, sur porte-greffes adéquats. Plantations d'orangers amers servant comme porte-greffe pour le citronnier; étude du néflier (<i>Mespilus germanica</i>), le plaque-minier du Japon (<i>Diospyros japonica</i>) et le jujubier (<i>Zizyphus vulgaris</i>). Physiologie et culture du piment, manipulation industrielle, assolement de cru, etc. Organisation des pépinières d'arbres fruitiers, mise à l'épreuve de nouvelles variétés pour l'industrie de la conserve	Ir.M.Pascual Jimenez Ir.I.Vivanco Guerao
11. Santa Cruz de Tenerife, Islas Canarias 11.1 Horticulture générale	Estacion Experimental de Horticultura y Jardineria (INIA)/<i>Station Expérimentale de l'Horticulture (INIA)</i> Bananier: Etude des méthodes de culture (fumures, irrigation, stérilisation, mécanisation, brise-vent; phytopathologie); sélection et amélioration des variétés cultivées; essais sur l'acclimatation de nouvelles variétés. Tomate: fumures, irrigation, assolement de cru, clôture en palissade, typification de la maturité, obtention de nouvelles variétés, emballage, transport. Pommes de terre: Variétés d'exportation, irrigation, assolement de cru, mécanisation et traitements phytopathologiques. Avocatier: Acclimatation de variétés de Californie et de Floride; sélection de variétés locales; multiplication par greffage, méthodes culturales, extension de cette culture avec des variétés d'hiver et par voie de greffage. Manguier et corossolier: Sélection de variétés locales et importation de variétés américaines, multiplication par greffage et comportement des variétés. Légumes: Méthodes de culture et nouvelles variétés de carotte, laitue, poivron, aubergine, choux, haricots et choux-fleurs. Melon, pastèque et concombre: Méthodes culturales: époque d'ensemencement, fumures, irrigation et variétés de melon qui ont rendu possible cette culture aux Iles Canaries. Néflier, goyavier (<i>Psidium pomiferum</i>) et sapotillier (<i>Casimiroa edulis</i>): Amélioration de la production. Glaïeul: Production commerciale de bulbes destinés à l'exportation. Problèmes généraux des cultures régionales: banane, avocat, mangue, corossol, tomate, etc.	Office: Avenida de Belgica 3, Santa Cruz de Tenerife, Islas Canarias Main Station: Valle Guerra, La Laguna, Tenerife, Islas Canarias Dir.: Dr.ir.A.García Cabezón
		Dr. ir. A. García Cabezón

Siège/Caractère du programme	Institution et projets de recherche	Adresse et état-major
Continuation de Santa Cruz de Tenerife, (11.1)	Génétique du maïs et de la tomate, culture et amélioration des variétés du glaïeul Cultures de fraises et de fleurs	Dr. ir. F. Machado Dr. ir. L. Acuña
12. Villa- viciosa 12.1 Fruits	Estación Pomológica de Villaviciosa/ <i>Station Pomologique de Villaviciosa</i> Organisation semi-officielle. Expérimentation avec pommes de table et ci- dre, poirier, prunier, pêcher, cerisier et noisetier sur pépinières et vergers: ferti- lisation, résistance aux maladies et aux in- sectes, traitements pesticides, floraison, maturité et conservation.	Villaviciosa (Asturias) Dir.: Ir. S. Alvarez Requejo
13. Tortosa 13.1 Oléi- culture	Estación de Olivicultura, Centro de Horticul- tura y Fruticultura (INIA)/ <i>Station d'Oléi- culture, Centre Expérimental de l'Horticul- ture et des Cultures Fruitières (INIA)</i> Adaptation et rendement des variétés de l'olivier; expérimentations sur méthodes de reproduction et de taille; étude sur l'usage industrielle de l'olive	Cervantes 2, Tortosa (Tarragona) Ir. M. Gayá Gilabert
14. Zaragoza 14.1 Horti- culture générale	Centro de la Cuenca Central del Ebro. Esta- ción de Cultivos de los Grandes Fegadiós (INIA)/ <i>Centre du Bassin Moyen de l'Ebre: Station Expérimentale des Cultures en Gran- des Zones Irrigables (INIA)</i> Cultures céréalières, fourragères et marai- chères; problèmes de l'horticulture générale et régionale: haricot, poivron, tomate, etc. Phytopathologie: délimitation des variétés et adaptation des arbres fruitiers à pépins et à noyau; porte-greffes Cultures industrielles: coton, lin, chanvre, etc. Arbres fruitiers à pépins et à noyau	San Vicente Paul 1, Zaragoza Champ: La Alfranca Dir.: Dr. ir. A. Mainar Dr. ir. A. Mainar Dr. ir. A. Alvaro Moreno Dr. ir. M. Pardo Pascual Dr. ir. J. Vozmediano Redal
14.2 Horti- culture générale	Centro de Propagación Hortofruticultura de la Cuenca del Ebro/ <i>Centre de Propagation de l'Horticulture et des Cultures Fruitières du Bassin de l'Ebre</i> Organisation de cours spécialisés pour gradués.	Calle Manifestación 16, Zaragoza Dir.: Ir. D. A. Casallo
14.3 Horti- culture générale	Estación Experimental de Aula Dei (CSIC)/ <i>Station Expérimentale de l'Aula Dei (CSIC)</i> Cultures des fruits: Identification et des- cription des diverses variétés d'arbres fru- tifiers: abricotier, cerisier, prunier, pommier et poirier; étude et sélection des clones pro- venant de l'étranger et sélection dans les populations indigènes; compatibilité; adapta- tion des arbres fruitiers en terrain calcaire; propagation par marcottage après stratifica- tion. Culture maraîchère: Amélioration de la bet- terave rouge polyploïde afin d'obtenir des va- riétés tétraploïdes et triploïdes; obtention d'asperges tétraploïdes; obtention de pastè- ques triploïdes sans pépins. Génétique de la betterave rouge, de l'asperge et de la pastèque Typification des variétés d'arbres fruitiers, adaptation de nouvelles variétés et distribution géographique des variétés actuelles; greffage	Apartado 202, Zaragoza Dir.: Ir. A. Silván Ir. A. Silván Ir. J. Herrero

Sweden



1. Alnarp, 2. Balsgård, 3. Göteborg, 4. Landskrona, 5. Lund, 6. Nyckelby, 7. Öjebyn, 8. Rånna, 9. Stockholm, 10. Uppsala.

General Survey

In Sweden advanced teaching, research and experimental work in agriculture and horticulture has been transferred to The Agricultural College of Sweden. This "university" is located at Ultuna, near Uppsala. However, education, research and development in the field of horticulture are located at Alnarp, near Lund. In Lund an experimental station for agricultural and horticultural building is situated.

The higher education in horticulture has recently been reorganized. The College studies proper are carried on for the first 2 years at Ultuna (basic subjects) and for the last 2 years at Alnarp (applied subjects). Horticultural training is specialized in, for example, cultivation technique, economics or landscape gardening. Each year 20 students are admitted. It is also possible to study for the licentiate and doctoral degrees.

The research work of the College of Agriculture in Sweden covers most aspects of agriculture and horticulture. It is carried out at the different departments. Ordinarily the departments are built up around a professorship, with the professor as head of the department. Some of the departments are engaged

in experimental work and have for this purpose one or more experimental divisions.

Applied research on experimental basis is carried out according to a general programme for the whole country. This programme is worked out at the divisions mentioned above which are in very close connection with practical agriculture and horticulture. At the College of Agriculture there is a committee for experimental work which functions as central authority of the applied research. Finally the programme is approved by the Board of the Agricultural College of Sweden.

The experimental work outside Alnarp is under supervision of the "field trial organization". The country is divided in three experimental horticulture districts. In each district there are district experimental stations (Alnarp, Nyckelby, Öjebyn) with district experimental officers as leaders and coordinators of the work. Investigations are, however, not only carried out at these experimental stations but also at a number of local experimental fields. It should be mentioned that very often practical growers are cooperating as hosts for such experiments which are for instance performed in their orchards or glasshouses.



Agricultural College
of Sweden, Alnarp.
Department of Pomology

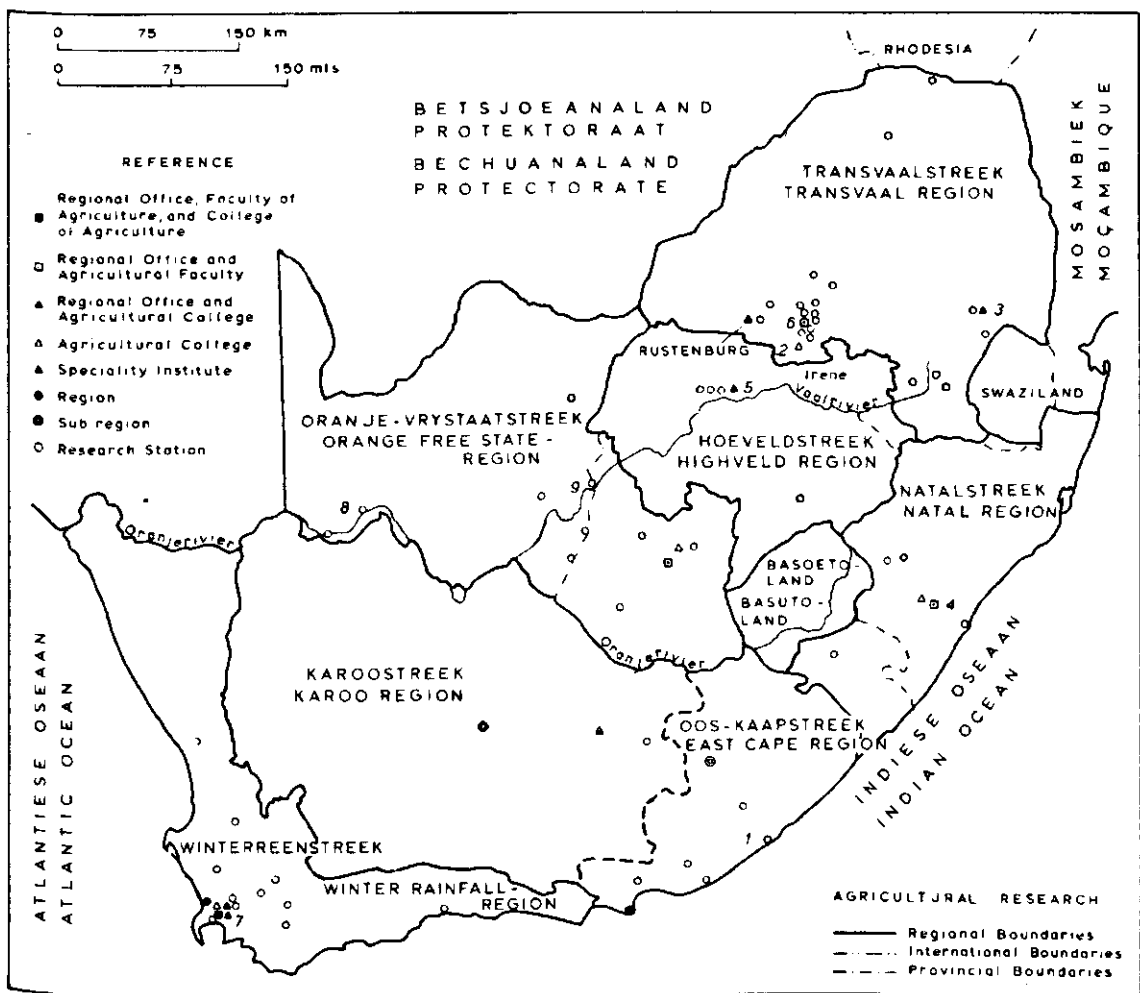
Seat/Nature of program	Institution and projects	Address and staff
1. Alnarp 1.1 General horticulture	Agricultural College of Sweden, Horticultural Division Comprises the following departments: a. Institutionen för Frukt- och Bärödling/ <i>Department of Pomology</i> - Division of research and teaching Genetical and cytological problems with soft fruit and physiological problems with tree fruit; investigations especially on Ribes. - Division of field experiments Variety and rootstock problems with tree- and soft fruit, pruning, soil management, weed control, fertilizer trials, cultivation of black currants and strawberries. b. Institutionen för Köksväxt- och Prydnads- växtdödling/<i>Department of Vegetable and Flower Growing</i> Section of vegetable growing - Division of research and teaching Cytogenetic studies in Pisum, investigations on the mineral nutrition of vegetables, etc. - Division of field experiments Crops grown for processing and market gardening, glasshouse crops, testing of new cultivars of vegetables, experiments with herbicides, fertilizers, peat, methods of production and storage of vegetables. Section of floriculture and ornamental horticulture - Division of research and teaching Nutrition uptake and balance in relation to polyploidy, the role of Ca and Mg in chlorophyll development, day-night cycle in Chrysanthemum, ecological and hardiness problems in gardens and parks. - Division of field experiments Testing cultivation value in relation to hardiness, resistance and flower richness in shrubs and perennials, grasses for lawns, greenhouse experiments with cultivation of Chrysanthemum and carnations in peat, day-length trials for Chrysanthemum and Begonia varieties, soil heating for carnations and Freesia, growth retardants for Chrysanthemum and Poinsettia, testing of stocks for roses and variety trials with various flower crops. c. Institutionen för Landbrukets Företagsekonomi/<i>Department of Agricultural Economics</i> - Division for horticultural economics Research and teaching in production economics of horticulture. d. Institutionen för Landbrukets Arbetsmetodik och Teknik/<i>Department of Farm Mechanization</i> - Division for horticultural mechanization Teaching of work methods and machinery in horticulture. e. Institutionen för Trädgårdskonst och Naturvård/<i>Department of Landscape Architecture</i> Teaching, training and research in landscape architecture and garden design, etc.	Alnarp Head: Prof. F. V. Nilsson Dr. E. Goldschmidt-Reischel Dr. I. Fernqvist/ Miss R. Bjurman Head: Prof. R. Lamm Head: Prof. R. Lamm Dr. L. Ottosson/Dr. G. Tometorp/H. Åvall Head: Prof. R. Lövkvist H. Sahlström Dr. S. E. Lenander/ J. Johansson Head a. i.: Prof. U. B. Renborg Head: M. Carlsson Head: Prof. Å. Haraldson Head: L. Gröné Head: Prof. P. Friberg

S 1.1 - 6.1

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Alnarp (1.1.)	f. Södra Trädgårdsförsöksdistriktet/ <i>South Swedish Horticulture Experimental District</i> Coordination of experimental work	S. Hintze
-	g. Institutionen för Växtpatologi/ <i>Department of Plant Pathology and Entomology</i> Division for field experiments on horticultural crops	
2. Balsgård 2.1 Fruit	Institutet för Växtförädling av frukt och Bär/ <i>Balsgård Fruit Breeding Institute</i> Breeding of free fruit and soft fruit.	Balsgård, Fjälkestad Head: Dr. Nybom
3. Göteborg 3.1 Botany	Göteborgs Botaniska Trädgård/ <i>Botanical Garden Göteborg</i> Rock garden plants, orchids, rhododendrons, arboretum with collection of trees from the northern hemisphere. Taxonomy (Thymelaeaceae) Southern Africa	Frölundagatan 22, Göteborg SV Acting dir.: R. Peterson, Lic. T. Niltzelius Dr. C. Blom
3.2 Food preservation	Svenska Institutet för Konserveringsforskning/ <i>Swedish Institute for Food Preservation</i> Preservation and storage of food.	Göteborg Head: Prof. E. v. Sydow
4. Landskrona 4.1 Plant breeding	Weibullsholms Växtförädlingsanstalt/ <i>Plant Breeding Institute Weibullsholm</i> The institute is owned by a private enterprise W. Weibull Ltd., but is given a yearly subsidy by the government. Garden department: Plant breeding and plant husbandry of vegetables and ornamental flowers. Laboratories: Cytological and pathological studies. Genetics mutations Breeding work on cucumber, cauliflower, celeriac, parsley, onion, carrot, cabbage, leek, radish, brussels sprouts, lettuce, spinach Breeding work on beans, peas, red beets, tomatoes Breeding work on lawn grasses Breeding work on flowers Plant pathology Cytology, genetics, mutations Publ.: <i>Agri Hortique Genetica</i> (twice a year).	Landskrona Head: Dr. F. Fajersson Dr. O. E. V. Gelin K. F. Axelsson N. E. B. Åkesson B. J. Langvad, Lic. E. Schütz P. N. Lundin S. G. Rixt
5. Lund 5.1 Farm building	Statens Lantbruksbyggnadsförsök/ <i>State Research Institute for Farm Buildings</i> - Division for building technology Horticultural buildings, designing and testing different types of glasshouse construction.	Lund Head: N. Holmqvist R. Landgren
6. Nyckelby 6.1 General horticulture	Distriktsförsöksstation/ <i>District Experimental Horticulture Station</i> Main station of the Middle Swedish Experimental Horticulture District. Applied research on experimental basis with fruit crops, vegetables, ornamental plants; investigations on fruit storage, herbicides.	Nyckelby, Ekerö near Stockholm District officer: Å. Nyhlén

Seat/Nature of program	Institution and projects	Address and staff
7. Öjebyn 7.1 General horticulture	Distriktsförsöksstation/ <i>District Experimental Horticulture Station</i> Main station of the North Swedish Experimental Horticulture District. Applied research on experimental basis with fruit crops, vegetables, ornamental plants; breeding and research work on northern species of Rubus.	Öjebyn near Pitea District officer: Mrs. G. Larsson
8. Rånna 8.1 Fruits	Försöksstation/ <i>Experimental Horticulture Station</i> Situated in the western part of the Middle Swedish Experimental Horticulture District. Mainly fruit growing, especially cherries.	Rånna near Skövde District officer: Å. Nyhlén
9. Stockholm 9.1 Botanics	Bergianska Botaniska Trädgården/ <i>Bergius Botanic Garden</i> Belongs to the Royal Swedish Academy of Sciences. Morphology, anatomy, taxonomy, geography of seed plants. Angiosperms, Scandinavian plant geography Gymnosperms, living and fossil (Conifer distribution in time and space) Podocarpaceae Publ.: "Acta Horti Bergiani"	Stockholm 50 Acting dir.: Dr. M. Ryberg Dr. M. Ryberg Prof. dr. P. Florin J. Tengnéer
(Solna) 9.2 Seed testing	Statens Centrala Frökontrollanstalt/ <i>State Seed Testing Station</i> Branch station The branch station at St. Råby has a section for vegetables, belonging to the Department of Certification (Fältkontrollavdelningen). Laboratories, farm (70 ha) for field check plots; testing of distinctness, uniformity, stability, varietal purity and trueness. Other branch stations	Solna, Stockholm Head: Prof. H. Esbo St. Råby, Lund Head: Dr. G. Andersson Hort. spec.: Å. Voss
(Solna) 9.3 Plant protection	Statens Växtskyddsanstalt/ <i>State Plant Protection Institute</i> Plant protection experiments on agricultural and horticultural plants. Branch institutions	Landskrona; Getinge; Röbäcksdalen, Umeå Solna, Stockholm Head: Prof. I. Granhall
10 Uppsala 10.1 Engineering	Statens Maskinprovningar/ <i>State Agricultural Machinery Testing Institute</i> Testing of agricultural and horticultural machinery. Branch station Umeå Branch station Alnarp	Uppsala Head: U. A. Moberg Head: Head: Å. Jacobsson

Union of South Africa



1. East London, 2. Johannesburg, 3. Nelspruit, 4. Pietermaritzburg, 5. Potchefstroom, 6. Pretoria, 7. Stellenbosch, 8. Upington, 9. Vaalharts.

General Survey

Organized horticultural research in South Africa is of relatively recent origin, dating from approximately 1928. The first horticultural research institutions of any significance to be established in South Africa were the Citrus and Subtropical Horticultural Research Station (now named the Citrus and Subtropical Fruit Research Institute) circa 1928, and the Western Province Fruit Research Station at Stellenbosch (now named the Fruit and Food Technology Research Institute) circa 1937. Since then the Pretoria Horticultural Research Institute, the Pineapple Research

Station at East London and the Viticultural and Oenological Research Institute at Elsenburg have also been established.

Horticultural activities are carried out in South Africa under a very large diversity of climatic conditions, on widely different soil types and with a very large variety of horticultural crops. Consequently numerous practical problems, requiring urgent attention, have been encountered. Although in horticultural research work applied research so far has been mostly emphasized, nevertheless many practical problems still remain to be solved.

Horticultural research in South Africa mainly concerns the following: deciduous fruit and table and wine grapes, subtropical fruits including citrus and pineapples, vegetables and ornamental horticulture.

Horticultural research is at present carried out mainly at four specialist institutes, viz.

(a) the Citrus and Subtropical Fruit Research Institute at Nelspruit, working mainly on citrus, subtropical fruits and vegetables;

(b) the Horticultural Research Institute near Pretoria, working mainly on vegetables, deciduous fruit and table grapes under summer rainfall conditions and ornamental horticulture;

(c) the Fruit and Food Technology Research Institute at Stellenbosch, working mainly on deciduous fruit and table grapes under winter rainfall conditions, and on packing, transport and storage and food technology problems;

(d) the Viticultural and Oenological Research Institute at Stellenbosch.

In addition horticultural research is being carried out by horticultural sections of agro-ecological regions and agricultural faculties of Universities. This research work is not limited to any particular crop or type of problem but usually involves crops which are of economic importance in the area served by the regional institution and such problems as are not sufficiently dealt with by the specialist institutions. The regional institutions are also responsible for all agricultural extension work. In this way fairly good coverage of the vast variety of soil and climatic conditions is obtained.

Horticultural research work was until recently co-ordinated by the National Division

of Horticulture. All agricultural, including horticultural, research work is now co-ordinated by the recently appointed Directorate for Agricultural Research, which has its offices in Pretoria. The Directorate consists of six full-time directors, one of which represents horticulture, and five co-opted directors, and is headed by the Chief Director. The Directorate is assisted by a full-time panel of eighteen specialists which acts mainly in an advisory capacity. The Chief Director is immediately responsible to the permanent head of the Department, viz. the Secretary for Agricultural Technical Services. The initiative for new research work still comes to a large extent from the individual research worker or research institution. Before new research work is started the research worker completes a prescribed project form in consultation with his colleagues and immediate chief. This form is submitted to the Directorate where the need for the work, the priority rating and technical details are checked. If all these are found satisfactory the work is approved and the project registered, otherwise the project is altered according to instructions which will then be issued by the Directorate. Facilities have been provided for consultation and discussion of research matters, when necessary, by groups of research workers or technical committees. It is hoped that in this way it will be possible to give more attention to the planning of future horticultural research work on a national basis.

Records are kept by the Directorate of all agricultural research projects in progress. Annual progress reports are submitted to the Directorate on all registered research projects. Summaries of these reports are published annually.



Part of the buildings of the Horticultural Research Institute at Pretoria

Research work on deciduous fruits, table and wine grapes and on citrus and sub-tropical fruits is mainly concerned with problems of immediate practical importance. These include variety and rootstock studies; breeding and selection of new improved varieties; propagation methods; cultural practices including soil cultivation, fertilization, irrigation, pruning; packing, transport and storage problems and disease and pest control.

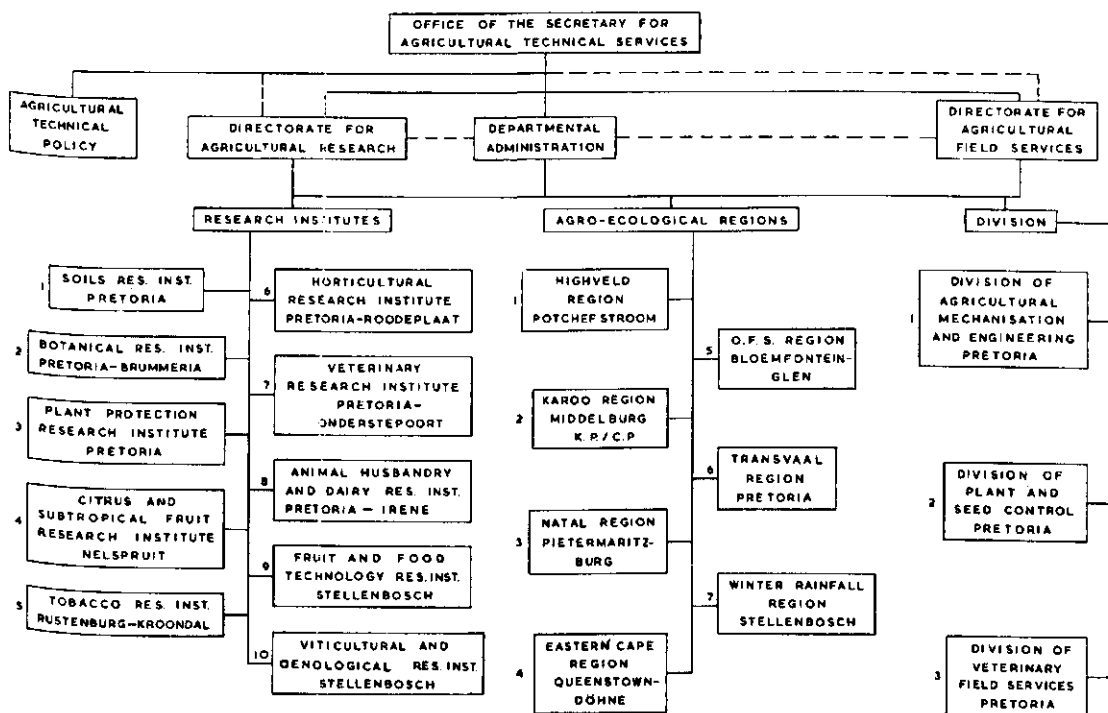
Research work on pineapple involves mainly fertilization, planting methods and planting material, soil preparation and cultivation, weed control and packing, transport and storage.

Research work on tea and coffee was commenced in 1963 and at present covers mainly selection of cultivars, planting methods, fertilization, and irrigation.

Research work on vegetables involves mainly variety tests and the breeding of new, improved varieties and hybrids, some cultural practices, water requirements, and also some

fertilizer experiments. Some special problems are being investigated such as bitter principles found in edible plants, fruit abnormalities, seed production problems and a few others. Problems dealing with disease and pest control are also being investigated. Research work on ornamental horticulture concerns mainly the collection and study of ornamental trees and shrubs, lawn grasses and rose varieties; breeding work with indigenous flowering plants with the object to develop suitable cut flower varieties, and the production, storage, etc. of flower bulbs. The inspection and certification of horticultural and other agricultural seeds produced under the Government's Seed Certification scheme, and the inspection of nursery plants and general plant inspection is the responsibility of the Divisions of Plant Control and Seed Control.

Control over and inspection of the marketing and processing of horticultural products fall under the Department of Agricultural Economics and Marketing. -



Organization of the Departments of Agricultural Technical Services

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

Seat/Nature of program	Institution and projects	Address and staff
1. East London (Eastern Cape Region) 1.1 Pine apple	Agricultural Research Station, Dohne Research on the production, propagation, breeding, nutrition and physiology of pineapples and in the near future on vegetable production Production of pineapples and vegetables Plant physiology, production of pineapples and vegetables Plant physiology and culture of pineapples Breeding and genetics of pineapples and vegetables	Private Bag 127, East London, Cape province Chief: J. A. van Blommestein J. A. van Blommestein M. C. Olivier P. K. Reynhardt C. M. Oosthuizen
2. Johannesburg 2.1 Botanics	Frankwald Research Station, Department of Botany, University of Witwatersrand Ecology, plant succession, soil structure Plant physiology, germination inhibitors Cryptogamic botany, river algology Mycology, soil fungi Cytology	Johannesburg, Transvaal Dep. head: Dr. R. L. Davidson Dr. E. R. Roux Miss F. D. Hancock Dr. H. J. Swart R. Wilsenach
3. Nelspruit (Eastern Transvaal) 3.1 Fruit	Navorsingsinstituut vir Sitrus- en Subtropiese Vrugte/Citrus and Subtropical Fruit Research Institute Research on all aspects of the production of citrus fruits, including genetics and breeding, stock-scion relationships and varieties, cultivation and fertilization; control of pests and diseases including virus diseases; cold storage, transport and keeping quality of fruit; production and handling of subtropical fruits such as banana, avocado, paw-paw, pecan and other nuts Supervision research and citrus diseases Citrus rootstocks and varieties Citrus pests Nutrition of citrus Cultural practices, citrus Horticultural meteorology Biometrics, horticultural crops Water relations of citrus Insect pests of citrus Low temperature storage and transport Biochemical research Botany, subtropical fruits Biochemical research, citrus Insect pests of citrus and subtropical fruits Cultural practices, subtropical plantation fruits Nutritional problems, citrus and subtropical fruits Advisory: citrus Physiology and propagation, subtropical fruits Low temperature storage Nutrition of citrus and soil studies Virology, citrus Plant physiology, subtropical fruits Pests of citrus and subtropical fruits Plant pathology Substations S. A. Co-op Citrus Exchange Control insect pests of citrus Plant pathology, citrus	Private Bag, Nelspruit Eastern Transvaal Chief: Dr. J. H. Grobler Dr. F. C. Loest (asst. chief) W. J. Basson E. C. G. Bedford G. S. Bredel W. P. Burger G. C. Green K. A. W. Helff J. A. Herholdt F. Honiball L. C. Holtshausen C. S. Jacobs A. J. Joubert C. C. Kingsley/dr. D. van Noort I. B. Kok/A. Schwartz/F. A. de Villiers F. A. Kuhne W. Langenegger I. Mathews/A. van Oostrum Dr. A. van der Meulen J. C. Nel S. F. du Plessis Dr. R. E. Schwarz D. de S. Thomas S. F. de Villiers H. J. Young Alkmaar, Eastern Transvaal Addo, Cape province M. R. Georgala Dr. K. McOnie/dr. G. van Noort

Seat/Nature of program	Institution and projects	Address and staff
4. Pietermaritzburg (Natal Region)	a. Faculty of Agriculture, University of Natal; b. Cedara College of Agriculture; c. Agricultural Research Station Estcourt	Private Bag 9021, Pietermaritzburg, Natal Chief: E.D. Adler
4.1 Subtropical crops	Culture, breeding and nutrition of subtropical fruits, nuts and vegetables, including citrus, pineapples, bananas, pecan nuts, coffee and tea Citrus, subtropical fruits and pecan nuts Subtropical fruits, vegetables Pineapple, banana, coffee and tea Diseases of fruit, field and vegetable crops Horticulture, pecan nut pollination studies Horticulture	Prof. J.C. le Roux Dr. P. Allan E.M. Fyenhuis Miss Prof. dr. S.J. Truter B.N. Wolstenholme L. Alleman
5. Potchefstroom (Highveld Region)	College of Agriculture and Research Institute Cultivation of fruits and vegetables specially suited for production in this area	The Chief, Highveld Region, Potchefstroom Chief: F.A. Deale Ass. chief: H.P.D. van Wijk
5.1 Fruits and vegetables	General pomological problems, pruning and fruit thinning, cherry rootstocks, fertilisation, cultivation; vegetable production	T. Prins
6. Pretoria (Transvaal)	Directorate of Agricultural Research	Private Bag 116, Pretoria Chief dir.: Dr. S.J. du Plessis
6.1 General horticulture	Co-ordination and control of horticultural research in common with other branches of agricultural research. The Chief Director of Agricultural Research is assisted by a number of specialist directors and other experts in various branches of research. Tasks: determination of the requirements of the horticultural industry; leading of planning research; evaluating research reports; placing research staff where their services can be used to the best advantage. Plant protection Agricultural chemistry Horticulture and biochemistry Plant pathology Soil fertility Biometry Entomology	Dr. J.W.G. Geyer Dr. J. van Garderen Dr. H.L. Pearse Dr. G.J.M.A. Gorter M.S. Steyn G.J. Strydom Dr. I.H. Wiese
6.2 Botany	Botanical Research Institute Main activities are concerned with taxonomy of indigenous flora (National Herbarium, Pretoria) and with ecological research. Systematic botany or ecology The National Botanic Garden, Pretoria has recently been initiated (1948) for the cultivation of indigenous plants, mainly for study in connection with the work undertaken in the National Herbarium, but also with the object of using indigenous plants in landscape design. Publ.: Flowering Plants of Africa (a publication on the lines of Curtis's Botanical Magazine); Flora of Southern Africa; Bothalia (systematic botany) and Botanical Survey Memoirs (ecology)	P.O. Box 994, Pretoria Dir.: Dr. L.E. Codd Ass. dir.: Dr. B. de Winter Remaining members of staff
6.3 General horticulture	Horticultural Research Institute, formerly Pretoria Horticultural Research Station Research on all aspects of the production of vegetables, fruits and flowers especially under summer rainfall conditions, including	Private Bag 293, Pretoria Chief: Dr. J.C. Strydom

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Pretoria (6.3)	breeding and selection of suitable varieties for the various production areas, nutrition and cultural practices, diagnoses and control of diseases, control of pests, virus diseases, weed control, water requirements and climatic adaptation of crops, shrubs and ornamental gardening. Floriculture Plant physiology - Biometry - Chemistry Organic chemistry, radio-isotopes Biochemistry Soil science - Fruits Cultural practices, deciduous fruits and table grapes - Meteorology - Plant Breeding Vegetables Fruits Breeding and cytology, indigenous flowers - Plant Protection Plant protection Plant pathology Virology Entomology - Vegetables Cultural practices	Dr. J. C. Strydom Dr. S. A. E. Rehm, ass. chief G. Strydom Dr. L. P. Neethling J. D. H. Conradie P. J. Gous W. Carstens J. Myburgh T. G. Joubert E. P. Evans Miss C. E. Malan A. T. Coertze Dr. G. J. Gorter/B. H. Boelema/ H. Visser Dr. P. J. Klessner Dr. C. C. Daiber/R. D. Hepplewhite/J. H. van Jaarsveld E. Strydom/T. E. Tillema
6.4 Plant protection	Navorsingsinstituut vir Plantbeskerming/ <i>Plant Protection Research Institute</i> Research on the incidence, taxonomy and control of insects, mites, and nematodes attacking horticultural crops, virus and fungus diseases of citrus and potatoes. Potato breeding and virus control - Acarology - Biological Control Systematics of parasitic Hymenoptera Biological control of citrus pests and potato tuber moth Biological control of citrus pests - Insecticides - Nematology Taxonomy of nematodes, especially Longidoridae Nematode diseases of potatoes, mainly skin eelworm (<i>Pratylenchus</i>) Root-knot nematodes, their biology, taxonomy and susceptibility tests Nematode ecology, taxonomy and population dynamics - Plant Pathology Citrus virus diseases	Private Bag 134, Beatrixstreet, Pretoria Chief: Dr. J. E. van der Plank Dr. J. E. van der Plank Miss dr. M. P. K. Meyer/G. G. van der Merwe Dr. D. P. Annecke S. W. Broodryk Miss C. J. Cilliers Dr. B. K. Petty/J. M. Richfield Dr. J. Heyns Dr. H. Koen Mrs. dr. V. Coetzee J. P. Furstenberg Dr. A. P. D. McClean
6.5 Fruit (Transvaal Region)	Department of Horticulture, Faculty of Agriculture, University of Pretoria Research on fruit tree nutrition, varieties, propagation and citrus virus diseases. Nutrition of fruit trees, citrus virus diseases, nucellar citrus selections, citrus rootstocks and banana fertilization Systematic pomology, fruit tree varieties and propagation, banana fertilization	Faculty of Agriculture, University of Pretoria Prof. dr. P. C. J. Oberholzer D. F. A. von Staden

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Pretoria (6.5)	Soil chemistry, availability of phosphate in soils, banana fertilization, citrus nutrition Black spot of citrus	Prof. dr. W. J. Fölscher Prof. dr. P. M. T. le Roux
7. Stellenbosch 7.1 Fruit, flowers	Navorsingsinstituut vir Vrugte en Voedsel tegnologie/ <i>Fruit and Food Technology Research Institute</i> All aspects of deciduous fruit growing and table grape production including cultural practices, evaluation of varieties and breeding for improvement, nutrition, control of pests and diseases, virus diseases and the provision of virus-free material, cold storage and transport and the processing of fruit including biochemical, microbiological and technological studies. Determination of quality standards for fruit and fruit products. Cultivation and improvement by breeding of indigenous flowers, especially Proteacea. The special needs of the various fruit growing areas are investigated intensively at the sub-stations at Groot Drakenstein, Grabouw, Robertson, De Doorns, Citrusdal, Paarl and Joubertina. Polarographic and gas chromatographic analysis (pesticide residues) Food chemistry Urea metabolism, phosphate and calcium uptake by fruit trees Chemical analysis Soil mineralogy Plant nutrition (micro-elements) Plant growth substances, dormancy studies Freeze drying Influence of temperature on maturation dates of fruit and other phenological data; climatic classification with respect to fruit adaptability, frost damage prevention Radio-isotopes in agriculture, plant nutrition studies (macro-elements) Spectrochemical analysis Virus diseases of fruit trees and vines Physiological aspects of silver leaf in peaches Rootstocks and pruning Farm implements, irrigation, spraying and dusting machines Gibberellins in relation to apple fruit growth Storage problems of deciduous and citrus fruits and pineapples Radio-isotope techniques, micro autoradiography, radiometric assay, dosimetry Diseases of deciduous fruits and vines, spray tests Fruit juices, concentrates and canning Breeding and selection of new cultivars of plums, apples and pears Biochemical changes of tissue associated with senescence Biochemical changes of apples during storage Fruit morphology development and handling Electronic apparatus Gas chromatography and citrus oils	Private Rag, Stellenbosch, Cape Province Chief: Prof. R. I. Nel Ass. chief: I. J. Burger E. E. Bartel D. S. Basson A. J. Bester J. J. A. Bester A. V. Betts Dr. E. Beyers Dr. K. L. S. Blommaert D. M. Bornmann M. E. L. Ruys J. Deist J. J. Eksteen/Dr. W. J. Pienaar/ W. Truter D. S. Engelbrecht G. M. M. Erasmus S. P. Erasmus K. J. Fourie M. P. Fourie L. Ginsburg Dr. F. J. Haasbroek Dr. A. J. Heyns J. F. du T. Hugo N. Hurter Dr. J. P. Ireland F. van Jaarsveld J. de V. Lötter E. v/d S. Lotz L. M. Louw

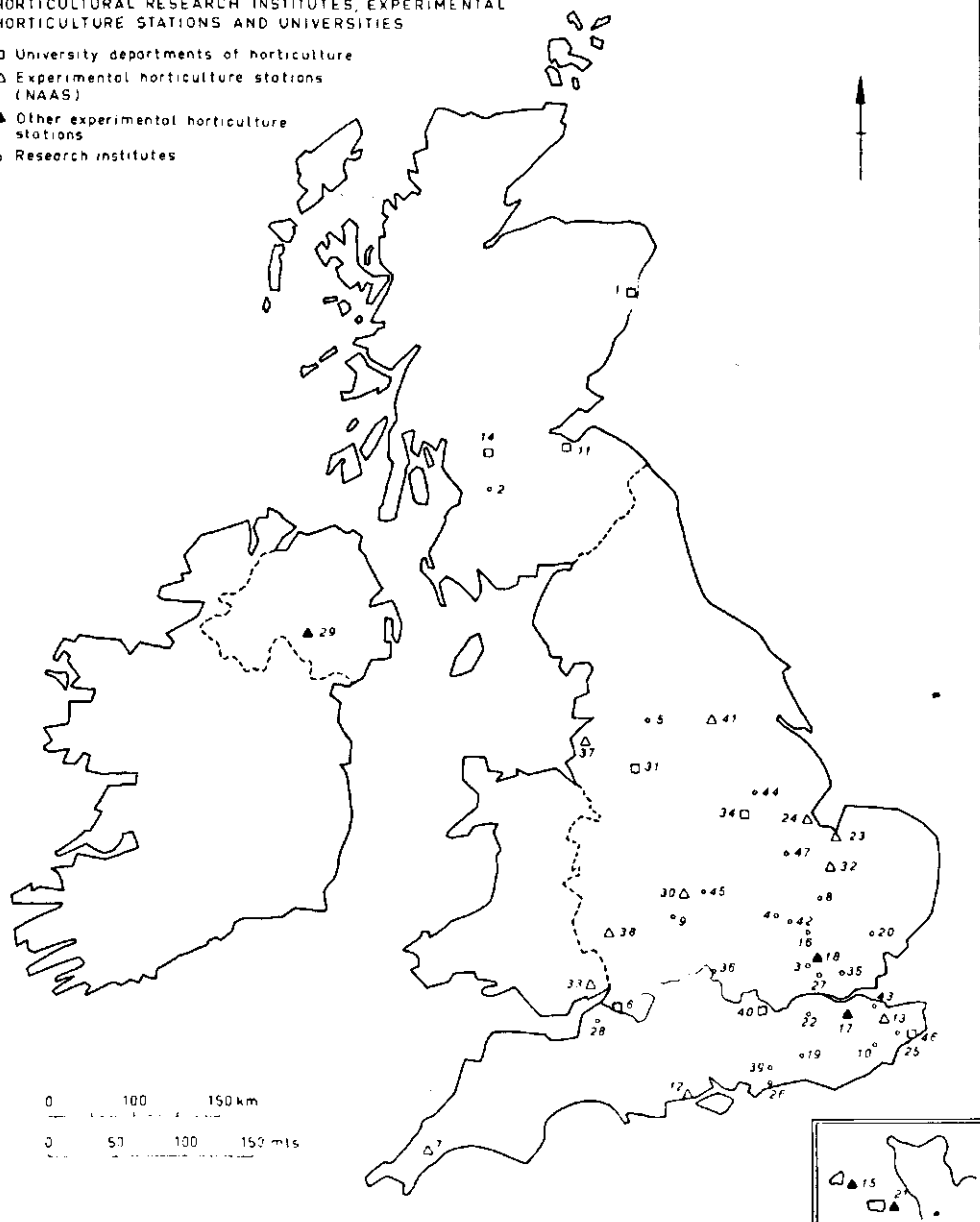
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Seat/Nature of program	Institution and projects	Address and staff
Continuation of Stellenbosch (7.2)	Studies on pollination and setting with <i>Vitis Vinifera</i> Cytological studies with <i>Vitis Vinifera</i> , correlating berry characteristics with resistance to rotting diseases	A.Kriel E.F.Beukman
7.3 Vegetables, fruits, grapes (Winter Rainfall region)	Stellenbosch-Elzenburg College of Agriculture Vegetable culture, viticulture and fruit culture, including breeding and testing of cultivars, nutrition and control of pests and diseases Adaptation and plant physiological aspects of vegetable crops Cabbage and tomato breeding Carrot and onion breeding Nutrition of cabbage, cauliflower and onions Trace elements deficiencies and vegetable production Chemical weed control in onions Propagation, bearing habits and crop control, fruit tree rest, pruning of deciduous fruit Diseases of onions	Chief Winter Rainfall Region, Stellenbosch, Cape Province F.E.C.Galle Prof.dr.J.M.Stevens Prof.dr.R.de V.Pienaar L.I.Eksteen C.P. de L.Beyers Dr.J.v.d.W.Jooste Prof.A.F.de Wet/Dr.D.K.Strydom C.F.Petzer
8. Upington (Orange Free State Region)	Upington Agricultural Research Station Production of table grapes, sultanas and deciduous fruit and vegetables under irrigation	P.O.Box 37, Upington Orange Free State Chief: R.J.Goosen
8.1 General horticulture	Table grape varieties and pruning sultanas Estimation of gibberellins in developing apple shoots; seed testing and cultivar trials of vegetables	R.J.Goosen C.J.Smit
9. Vaalharts 9.1 General horticulture	Vaalharts Landbounavorsingstasie/ <i>Vaalharts Agricultural Research Station</i> General horticultural problems (deciduous fruit, grapes and vegetables) Irrigation requirements and soil moisture studies	Jan Kempdorp, Orange Free State G.Lombaard(temp.chief) J.H.P.Kellerman

United Kingdom

HORTICULTURAL RESEARCH INSTITUTES, EXPERIMENTAL HORTICULTURE STATIONS AND UNIVERSITIES

- University departments of horticulture
- △ Experimental horticulture stations (NAAS)
- ▲ Other experimental horticulture stations
- Research institutes



1. Aberdeen, 2. Auchincruive, 3. Bayfordbury, 4. Bedford, 5. Bingley, 6. Bristol, 7. Camborne,
8. Cambridge, 9. Chipping Campden, 10. East Malling, 11. Edinburgh, 12. Efford, 13. Faversham,
14. Glasgow, 15. Guernsey, 16. Harpenden, 17. Hextable, 18. Hoddesdon, 19. Horsham, 20. Ipswich, 21. Jersey,
22. Kew, 23. King's Lynn, 24. Kirton, 25. Lackfield, 26. Littlehampton, 27. London, 28. Long Ashton,
29. Loughgall, 30. Luddington, 31. Manchester, 32. Mepal, 33. Newport, 34. Nottingham,
35. Ongar, 36. Oxford, 37. Preston, 38. Preston Wynne, 39. Pulborough, 40. Reading, 41. Selby,
42. Silsoe, 43. Sittingbourne, 44. Thurgarton, 45. Wellesbourne, 46. Wye, 47. Yaxley.

General Survey

Organized research in agricultural subjects in Great Britain began in 1843 with the founding of Rothamsted Experimental Station at Harpenden by Sir John Lawes. The experiments there soon attracted the attention of scientists throughout the world but it was not until the first decade of the present century that similar institutions began to be set up to investigate the problems of horticultural crops. Each of our research stations has had a different history and is governed in a different way, although with the institutes founded since 1945 a similar pattern of administration has emerged.

The Research Stations

The Long Ashton Research Station originated in 1903 as the National Fruit and Cider Institute; in 1912 it became associated with the University of Bristol and expanded its interests to cover all aspects of fruit growing. East Malling Research Station started in 1913 as a field station of Wye College, where experimental work with hops and fruit had been in progress for some years under the guidance of a famous agronomist, Sir Daniel Hall. East Malling, now independent of Wye, specializes in work on fruit crops, while the tradition of field research in hops is continued at Wye College in a department which studies all aspects of the production and growing of the crop. The Ditton Laboratory is a separate organization which adjoins the East Malling Research Station. Its programme of research covers the whole field of storage and transport to market of fruit and vegetables.

During the same period when fruit growers were getting together to found the Long Ashton and East Malling Research Stations a certain Mr. John Innes made a bequest for the founding of an institution for horticultural research at Merton, in South London. This institute has since been transferred to Bayfordbury in Hertfordshire and now conducts a wide range of fundamental research in plant genetics and physiology, cell biology and the effect of growing conditions and environment under glass. Its Department of Applied Genetics is well known for the new varieties of fruit it has produced.

Other horticultural research institutes have been established more recently. At the National Vegetable Research Station work in progress includes the breeding of new varieties of outdoor vegetables, pest and disease control of vegetables and watercress, weed studies and irrigation. The Glasshouse Crops Research Institute in Sussex is concerned with all aspects of the growing of glasshouse crops and of mushrooms. Its sphere of interest includes flowers and bulbs grown in the open but most of the present work in floriculture is under glass.

The Scottish Horticultural Research Institute devotes particular attention to horticultural problems in Scotland with special emphasis on the physiology and breeding of strawberries and raspberries and the study of plant virus diseases including those which are soil borne.

Since 1909 when Government grants first became available, financial aid for agricultural and horticultural research has steadily increased, and the older research institutes have gradually become almost wholly dependent on these grants to meet their annual expenditure. The State-aided institutes in England and Wales now draw their grants from the Agricultural Research Council; those in Scotland are financed by the Department of Agriculture and Fisheries for Scotland on advice of the Council, which has responsibility for agricultural, horticultural and food research in Great Britain. It is responsible to the Secretary of State for Education and Science. In addition to the institutes already mentioned, two other A.R.C. sponsored bodies have horticultural departments. The National Institute of Agricultural Engineering, at Silsoe, has engineering departments concerned with the design of fruit tree sprayers and other horticultural machinery and an environmental control division which investigates problems of glasshouse heating and watering. The A.R.C. Weed Research Organization at Begbroke, near Oxford, is concerned with the control of weeds by chemical and cultural methods.

The Universities

Three of our Universities have horticultural departments, viz. the Universities of London (Wye College), Nottingham, Reading and all engage in some research as an adjunct to their teaching activities.

The new Food Research Institute which will be responsible for work on the storage and handling of fruit, on the biochemistry of fruit ripening and the storage and dormancy of potatoes, is being established at Norwich and will be adjacent to the University of East Anglia thus facilitating co-operation between workers in the two bodies.

Work done in the botany departments of universities, ranging into the fields of biochemistry, physiology, genetics and ecology, is often of horticultural interest.

The money to support this work is mostly derived from the Government grant to the universities, and may be supplemented by research grants from the Agricultural Research Council to cover particular projects. For example, such support has been given to the universities of Nottingham and Reading and to Wye College for plant studies of interest to horticulture as well as to agriculture. The Council also, by agreement with the Universities, gives extended support to certain

able scientific workers, providing them with additional staff in small teams known as research units.

The unit on plant growth substances and systemic fungicides under the direction of Prof. R.L. Wain, F.R.S., at Wye College and that on flower crop physiology under Prof. O.V.S. Heath, F.R.S., at Reading University are examples of this system in operation.

The A.R.C. Unit of Nitrogen Fixation will be established at the new University of Sussex at Brighton.

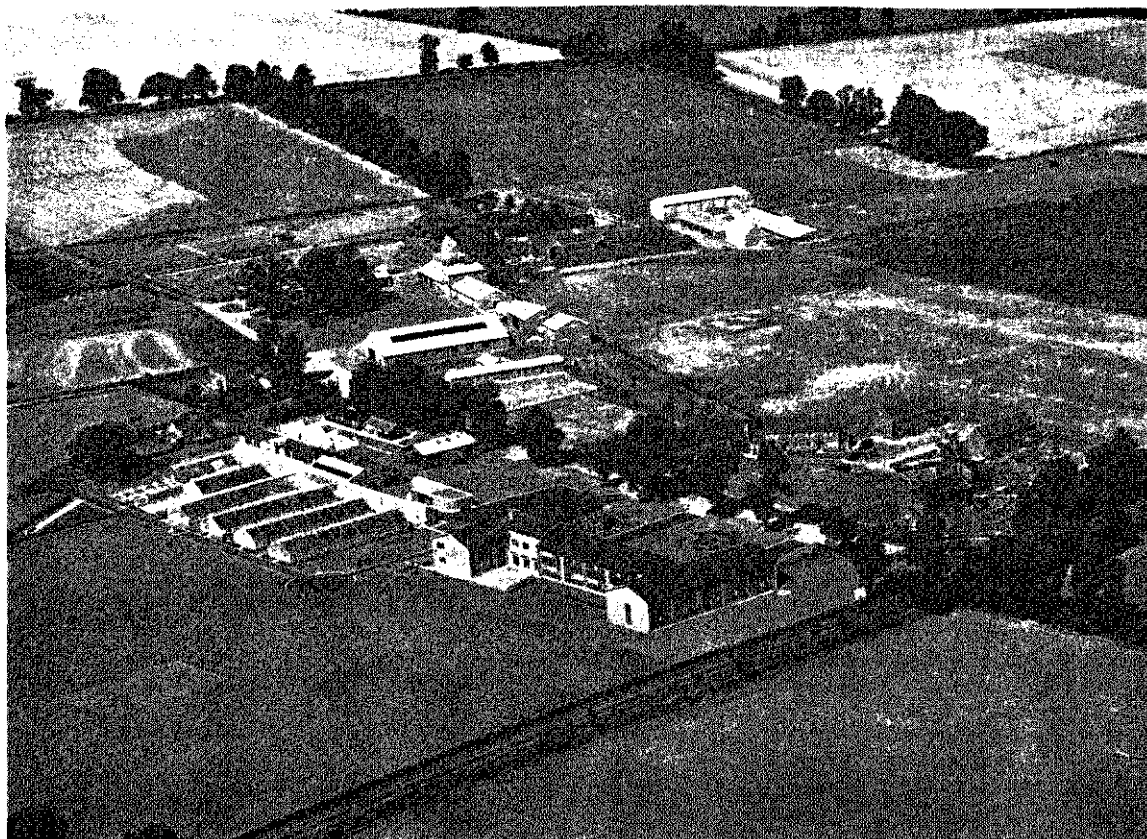
The National Agricultural Advisory Service

A wide range of practical horticultural problems are being studied on the Experimental Horticultural Stations which form part of the National Agricultural Advisory Service of the Ministry of Agriculture, Fisheries and Food. These stations are intended to provide facilities for the testing of research findings on a wider scale than can be done at the research stations under conditions approximating to those found on commercial farms and nurseries. They also provide facilities for the study of important local problems and in addition conduct variety trials, so that the reaction of promising new kinds

of fruit or vegetables to a range of soil and climate conditions may be assessed. Certain long-term manurial experiments which give valuable information on the needs of the local soils are being undertaken.

The Stations are located in the main horticultural areas of England and Wales. The Directors are senior members of the NAAS. They are assisted by NAAS horticultural officers and a farm manager who is responsible for the horticultural workers employed. There are also trained crop recorders. A Station Advisory Committee which includes prominent local growers helps in the general planning of the experimental work.

The first Experimental Research Station to be established was at Luddington near Stratford-on-Avon, where apples, plums, soft fruits, flowers and a range of outdoor vegetable crops including asparagus, which is important in the adjoining Vale of Evesham, are being studied. At Stockbridge House in Yorkshire a similar station is concerned with vegetables, glasshouse crops, kinds of fruit suitable for northern English conditions and rhubarb for forcing. Rosewarne in Cornwall caters for the needs of the growers of early vegetables and potatoes, straw-



National Vegetable Research Station Wellesbourne, Warwickshire

berries, flowers in the south western peninsular and the Isles of Scilly. At Efford in Hampshire work is in progress on apples, pears, soft fruit, vegetables, and crops grown in frames and glasshouses. Experiments with tomatoes, lettuce and other glasshouse crops are also being undertaken at Fairfield in Lancashire and at the Lee Valley Experimental Horticulture Station at Hoddesdon just north of London. This is the most recent of the Stations and is devoting considerable attention to problems of tomato and cucumber growing.

Variety Trials

Two important organizations must be mentioned in connection with variety testing. The first is the National Institute of Agricultural Botany (NIAB) at Cambridge and the second the National Fruit Trials.

The NIAB sponsored by the Ministry of Agriculture exists for the classification and testing of varieties of crop plants and for the maintenance of mother stocks of varieties which official plant breeders have raised and handed over to its care. In addition to its own farm at Cambridge it makes use of farm institutes, agricultural colleges, and experimental horticulture stations as regional trial centres. Such regional trials give valuable data on the performance of new varieties of vegetables under varied climatic conditions. For fruit crops similar functions are performed by the National Fruit Trials, whose main centre is at Brogdale, near Faversham, in Kent. These trials form part of the National Agricultural Advisory Service and each of the experimental horticulture stations and one experimental husbandry farm act as sub-centres. Trials of apple, pear, plum, cherry, blackcurrant, strawberry, gooseberry and redcurrant are conducted and at Brogdale a living collection of over 5,000 named varieties of apple is maintained. There are also collections of varieties of the other economic hardy fruits and nuts grown in the British Isles.

The experience gained in these studies of fruit and vegetable varieties is being found of great help in the setting up of the Plant Variety Rights Office.

National collections of plants include the Royal Botanic Gardens at Kew and Edinburgh. At Kew, the large scientific staff is able to avail itself of a herbarium without equal in its wealth of preserved plants from many parts of the world, and its fine botanical library. In addition there is the collection of living plants comprising some 25,000 species and varieties. Scientific work done here is concerned with the identification, classification of plants, a study of their anatomy and cytology, and their economic uses.

Several universities of the United Kingdom

have botanic gardens providing material for investigations of plants; the one at Oxford is the oldest, while that of Cambridge is of special distinction.

The Royal Horticultural Society's garden at Wisley performs a valuable service in testing varieties of garden-plants, including fruit and vegetables. Pests and diseases of plants are also studied.

The national rose collection is maintained at St. Albans, Herts.

Many horticultural firms have collections of plants for selection and breeding; and the contribution made by owners of private gardens to the introduction and improvement of garden-plants deserves mention.

Northern Ireland

Research on horticultural crops is one of the responsibilities of the Ministry of Agriculture for Northern Ireland which maintains a Horticultural Garden at Laughall in County Armagh, where work is in progress on apples, blackcurrants, strawberries and a number of pest and disease and weed control problems.

Scotland

The Scottish Horticultural Research Institute has already been mentioned. It is situated at Mylnfield near Dundee and has a unit at Auchincruive mainly concerned with strawberry breeding.

The three agricultural colleges, the North of Scotland College of Agriculture at Aberdeen, the West of Scotland at Glasgow and the Edinburgh School of Agriculture are all engaged in advisory work which also includes experiments and fruit variety trials.

Other Research

Most of the organizations spoken of so far are maintained by funds provided directly or indirectly by the Government. There are two further groups which conduct research of a more specialized kind. The first are trade associations for research purposes which receive some Government support. These include the Electrical Research Association's Horticultural Research Station at Shinfield and the Canning and Quick Freezing Research Association. Secondly, there are the manufacturers of agricultural chemicals. Some of the larger firms conduct research centres which undertake quite extensive horticultural work. They include Messrs. Boots Chemists Ltd., Fisons Ltd., Plant Protection Ltd. and Shell Chemicals Ltd. All are concerned mainly with the field testing of the company's products.

Publications

The best known among the scientific journals is the "Journal of Horticultural Science". It is sponsored by East Malling and Long Ashton Research Stations but receives contributions

from all the Research Stations in the United Kingdom conducting horticultural research and from many overseas research centres in addition. It is thus not confined to temperate horticulture but also has papers on crops such as citrus fruits. A new journal called "Horticultural Research", sponsored by the Scottish Horticultural Research Institute, started in October, 1961. The experiments of the Experimental Horticulture Stations are reported in a publication issued by Her Majesty's Stationery Office entitled "Experimental Horticulture". There is at least one number a year.

Each of the main research stations issues an annual report which should be consulted for full details of their publications. The list attached to this article only covers publications which have a horticultural flavour. In addition many research workers publish results in the specialized journals devoted to their particular discipline and quite a number of papers from this country now appear in journals published overseas. "Plant and Soil" published in the Netherlands is an example of a journal containing such papers. For reasons of space several publications devoted mainly to private gardens and amateur horticulture are not mentioned here. Nor does the list given below include all the journals which are primarily botanical in their field of interest.

It would be impossible to write about horticultural, technical and scientific literature in the English language without mentioning "Horticultural Abstracts". This journal is essential to every serious student of horticultural science. It appears quarterly in March, June, September and December. A complete annual index is issued with the December number. In addition there are comprehensive indices embracing a period of years, the latest of which covers 1956 to 1960. This index and the volumes of abstracts are a veritable key to the horticultural literature of the world. Although the Bureau producing the Abstracts is specially linked with the countries of the British Commonwealth, the journals and publications abstracted include those of almost every country with an interest in horticulture. Among them are numerous publications in languages not readily understood in Western Europe such as Russian and Japanese.

Advisory publications have not been mentioned in the list. An extensive series of Bulletins and Advisory Leaflets are published by the Ministry of Agriculture, Fisheries and Food, by the Department of Agriculture for Scotland and by the Ministry of Agriculture for Northern Ireland. Many of the manufacturers of spray chemicals, fertilizers and other technical products also issue leaflets or bulletins and in some cases also produce reports on work carried out at their research

stations.

List of publications

1. *Abstracting journals*: Horticultural Abstracts (Quarterly with full index annually and a comprehensive index after five years). Other abstracting journals in related fields: Agricultural and Horticultural Engineering Abstracts, Forestry Abstracts, Helminthological Abstracts, Pesticides Abstracts and News Summary, Plant Breeding Abstracts, Review of Applied Entomology (Agricultural), Review of Applied Mycology, Soils and Fertilizers, Weed Abstracts.
2. *Scientific or technical journals*: Agriculture, Agriculture in Northern Ireland, Annals of Applied Biology, Annals of Botany, Experimental Agriculture, Experimental Horticulture, Forestry, Horticultural Research, Journal of Agricultural Engineering Research, Journal of Experimental Botany, Journal of Horticultural Science, Journal of the National Institute of Agricultural Botany, Journal of the Royal Horticultural Society, Journal of the Science of Food and Agriculture, Journal of the Sports Turf Research Institute, Mushroom Growers Association Bulletin, NAAS Quarterly Review, New Phytologist, Park Administration, Plant Pathology, Scientific Horticulture, Scottish Agriculture, Tropical Agriculture, Weeds Research, World Crops.
3. *The horticultural weekly press*: The Commercial Grower, Gardeners' Chronicle, The Grower, Nurseryman and Seedsman.
4. *Reports of official research stations and similar bodies*: Agricultural Research Council; Ditton Laboratory; East Malling Research Station; Edinburgh School of Agriculture; Efford Experimental Horticulture Station; Fairfield Experimental Horticulture Station; Forestry Commission; Glasshouse Crops Research Institute; Hops Research Department (Wye College); John Innes Institute; Kirton Experimental Husbandry Farm; Lee Valley Experimental Horticulture Station; Long Ashton Research Station; Luddington Experimental Horticulture Station; Ministry of Agriculture for Northern Ireland (Research and Experimental Record); National Institute of Agricultural Botany; National Institute of Agricultural Engineering; National Vegetable Research Station; North of Scotland College of Agriculture; Pea Research Station Yaxley; Rosemaund Experimental Husbandry Farm (for Hops); Rosewarne Experimental Horticulture Station; Rothamsted Experimental Station; Scottish Horticultural Research Institute; Scottish Society for Research in Plant Breeding; States Experimental Station, Howard Davis Farm, Jersey; Stockbridge House Experimental Horticulture Station; University of Nottingham, Department of Horticulture; West of Scotland Agricultural College.
- 5a. *Yearbooks issued by the Royal Horticultural Society*: Paffodil and Tulip Yearbook.

Fruit Yearbook, Lily Yearbook, Rhododendron and Camellia Yearbook.

5b. *Other yearbooks and annuals*: The specialized societies concerned with particular plants issue year books to their members and some are available to the general public. The following species are covered by yearbooks of this kind: Carnation, Chrysanthemum, Dahlia, Delphinium, Fuchsia, Geranium, Gladiolus, Iris, Rose and Sweet Pea. In addition there is a Yearbook of the Alpine Garden Society.

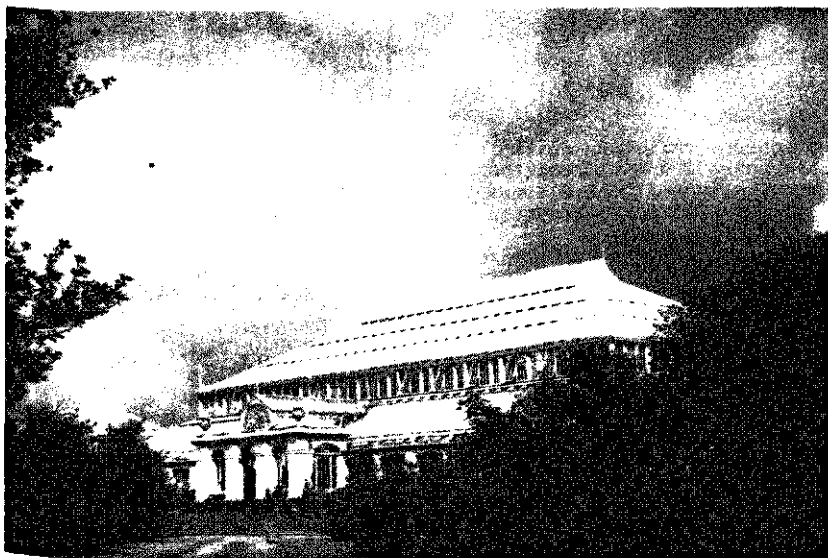
6. *Reports on economics of commercial horticulture issued by University Departments of Agricultural Economics*. Reports available include items from: University of Bristol University of London (Wye College), Univer-

sity of Nottingham, University of Reading, Edinburgh School of Agriculture.

7. *Survey of agricultural research in the United Kingdom*: "Index of Agricultural Research". Compiled by Agricultural Research Council; appears at irregular intervals; the current edition is the fourth.

"Scientific Research in British Universities and Colleges". Compiled by Department of Scientific and Industrial Research; appears annually; last edition: 1964-65.

These publications do not include anything about the Experimental Horticulture Stations and organizations such as the Fruit and Vegetable Canning and Quick Freezing Research Association or research in industry generally.



The temperate house
of the Royal Botanic
Gardens at Kew

Seat/Nature ¹ of program	Institution and projects	Address and staff
1. Aberdeen 1.1 <i>Fruits, Vegetables</i>	North of Scotland College of Agriculture Department of Horticulture Gardens. Variety trials with raspberries, black currants, strawberries, Brussels sprouts and cauliflower in collaboration with Scottish Horticultural Research Institute. Experimental culture of American varieties of blueberry. Variety trials of other fruits at Craibstone and at other centres. Testing of new techniques under local conditions by the Horticultural Officers of the College's Advisory Service.	41½ Union Street, Aberdeen, Scotland Princ.: Prof. dr. J. R. Raeburn B. Sc. J. S. Pantou M. A., B. Sc. Craibstone Farm, Bucksburn, near Aberdeen and Stratherrick Road, Inverness
2. Auchincruive 2.1 <i>Small fruit</i>	West of Scotland Unit, Scottish Horticultural Research Institute (SHRI) Strawberry breeding Breeding strawberry varieties suitable for commercial purposes and with resistance to diseases, especially Red Core disease (<i>Phytophthora fragariae</i> Hickman), breeding raspberries. Substation of SHRI: Mylnefield	Auchincruive, Ayr, Scotland Dir.: Dr. C. H. Cadman Off. i. ch.: R. D. Reid Further staff: A. M. Sutherland/K. C. McConnell Invergowrie, near Dundee Miss I. G. Montgomery, B. Sc., Ph. D.
3. Bayfordbury 3.1 <i>Genetics</i>	John Innes Institute Founded in 1910 by a bequest of the late John Innes of Merton, supported by a grant-in-aid from the ARC. - Department of Cell Biology Problems of cell growth and multiplication - Department of Applied Genetics Tomatoes, peas and top fruits - Department of Genetics Genetics of micro-organisms and higher plants - Department of Potato Genetics Crytogenetics of tuberous solanums; maintenance of the Commonwealth Potato Collection	Bayfordbury, Hertford, Herts., England Dir.: K. S. Dodds Head: Head: Dr. K. S. Dodds Head: Dr. J. R. S. Fincham Head: N. W. Simmonds
4. Bedford 4.1 <i>Vegetables</i>	Unilever Research Laboratory Private institution. Research on vegetable crops in physiology, pathology, breeding, cultural methods, variety testing, herbicides and seed testing.	Colworth House, Sharnbrook, Colworth Bedford Dir.: W. G. Kovachich Dr. L. H. Jones/Dr. D. G. Rowlands/A. L. Wharton/W. Collins/T. R. Dickinson/A. V. Haddon/M. L. G. Smith/Dr. J. Aston/J. Taylor
5. Bingley 5.1 <i>Grasses</i>	The Sports Turf Research Institute Independent noncommercial organization undertaking research on the production of sports turf and advising associate members. Chemistry Biology	Bingley, Yorkshire, England Dir.: J. R. Escritt, M. Sc. H. J. Lidgate, B. Sc. J. G. Halcrow, B. Sc.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Bingley (5.1)	Advisory officer Grounds superintendence Secretariat Publ.: Annual Journal and Quarterly Bulletin; J.D.Smith: Fungal diseases of turf grasses (revised N.Jackson and J.D.Smith); D.Clouston: Identification of grasses; Specifications (joint publ. with National Playing Field Ass.)	B.C. Clayton, M.A. J.Parker, B.M.Wood, F.C.I.S.
6. Bristol	Department of Botany	Bracken Hill, Leigh Woods Bristol 8
6.1 Rotanics	Morphology and history of horticultural plants	Dr.T.E.T.Bond
7. Camborne	Rosewarne Experimental Horticulture Station	Camborne, Cornwall, England
7.1 General horticulture	Area 46.5 ha. 24 controlled temperature cabinets, each of 0.75 m ³ , temperature range: -4° to 48°C, humidity control; 4 controlled temperature water tanks. Wind breaks include 400 species and cultivars of trees and shrubs. Living and artificial shelter for horticul- tural crops Potato, strawberry and other vegetable and fruit crops Breeding: anemone and other flower crops Breeding: winter cauliflower and other bras- sicae Bulb crops Salad and vegetable crops under unheated glass Breeding and stock maintenance: winter cauli- flower stock Substation: Ellbridge Experimental Horticul- ture Station Area 2 ha. Anemone, strawberry, chrysanthemum and other local crops	Dir.: R.H.Eaton E.G.Ing A.E.Jeff A.M.Williams L.W.Wallis J.E.K.Cox K.E.Haine Hatt, Saltash, Cornwall, England Dir.: H.J.Eaton N.D.Goodyway
8. Cambridge	Agricultural Research Council (ARC), Virus Research Unit	Huntingdon Road, Cambridge, England
8.1 Virology	Modern apparatus for all kinds of biochem- ical and biophysical investigations of vi- ruses. Investigations of plant and insect viruses with particular reference to their biochem- ical and biophysical properties, nucleic acids. Viruses and nucleic acids Protein composition and plant viruses Analytical composition of nucleic acids Virus multiplication Amines in plant viruses Insect viruses Plant virus collection Chemistry of plant nucleic acids Virus diseases of plants Electron-microscopy Photographic department	Dir.: Dr.R.Markham Dr.R.Markham M.W.Rees Dr.D.B.Dunn Dr.J.H.Hitchborn Dr.M.W.Johnson C.F.Rivers Miss M.N.Short Dr.A.R.Trim Dr.R.Hull G.J.Hills Head: S.Frey
9. Chipping Campden	The Fruit and Vegetable Canning and Quick Freezing Research Association	Chipping Campden, Glos., England
9.1 Pro- cessing	Industrial research association. Recently installed additional laboratories specially for studies on frozen foods.	Dir.: W.B.Adam, M.A., F.R.I.C. Hort.officer: Dr.V.D.Arthey

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Chipping Campden (9.1)	Quality of fruit and vegetables for canning and freezing Food chemistry Bacteriology, process calculations Chemistry of ripening peas Food analysis Bacteriology, frozen foods Freezing of fruit and vegetables Chemistry of natural colours	W. B. Adam, M. A., F.R.I.C. Dr. D. Dickinson Dr. T. G. Gillespy/R. H. Thorpe Dr. D. R. Haisman G. Coleman L. P. Hall D. A. Steele H. Blundstone/D. Crean
10. East Malling	East Malling Research Station	East Malling, Maidstone, Kent, England
10.1 Fruit	The station, dealing with deciduous fruit crops, belongs to Kent Incorporated Society for Promoting Experiments in Horticulture, a body representing universities, scientific societies, fruit growers, hop growers and administrative bodies, which is grant-aided for this purpose from public funds through the ARC. Area for field experiments: 208 ha. Growth and fruiting of tree and bush crops, temperate and tropical Influence of orchard environment on storage life of apples - Entomology Aphids and general fruit pests Nematodes Insect and mite population studies Insect population studies Insect and mite studies in relation to breeding resistant varieties of fruits - Fruit Breeding Breeding Ribes, Rubus, tree fruits and rootstocks Ribes and Rubus, cytology Apples - Fruit Nutrition Soil management, manuring Water relationships Uptake from foliar sprays Sand culture, nitrogen Magnesium Plant analysis Soil management, nitrogen - Plant Pathology Virus diseases Plant pathology: bacterial diseases, bacteriophages Apple scab, apple mildew, Botrytis (strawberry) Host/parasite relations in apple scab Verticillium wilt of hops, host resistance Records, silver leaf Hop virus diseases Soil borne diseases, Verticillium albo-atrum, Phytophthora cactorum Top fruit virus diseases Virus diseases of Ribes Field trials, hop Verticillium wilt Field trials, hop virus diseases Air borne diseases, apple scab, mildew, gloeosporium Bacterial diseases of cherry, plum and pear Biochemistry of host-pathogen relations	Dir.: Dr. F. R. Tubbs Ass. Dir.: Dr. H. B. S. Montgomery Dr. F. R. Tubbs Dr. H. B. S. Montgomery Head: Dr. G. H. L. Dicker Dr. R. S. Pitcher R. C. Muir R. G. Gambrill J. B. Briggs Head: Dr. R. L. Knight Miss E. Keep Dr. F. H. Alston Head: Dr. D. W. P. Greenham J. E. Goode Dr. M. Allen Mrs. Dr. A. V. Delap Mrs. Dr. E. M. Ford A. B. Whitfield G. C. White Head: Dr. A. F. Posnette Dep. head: Dr. J. E. Crosse Dr. M. H. Moore Dr. D. S. Kirkham Dr. P. W. Talboys Miss M. Bennett J. T. Legg/Dr. K. R. Bock Dr. W. G. F. Sewell R. Cropley J. M. Thresh J. F. Wilson P. J. Ormerod Dr. R. T. Burchill Miss C. M. E. Garrett Dr. R. C. Hignett

Seat/Nature of program	Institution and projects	Address and staff
Continuation of East Malling (10.1)	Soft fruit virus diseases Orchard ecology of diseases	Miss S.J.Vine A.A.W.Swait
	- Plant physiology - Studies on tree growth and cropping, auxins and inhibitors, shoot morphology - Effects of sprays of leaf, growth and crop - Regularity of fruiting of apples - Carbohydrate storage and use - CO₂ exchange, nett assimilation - Growth substance technology - Meteorological records - Mechanism of rootstock/scion interaction - Biochemical factors in rootstock/scion interaction - Analysis of crop development - Plant Protective Chemistry - Chemical structure in relation to biological activity - Assay of spray deposits and residues, analytical methods - Fungicide and bactericide testing - Organic synthesis, fungicides and bactericides - Formulations - Pomology - Rootstocks, root growth, strawberries, frost control - Anatomy and histology of fruit plants - Propagation - Recording, plum rootstocks, walnuts - Frost damage and its avoidance - Apple rootstocks, pruning - Root growth - Frost protection - Pear rootstocks - Recording, herbicides - Strawberries - Scientific Liaison - Influence of orchard conditions on fruit development and storage life of apples - Statistics - Experimental design, plant variation - Growth curves - Multivariate analysis, nutritional and growth problems - Techniques of orchard experimentation - Multivariate analysis, insect populations - Variation in fruit trees	Head: H.W.B.Barlow Dr.F.W.M.Llewellyn Dr.R.M.Fulford Dr.C.A.Priestley Dr.A.J.Avery H.J.Lacey G.F.Trowell Dr.O.P.Jones Mrs.Dr.P.Sykes Dr.J.D.Quinlan Head: Dr.A.H.M.Kirby Miss J.M.Sillibourne/ R.P.Tew E.L.Frick L.D.Hunter T.M.Warman Head: Dr.W.S.Rogers Dr.A.Beryl Beakbane Dr.B.H.Howard/R.J.Garner Miss E.M.Glenn Dr.I.Modlibowska A.P.Preston G.C.Head C.H.W.Slater M.S.Parry R.I.C.Holloway D.W.Way J.H.Walker/T.E.Walter/ B.F.Self/M.H.Menzies Dr.R.O.Sharpley Head: Dr.S.C.Pearce P.Sprent D.A.Holland Dr.N.A.Goodchild D.H.Rees C.S.Moore
11. Edinburgh 11.1 General horticulture	Agricultural Scientific Services Station of the Department of Agriculture and Fisheries for Scotland Sections devoted to seed testing, potatoes, plant pathology, mycology, agricultural zoology and chemistry. Seed testing Varietal recognition Bacterial diseases of plants, tuber diseases of potatoes Potato virus disease epidemiology Potato and raspberry virus disease epidemiology, soil borne virus infection in narcissus, strawberry and raspberry	East Craigs, Edinburgh 12, Scotland Dir.: Dr.D.W.Williams Dep.dir.: J.R.Thomson R.D.Seaton J.L.Keppie Dr.D.C.Graham Dr.P.J.Howell J.M.Todd

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Edinburgh (11.1)	Seed pathology Aphid vectors of plant viruses, black-currant gall mite, potato tuber moth Plant parasite nematodes Potato merit trials, certification schemes etc. Production of virus tested potato varieties Potato physiology and virus testing Maintenance of potato collection for training purposes, etc.	Dr. M. J. M. Noble W. P. L. Cameron T. W. Mabbott Dr. J. L. Hardie N. M. Wight D. M. MacDonald T. D. Hall
11.2 General horticulture	Edinburgh School of Agriculture, Department of Horticulture At this centre is situated the - East of Scotland Centre of the Scottish Fruit Trials with black currants, raspberries strawberries and plums. - Horticultural section at Bush House (8 ha) with decorative gardens and areas for commercial cultivation of vegetables, fruit and flowers, with glasshouse unit of 8,000 sq. ft. - Department of Soil Science Soil problems in Rhododendron and other calcifuge plants	Gilmerton Road, Nether Liberton, Edinburgh 9 Head: J. Bruce, N. D. H., S. H. M. Teaching staff: S. F. Hayes/ J. J. C. Black, S. D. H., N. D. H./ P. N. Linton, S. D. H., N. D. H./ D. G. Taylor Milton Bridge, Midlothian, Scotland Dr. H. Tod
12. Efford 12.1 General horticulture	Efford Experimental Horticulture Station Field experiments with fruit, vegetables glasshouse crops and flowers. Variety trials with apples, pears, black currants, raspberries and strawberries. Field studies of nutrition of apples and pears. Vegetable variety testing, nutrition studies, irrigation, pest and disease control. Studies of glasshouse climate, nutrition and water requirement of tomatoes. Effect of tomato mosaic virus and of root diseases on yield and quality of tomatoes. Variety testing of tomatoes. Variety testing, nutrition, spacing studies of vegetables in cold structures. Variety trials with flowers under cold glass. Bush and cane fruits Heated glasshouse crops, cold glasshouse and frame crops and flowers Vegetables Tree fruits	Efford, Lymington, Hampshire, England Dir.: S. P. Craze Sen. ass.: H. M. Hughes, M. Sc., N. D. H. Dr. D. R. Smith A. Brown E. Gunn, N. D. H. / P. B. Tatham, B. Sc. / M. B. Wood, N. D. H.
13. Faversham 13.1 Fruit	National Fruit Trials National registration authority for hardy fruits. Co-ordinating body for extended variety trials at Experimental Horticulture Stations. Conducting trials of new varieties of all kinds of hardy fruits, to determine their commercial merits by assessing cropping, pomological characters, market qualities, etc. Liaison with processing institutes. Determination of self- and cross compatibility of new varieties. Maintenance of variety collections for study of nomenclature, synonymy, classification and as source of material for breeding Systematics Registration	Brogdale Farm, Faversham, Kent, England Dir.: J. M. C. Potter, O. B. E., N. D. H. Ass.: J. C. Todd, B. Sc. H. J. Gooding, B. Sc. Miss M. W. G. Smith

Seat/Nature of program	Institution and projects	Address and staff
14. Glasgow 14.1 General horticulture	The West of Scotland Agricultural College, Department of Horticulture Primarily a teaching centre for the Scottish Diploma in Horticulture (S.D.H.) and for preparation for the intermediate examination of the National Diploma in Horticulture (N.D.H.). Variety trials of soft fruit and vegetables, including trials conducted regionally in Scotland in co-operation with other research and teaching/advisory centres, variety observational trials of chrysanthemums, experiments on production techniques for glasshouse and other crops, including responses on CO₂ enrichment, herbicide screening, economic study of narcissus bulb production, problems related to the horticultural advisory work of the College. Publ.: "Horticultural Research"	Auchincruive, Ayr, Scotland Head: C. A. Wood, R. Sc., Ph. D., M. I. Biol. Lecturers: K. J. W. Beckwith, B. Sc./Mrs. P. I. H. Dovaston, M. A., C. D. H./I. C. G. Dougall, S. D. H., N. D. H. Demonstrator: F. S. Hardy
15. Guernsey 15.1 General horticulture	States of Guernsey Horticultural Advisory Service Temperature controlled compartmented glass-houses, commercial glasshouses and soil analysis laboratories. Advice to growers, mainly concerned with glasshouse crops. Cultural experiments on glasshouse crops, mainly tomatoes, but including Freesias, bulbous iris, roses. General horticulture Horticultural experiments Horticultural economics Horticultural engineering Soil chemistry Plant pathology General horticulture	Experimental Station, P.O. Box 72, Burt Lane, St. Martin's, Guernsey, C. I. Dir.: R. G. Siddall, B. Sc. R. G. Siddall, B. Sc. E. T. Wall, B. Sc. A. P. Mitchell, B. Comm. K. C. Cokeley, B. Sc., A. M. I. Mech. Eng. I. O. Dorey, B. Sc. J. W. H. Taylor, B. Sc. B. M. Toms, B. Sc./A. E. Moorat, N. D. H./H. R. Dally, N. D. H./ R. A. T. George, B. Sc., N. D. H./P. G. Burgess, B. Sc., D. P. P.
16. Harpenden 16.1 Plant protection	Plant Pathology Laboratory, Ministry of Agriculture, Fisheries and Food a. Providing the scientific basis for the administration of Destructive Insects and Pest Acts and Orders intended to prevent the introduction or further spread of dangerous plant diseases and pests. b. Responsibility for the scientific aspects of plant import and export work including examination of seeds for export, suitability of nurseries for exporting plants and training of inspectors c. Providing the scientific basis for the Ministry's Crop Certification Schemes for potatoes, fruit and hops d. Scientific and secretarial aspects of the official Pesticides Safety Precaution Scheme concerned with the toxic hazards of pesticides to man, animal and wild life e. Administration of the official Agricultural Chemicals Approval Scheme concerned with the biological efficiency of pesticides f. Co-ordinating centre for intelligence and co-operative survey work on plant diseases and pests and on pesticides; identification	Hatching Green, Harpenden, Herts, England Dir.: Dr. M. Cohen Dep. dir.: Dr. I. W. Prentice

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Harpenden (16.1)	of insect pests, virus, fungus and bacterial diseases g. Preparation and revision of leaflets and bulletins on plant pests and diseases and publication of periodic reports and the journal "Plant Pathology". h. Research into new or uncommon diseases and pests, the taxonomy of aphids, fumigation of living plants and seeds, and formulation and residue analysis of pesticides. - Entomology Pest assessment General entomology Nematology Aphid taxonomy Fumigation Advisory leaflets - Plant Pathology Disease assessment General pathology Bacteriology Virus diseases - Plant Protection Chemistry Toxic hazards of pesticides Biological efficiency of pesticides Research liaison and information Hazards to operators Analytical methods for residues Pesticides residues analysis	Head: F.H. Jacob A.H. Strickland (co-editor of "Plant Pathology")/ K. S. George P. Aitkenhead/C. R. B. Baker J. F. Southey H. L. G. Stroyan K. G. Gostick Miss M. Gratwick Head: Dr. I. W. Prentice Dr. F. J. Moore/Dr. W. C. James J. J. Baker (editor of "Plant Pathology")/J. S. W. Dickens R. A. Lelliott Dr. R. H. Cammack Head: Dr. R. de B. Ashworth Dr. E. J. Miller/J. A. R. Bates Dr. E. A. Riley/Dr. G. Clarke/ Dr. J. G. Davison E. J. Labrum G. A. Lloyd Dr. N. A. Smart D. F. Lee
17. Hextable (Swanley)	Rowhill Experimental Farm Belongs to Baywood Chemicals Limited	59 Top Dartford Road, Hextable, Swanley, Kent, England 37-41 Bedford Row, London, W.C.1
17.1 Plant protection	About 17.5 ha fruit and arable farm including a laboratory, glasshouse and chemical store used entirely for trials with new chemicals for pest, disease and weed control in agriculture and horticulture. Horticultural, residue and fundamental trials Arable trials	J. Walker G. Smith
18. Hoddesdon	Lee Valley Experimental Horticulture Station	Ware Road, Hoddesdon, Hertfordshire, England
18.1 General horticulture	Area 10.5 ha. Static and mobile glasshouses covering just over 0.4 ha, heated by a modern system of steam to hot water injection. Packing sheds with a temperature controlled store. Variety testing, effect of environment on crop yield and quality and on storage life, testing of oil fired ducted air heating for glasshouses, cropping sequences for mobile houses and study of a range of flower crops in the open and under low glass coverage. Experimentation on about 16 crop plants with special attention to tomato, cucumber, lettuce, mushroom and chrysanthemum.	Dir.: P. G. Allen, N. D. H. Ass.: A. E. Waterfield, N. D. H. / F. G. Lloyd/G. L. Jones, B. Sc. / A. J. George, M. Sc. /D. Green, B. Sc.
19. Horsham	CIBA Laboratories Ltd.	Saxton's Farm, Monks Gate, Horsham, Sussex
19.1 Plant protection	Private institution. Pesticide and herbicide research on horticultural crops.	Head: A. V. Lewis, B. Sc., Ph. D.

Seat/Nature of program	Institution and projects	Address and staff
20. Ipswich 20.1 Fertilization	Levington Research Station Private institution. Research station of Fisons Fertilizers Ltd. Harvest House, Felixstowe, Suffolk Equipment: Horticultural unit of 28 ha (70 acres), comprising orchards, arable land for vegetable and fruit trials, fine-turf areas and a 1/5 ha (1/4 acre) block of glasshouses. Fertilizer technology, fertilizer usage for agriculture and horticulture, peat, composts, pesticides, application machinery. Aspects of professional and amateur horticultural markets. - Soil Science Department - Chemistry Department - Horticulture Section	Levington, Ipswich, Suffolk Dir.: J. A. Storrow, M. Sc. Ph. D., D. Sc. M. I. Chem. E. Dep. dir: J. G. Hunter, B. Sc., Ph. D., F. R. I. C., F. Inst. Biol. Head: J. G. Hunter Chief: P. S. Atkins, B. Sc.
21. Jersey 21.1 Plant protection	States Experimental Station Government institution; under the administration of the States of Jersey. Potato root eelworm Stem rot diseases of tomatoes Soil analysis	Trinity, Jersey, Channel Islands Dir.: R. E. Johnston, B. Sc., N. D. H. G. E. Thomas, B. Sc. E. F. Collingwood, B. Sc., N. D. A. F. A. Crumpton
22. Kew 22.1 Botanics	Royal Botanic Gardens Government maintained. Potamogeton, Podostemonaceae Curator of living collections The gardens comprise 4 departments: a. Herbarium and Library Classification and naming of plants from all parts of the world, preparation of monographs, revisions and floras. The collection of dried specimens includes more than 6.5 million sheets representative of all plant groups and is supplemented by an extensive series of dried fruits and seeds and by flowers and fruits in liquid preservative. The library contains more than 55,000 bound volumes, 80,000 separates, 150,000 plant illustrations and 6,000 maps Gramineae (of the world) Editor of Kew Bulletin, Flora of Tropical Africa b. Jodrell Laboratory Systematic anatomy of flowering plants, microscopical identification of vegetable material, cytogenetics, some aspects of horticultural physiology, collection of 20,000 microscopic slides. Systematic anatomy Cyto-genetics Plant physiology Plant anatomy c. Economic Botany and Museums General botanical museum containing a wide collection of plant products and a wood museum housing much valuable reference material. Advice is given on the introduction and distribution of living economic plants and on	Kew, Richmond, Surrey, England Dir.: Dr. G. Taylor Dep. dir.: Dr. C. E. Hubbard L. Stenning Keeper: Dr. C. E. Hubbard Dep. keeper: E. W. B. H. Milne-Redhead Dr. C. E. Hubbard E. W. B. H. Milne-Redhead Keeper: Dr. C. F. Metcalfe Dr. C. F. Metcalfe Dr. K. Jones Miss Dr. M. Y. Stant F. R. Richardson/ Miss M. Gregory

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Kew (22.1)	related problems to correspondents in many parts of the world. Special quarantine houses are maintained for this work. d. The Living Collection Collection of flowering plants, ferns and fern allies from all parts of the world (25,000 species and botanical varieties and many thousands of cultivars). Collection of hardy Coniferae grown at Bedgebury (National Pinetum), Kent.	Curator: L. Stenning
23. King's Lynn 23.1 <i>General horticulture</i>	Terrington Experimental Husbandry Farm Area 80 ha, buildings include glasshouses for potato chitting and tomato production. Variety trials and nutrition of strawberry in the open and with tomatoes under glass.	Terrington St Clement, King's Lynn, Norfolk, England Dir.: F.E. Shotton, M.A. J.L. Short, M.A. / R.H. Jarvis, M.A.
24. Kirton 24.1 <i>General horticulture</i>	Kirton Experimental Horticulture Station Established on the land of the former Kirton Agricultural Institute. About 42 ha. Controlled temperature cabinets and glass-houses for the storage and forcing of bulbs. Experiments and studies on the effect of controlled temperature etc., storage of bulbs (tulip and narcissus) for forcing and in bulb production. Field experiments on cultivations, systems of planting, manuring, chemical weed control and pest and disease control in tulips and daffodils. Variety trials of vegetables in conjunction with National Institute of Agricultural Botany. Production methods and techniques to give continuity of supply of high quality cauliflower. Mechanical harvesting of Brussels sprouts. Chemical weed control in vegetable crops. Strawberry variety trials and cultural studies. Variety trials and cultural studies of tomatoes under glass. Bulbs Vegetables and strawberries	Kirton, Boston, Lincolnshire, England Act.dir.: G. Baines, N.D.H.
25. Larkfield 25.1 <i>Processing</i>	Agricultural Research Council (ARC), Ditton Laboratory Storage of fruit, vegetables and flowers. Biochemistry Organic chemistry Mycology Engineering Plant physiology: apples, pears Plant physiology: soft fruit and vegetables Plant physiology: potatoes Effects of orchard treatment	Larkfield, near Maidstone, Kent, England Dir.: Dr. R. G. Tomkins Dr. A. C. Hulme / Dr. J. D. Jones / Dr. M. J. C. Rhodes Dr. D. F. Meigh K. L. Edney, B.Sc., A.R.C.S. Dr. G. Mann Dr. J. C. Fidler W. H. Smith, B.A. W. G. Burton, B.Sc, M.A. Dr. B. G. Wilkinson
26. Littlehampton 26.1 <i>Glass-house crops</i>	Glasshouse Crops Research Institute A State-aided independent research institute under the supervision of the ARC. Main laboratory block with about 35 small laboratories, and field laboratories for most of the research departments, including 2 units for pathology and horticulture. Research glasshouses for chemistry, crop protection, mycology and plant physiology and screened compartmented glasshouses (with con-	Worthing Road, Rustington, Littlehampton, Sussex, England Dir.: F.W. Toovey, O.B.E., B.Sc., A.R.C.S., A.I.C.T.A.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Littlehampton (26.1)	trolled ventilation) for virology and entomology. Several commercial-type glasshouses (about 1 ha) for large scale trials and experiments. Glasshouse crops, flower crops (including those grown for bulbs) hardy nursery stock and mushrooms. - Chemistry Soils and plant nutrition, nutrition of glasshouse crops, tomato fruit quality and composition. - Crop Protection Chemical control of pests and diseases of glasshouse crops and ornamentals, soil sterilization, control of Glasshouse Red Spider Mite. - Entomology Horticultural and forest insect pests, ecology and biological control of Glasshouse Red Spider Mite, study of integrated control in glasshouses, control of mushroom Phorids. - Horticulture General horticulture; design, construction and heating of glasshouses; control of environment in glasshouses and mushroom sheds. - Mycology and Bacteriology Plant diseases and microbiology; epidemiology of root diseases, soil sterilization, virus diseases of mushroom. - Nematology Plant parasitic nematodes, biology of stem and bulb eelworm <i>Ditylenchus dipsaci</i>, especially the narcissus strain, biology of eelworms on mushrooms. - Plant Breeding Tomato, cucumber, lettuce, anemone. - Plant Pathology Epidemiology of virus diseases (tomato). - Statistics Biometrics, design and analysis of experiments with glasshouse crops, outdoor flower crops and mushrooms. - Virology Virus purification and serology, viruses of ornamental plants, mushroom viruses. Organic plant constituents, carbohydrates, acids and nitrogenous components Plant biochemistry, enzymes in tomato fruit ripening, pectic substances Plant nutrition, manganese toxicity in glasshouse crops, fractionation of inorganic soil phosphates Soil salinity, methods for determination of effects on plant growth Plant nutrition, manurial trials underglass, soil and plant analysis Analytical control of experimental work Plant physiology: growth and flowering of ornamental bulbs Plant physiology: effect of CO₂ enrichment on glasshouse crops Plant physiology: post-harvest physiology of	Head: Dr. G. W. Winsor Head: W. H. Read, M. Sc., F. R. I. C. Head: Dr. N. W. Hussey Head: G. F. Sheard, M. Sc. (Sc. Liaison Officer) Head: Dr. F. T. Last Head: J. J. Hesling Head: L. A. Darby, B. Sc. Head: Dr. L. Broadbent Head: J. H. Gisborne Head: M. Hollings Dr. J. N. Davies Dr. G. E. Hobson J. H. L. Messing, B. Sc. D. M. Massey, B. Sc. M. I. E. Long, Grad. R. I. C. P. Adams A. R. Rees Dr. R. G. Hurd R. Nichols

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Littlehampton (26.1)	cut flowers (at present at Ditton Laboratory, Kent) Taxonomy of Cecidomyiidae, biology and control of mushroom Cecids, ecology and control of aphids on chrysanthemums Horticultural pests, ecology and biological control of Glasshouse Red Spider Mite Biology of mushrooms and bulb mites Mushroom diseases, petal blight of chrysanthemums Mushroom physiology and nutrition, and composts Wilt of carnations, root diseases of glasshouse crops Plant viruses, viruses of ornamental plants Virus diseases of bulbs, dahlias and other ornamental plants Plant viruses, viruses of ornamental plants, intracellular inclusions Organic chemistry: uptake, translocation and metabolism of systemic compounds Control of diseases of glasshouse and ornamental plants, bio-assay of fungicides, control of powdery mildews, fusarium of freesias Pesticide analysis, residues, application methods, defoliants for roses Retention and persistence of pesticides, distribution and decomposition of soil fungicides Applied plant physiology: control of growth and ripening disorders (tomato) Mushrooms: effect of environment on sporophore development, initiation of fruiting, composting Inflorescence development, pollination and fertilization problems in the tomato Horticulture, loamless seed and potting composts, plant containers, carnation culture Keeping quality of flowers Problems of mushroom composting Propagation and allied problems of hardy ornamental nursery stock Breeding: tomato (disease resistance), mushroom Breeding: tomato (including disease resistance) Breeding: tomato (rootstocks and disease resistance), lettuce Resistance in Lycopersicon to potato-root eelworm <i>Heterodera rostochiensis</i>	I. J. Wyatt, B. Sc. W. J. Parr Miss B. Gurney Miss D. G. Gandy, M. Sc. Dr. W. A. Hayes Miss M. H. Ebben, M. A. Dr. O. M. Stone A. A. Brunt, B. Sc. Miss M. E. Norrish Dr. C. R. Worthing Miss P. M. Smith, B. Sc. R. J. Kempton, B. Sc. J. M. Walker, Grad. R. I. C. Dr. A. J. Cooper P. B. Flegg, B. Sc., A. R. I. C. A. Calvert A. C. Bunt, N. D. H. Z. J. Kulwiec Miss P. E. Randle, B. Sc. D. J. Humphries (Ass. Liaison Off.) J. Pelham, M. A. H. C. Harries, B. Sc. J. W. M. Smith P. R. Ellis, B. Sc.
27. London	Wye College, University of London	Wye, Near Ashford, Kent, England
27.1 General horticulture	a. Department of Agricultural Economics Economics of horticultural production and marketing Management of horticultural holdings, economics of early tomato growing under glass b. Department of Biological Sciences Plant pathology especially virus diseases Verticillium in tomato Plant breeding and genetics especially <i>Lilium</i> and <i>Rubus</i> Gibberellins of the tomato	Princ.: D. Skilbeck Dr. R. R. W. Folley J. A. H. Nicholson, B. Sc. Prof. dr. I. W. Selman Dr. G. F. Pegg Dr. G. J. Dowrick Dr. T. A. Hill

Seat/Nature of program	Institution and projects	Address and staff
Continuation of London (27.1)	Plant breeding especially Brassica oleracea c. Department of Horticulture 32 ha of fruit plantations and market garden with conventional static and mobile glass-houses. Gardens laid out with range of flowering shrubs, annual and perennial plants especially suited to calcareous soils. Laboratories, experimental glasshouses and growth rooms. Plant propagation, crop improvement, plant protection. Entomology: study of orchard fauna and insects injurious to ornamental plants Fruit crop husbandry: diseases of orchard fruits especially Gloeosporium, orchard and tree conditions and their effects on fruits in store Vegetable crop improvement: protected cultivation, culture of less common vegetables, influence of seed source and parent plant on seed quality, physiology of rooting, use of mist techniques and supplementary lighting in propagation d. Department of Physical Sciences Organic and biochemistry: chemical structure in relation to growth regulating activity and systemic fungicides Plant biochemistry: studies on differentiation in fungal cells Organic chemistry: synthesis of plant growth regulators, resolution of optical isomers Organic chemistry: synthesis of organic fungicides Soil science: retention of biologically active anions by soil Pedology, soil mineralogy and soil aspects of root development Physical chemistry: influence of plant growth regulators on plant enzyme systems Animal biochemistry, poultry nutrition Soil science: influence of growth retardants on potassium uptake by plants Analytical chemistry: chemical changes in plant tissue following application of plant growth regulators Geology, pedology of downland soils e. Market Research Unit, with special reference to Horticulture	Dr. W. Peat Prof. dr. H. W. Miles Dr. E. H. Wilkinson A. A. Jackson, B. Sc. Head: Prof. dr. R. L. Wain Dr. A. E. Flood Dr. M. S. Smith Dr. J. L. Garraway J. Ingram, M. Sc. Dr. J. L. M. Lambert Dr. P. P. Rutherford Dr. H. S. Bayley Dr. B. E. Davies E. W. Weston, B. Sc. M. A. Jones, B. Sc. Prof. J. H. Kirk, M. A. / P. G. Ellis, M. Sc.
28. Long Ashton 28.1 Fruit	Long Ashton Research Station This station, forming the Department of Agriculture and Horticulture in the University of Bristol, is under the aegis of the ARC, who finances its work by grants made to the University. Pilot plant for the manufacture of fruit products, special purpose glasshouses, controlled-environment chambers, sand and water purification equipment for work with micro-nutrients, workshops for making and testing spraying machines. Available for field experiments approx. 100 ha land. Study of all aspects of fruit and willow cul-	Long Ashton, Bristol England Dir.: Prof. H. G. H. Kearns

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Long Ashton (28.1)	ture, manufacture of cider, perry and fruit juices and domestic preservation of food. - Analytical and General Chemistry Chemistry of insecticides and fungicides Mode of action of fungicides Analytical methods Plant biochemistry: plant enzymes in relation to photosynthesis - Cider and Fruit juices Cider, perry and fruit juices Biochemistry of fermentation Microbiology of cider yeasts Chemistry of fermentation Chemistry of fruit juices Microbiology of cider bacteria Metallic complexes in fruit products - Domestic Food Preservation Nutritional and microbiological aspects of domestic preservation of fruit, vegetables, poultry and meat - Entomology Spraying and temperature of tropical crops Techniques of spray application Insect ecology and physiology Spray materials for tropical crops Black currant gall mite life history and control - Nutrition of Fruit Plants Relation between foliage nutrient status and yield Trace elements in fruit crops Nitrogen metabolism of fruit crops - Organic Chemistry Chemical constitution and biological activity Fungicides for apple mildew Plant constituents: organic constituents of plants - Physical Chemistry Dynamic surface tensions Use of radio-active tracers - Plant Pathology Fruit disease control Bioassay of fungicides Perennation of fruit-disease fungi - Plant Physiology Mineral nutrition of higher plants Micro-element nutrition of excised tissue - Pomology and Fruit Breeding Growth-regulating substance and fruit tree viruses Plantations management Fruit plant physiology Cider fruit growing Fruit plant breeding Gooseberry culture - Statistics Design and analysis of experiments - Willows Culture, utilization, pests and diseases of basket and cricket bat willows	Ass.dir. and Head: Dr. J. T. Martin Dr. E. Somers Dr. E. J. Skerrett Dr. H. F. Davenport Head: Dr. A. Pollard Fr. G. C. Whiting Dr. F. W. Beech Dr. L. F. Burroughs M. E. Kieser Dr. J. G. Carr Dr. C. F. Timberlake Miss M. Leach Head: Prof. H. G. H. Kearns Dr. N. G. Morgan A. Stringer H. F. Mapother Dr. B. D. Smith Head: Dr. C. Bould Dr. R. A. Webb Dr. D. G. Hill-Cottingham Head: Fr. D. Woodcock Dr. D. A. M. Watkins A. H. Williams Head: Dr. W. D. F. Thomas C. P. Lloyd-Jones Ass.dir. and Head: R. W. Marsh Dr. R. J. W. Byrde Dr. A. T. K. Corke Head: Dr. E. J. Hewitt A. J. Abbott Head: Dr. L. C. Luckwill F. W. Hobbis D. L. Abbott R. R. Williams Dr. D. Wilson Miss B. A. Rake G. M. Clarke K. G. Stott

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Long Ashton (28.1)	Publ.: Annual Report of the Agr. and Hort. Res.St., Long Ashton; Science and Fruit (Jubilee Celebration Volume, 1953)	
29. Loughgall	The Horticultural Centre	Loughgall, County Armagh, Northern Ireland
29.1 General horticulture	Established by the Ministry of Agriculture for Northern Ireland to conduct research in all aspects of the horticultural industry. Total area 12 ha with 0,8 ha walled garden, 0,1 ha heated glasshouses and 0,4 ha of unheated glasshouses, Dutch lights and cloches. Tomato and Chrysanthemum variety trials, propagation and cultural techniques, automatic irrigation systems, cold glass lettuce variety trials, flower crops Chemical weed control top fruit, soft fruit and vegetables: variety trial; soft fruit and vegetables: cultural techniques, soft fruit and vegetables Apple scab observation service, applied research apple scab, apple canker, black currant leaf spot, gooseberry mildew, rose mildew, propagation, apple rootstocks and rose rootstocks Mushrooms, applied research in new mushroom unit with accurate environmental control of temperature, humidity and air changes	Dir.: I. G. P. Dingwall, B. Sc. Bot. Dep. dir.: A. A. Frost, B. Sc. D. J. Allott, M. I. Biol., F. L. S. J. Cartwright, B. Sc. Bot, M. Sc. B. C. Ross, B. Sc. Hort.
30. Luddington	Luddington Experimental Horticulture Station	Luddington, Stratford-upon-Avon, Warwickshire, England
30.1 General horticulture	Area 92 ha. Work on orchard spraying techniques; control of apple mildew and fruit tree red spider mite; bulk handling and storage of apples; culture, harvesting and pollination studies with black currants; irrigation of a range of fruit and vegetable crops, including water sprinkling to prevent frost damage; herbicides in horticultural crops; rootstock and variety trials of fruit and vegetables; systems of production and harvesting of asparagus, Brussels sprouts, cauliflowers and leeks; rotations in unheated glasshouses and their economics; mobile glasshouse rotations; collection of varieties of hops. Manurial and pollination trials Vegetable trials Glasshouse studies Fruit experiments	Dir.: T. Laflin, N. D. H. Dep. dir.: A. R. Carter, N. D. H. W. A. Scriven, N. D. A., N. D. D. Miss J. M. Garthwaite, B. Sc. / M. J. Simmonds Miss E. A. Turner, B. Sc. / C. B. Westley, B. Sc. J. Ingram / J. R. Lees / B. H. Powell / P. C. White / A. E. Childs
31. Manchester	University of Manchester, Department of Botany	Oxford Road, Manchester 13, England
31.1 Vegetables, flowers	Growth analyses of vegetable crops, flowering, behaviour of dahlias and chrysanthemums Club root disease of Brassicace	Dr. P. Newton Dr. J. Colhoun
32. Mepal	Arthur Rickwood Experimental Husbandry Farm	Mepal, Ely, Cambridgeshire
32.1 Vegetables	Experimental centre of the National Agricultural Advisory Service. Situated in the centre of a black peatland area noted for the production of vegetable root crops, celery and onions.	Dir.: P. F. Cross, O. B. E., N. D. H.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Mepal (32.1)	Studies on peat wastage and mineralization; market garden crops which are integrated in the fenland farming system.	
33. Newport 33.1 <i>Fruit, vegetables</i>	Cleppa Park Experimental Horticulture Station Experimental and demonstration work concerning glasshouse, vegetable and fruit crops	Cardiff road, Newport, Monmouthshire, England Dir.: T.W. Pringle, horticultural adviser for Wales Techn. off.: A.W.E. Roberts Ass.: R.F. Potter
34. Nottingham 34.1 <i>Plant protection</i>	Lenton Experimental Station Commercial research station belonging to Boots Pure Drug Company (Station Street, Nottingham). Research and development of insecticides, fungicides and herbicides. Branch station at Thurgarton (44.1).	Lenton House, Nottingham, England Head: A.W. Billitt Dep. head: G.R. Lush
34.2 <i>General horticulture</i>	University of Nottingham, School of Agriculture - Department of Agriculture Developmental studies of plants, factors affecting yield of potatoes, growth of herbage plants and grassland utilisation Agricultural and horticultural machinery Growth analysis of plants, especially of potatoes - Department of Agricultural Sciences a. Agricultural Botany Growth of leaves, growth of the potato, factors influencing the transpiration rate, host-pathogen relationships Germination of seeds Competition between grasses Genetic control of leaf growth, cytology and growth characteristics of <i>Festulolium loliae</i> (Huds.), physiological role of boron Ecology of soil micro-organisms, host-pathogen relationships b. Agricultural Chemistry Amino-acid metabolism Biological aspects of podsolization Oxidation systems in plants, decomposition of carbohydrates Micrometeorology, heat and moisture movement in soils Nutrition and biochemistry of Leguminosae X-ray studies of clays, soil structure c. Agricultural Microbiology Mass production of micro-organisms with reference to their production of fat or protein Bacteriology and chemotherapy of the <i>Cornyne</i> bacteriaceae, bacteriology of <i>Rhizobium</i> spp. d. Agricultural Zoology The fauna and leaf litter, soil-inhabiting mites (Acarina) and micro-anthropods, biological characterization of humus forms, oribatid mites associated with fruit trees Biological problems of Aphididae - Department of Biometry Sampling techniques, analysis of plant growth	Sutton Bonington, Loughborough, Nottingham, England Prof. J.D. Ivins B. Wilton P.M. Bremner Prof. F.L. Milthorpe Miss Dr. M. Edwards Dr. K.W. Dent Dr. W.J. Whittington Dr. R.G. Lewis Prof. D. Lewis Dr. D.V. Crawford Dr. G. Norton I.R. Cowan P.E. Cansfield I.F. Taylor Dr. M. Woodbine Dr. A. Seaman Dr. P.W. Murphy J.Y. Ritchie R.T. Clarke

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Nottingham (34.2)	- Department of Food Science Biochemistry and processing of foods - Department of Horticulture Glasshouse crops, water relations with particular reference to glasshouse plants and irrigation of crops growing under hot arid (convection) conditions, re-generation from roots, control of environment in experimental work, use of chemical growth regulators - Ornamental plants, regeneration, particularly from leaves - Fruit, vegetables, environmental effects on the establishment of seedlings, seedling vigour - Glasshouse crops, growth analysis of plants, especially glasshouse lettuce, CO₂ enrichment, effects of transplanting	Dr. R. A. Lawrie/dr. M. Stein/ J. M. V. Blanchard Prof. J. P. Hudson Dr. M. E. Marston Dr. W. Heydecker W. M. Dullforce
35. Ongar 35.1 Plant Protection	May and Baker's Agricultural/Horticultural Research Station Private institution. Evaluation of new chemicals for possible herbicidal, insecticidal and fungicidal activity. - Agricultural Field Research Division - Plant Chemotherapy Division	Ongar, Essex Man.: K. Carpenter, R. A. Head: H. J. Terry, B. Sc. (Hort.) Head: Miss H. J. Cottrell, B. Sc., A. P. I. C.
36. Oxford 36.1 Weeds	Agricultural Research Council (ARC) Weed Research Organization Government station. - Agronomy section Integration of weed control methods into farm practice; weed control in kale and potatoes - Botany section Botany of weeds - Chemistry section Adsorption of soil-acting herbicides; analytical studies - Evaluation Section Evaluation of herbicides in glasshouse and pot trials Field evaluation of herbicides and special weed problems - Horticultural section Weed control in strawberry and bush fruit crops and ornamentals - Information section Publ.: "Weed Research" (J. Eur. Weed Research Council); Ed.: J. D. Fryer "Weed Abstracts", Ed.: J. D. Boyle.	Begbroke Hill, Kidlington, Oxford, England Dir.: J. D. Fryer Head: J. G. Elliot Head: R. J. Chancellor Head: Dr. R. J. Hance Head: Dr. K. Holly J. Holroyd Head: Dr. G. W. Ivens Head: P. J. Boyle
37. Preston 37.1 General horticulture	Fairfield Experimental Horticulture Station Area ca. 9 ha. About 0.8 ha of experimental glasshouses equipped with modern boilers and heating systems. Small mushroom unit. Study of glasshouse heating system and their efficiency, effect of pipe layout and position on heat distribution, glasshouse design	Greenhalgh, Kirkham, Preston, Lancashire England Dir.: A. J. Bedding, M. Sc., N. D. H. Ass.: J. B. Rothwell, B. Sc./Miss J. C. Kinnings, B. Sc.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Preston (37.1)	and construction, water requirement and nutrition of tomatoes under glass. Variety testing and effect of temperature on growth and cropping of tomato. Plant environment. Lettuce production in winter, especially testing of new varieties. Variety testing, nutrition and growing techniques of chrysanthemums in the open and under glass. Environment, casing problems and pest control of mushrooms. Variety trials with soft fruit outdoors. Techniques for growing and perennial outdoor cut flowers, weed control and variety testing.	
38. Preston Wynne 38.1 <i>General horticulture</i>	Rosemaund Experimental Husbandry Farm Husbandry experiments on hops, variety trials with cider apples.	Preston Wynne, Herefordshire, England Dir.: G.P. Chater Ass.: Miss R.M. Nott
39. Pulborough 39.1 <i>Irrigation etc.</i>	Cameron Experimental Horticulture Station Private institution owned and controlled by Cameron Irrigation Co. Ltd, 249 West End Lane, London. Trial and demonstration of irrigation and liquid feeding equipment for use in glass-houses.	West Chilton Road, Pulborough, Sussex
40. Reading 40.1 <i>Plant physiology</i>	Horticultural Department and Research Laboratories, University of Reading Developmental physiology and growth substances, photosynthesis, respiration and stomatal physiology, competition between ground covering ornamentals and weeds Interrelations of insects and weeds Developmental physiology of glasshouse flower crops, initiation of roots and buds Water relations, photosynthesis, respiration and stomatal physiology Developmental physiology, effects of wave length of light	Shinfield Grange, Reading, Berkshire, England Prof. dr. O. V. S. Heath R. Barnwell, B. Sc. / W. R. Buckley, M. Sc. / Dr. H. F. van Emden E. M. Harris, M. Sc. / Dr. G. P. Harris Dr. H. Meidner Dr. D. Vince
40.2 <i>Engineering</i>	Faculty of Agriculture, Electrical Research Station (formerly Electrical Research Station Shinfield) Research concerning the effects of environment on plant growth and development. Electricity in horticulture: effects of artificial light, soil warming and general environmental control Environmental control: effects of soil temperature on plant growth Effects of environment on plants	Shinfield Green, Reading, Berkshire, England Dir.: Prof. dr. E. W. Russell A. E. Canham, M. Sc. M. I. Boxall, B. Sc. Miss O. G. Hall, B. Sc.
41. Selby 41.1 <i>General horticulture</i>	Stockbridge House Experimental Horticulture Station Area 64 ha, mobile glasshouses, Dutch light structures, heated sheds for rhubarb forcing and mushrooms. Variety testing and cultural investigations with field grown vegetables including cauliflower, Brussels sprouts, self blanching celery, peas, carrots, lettuce, leeks, cabbage, red beet and horse-radish.	Cawood, Selby, Yorkshire, England Dir.: F. G. Smith, N. D. H.

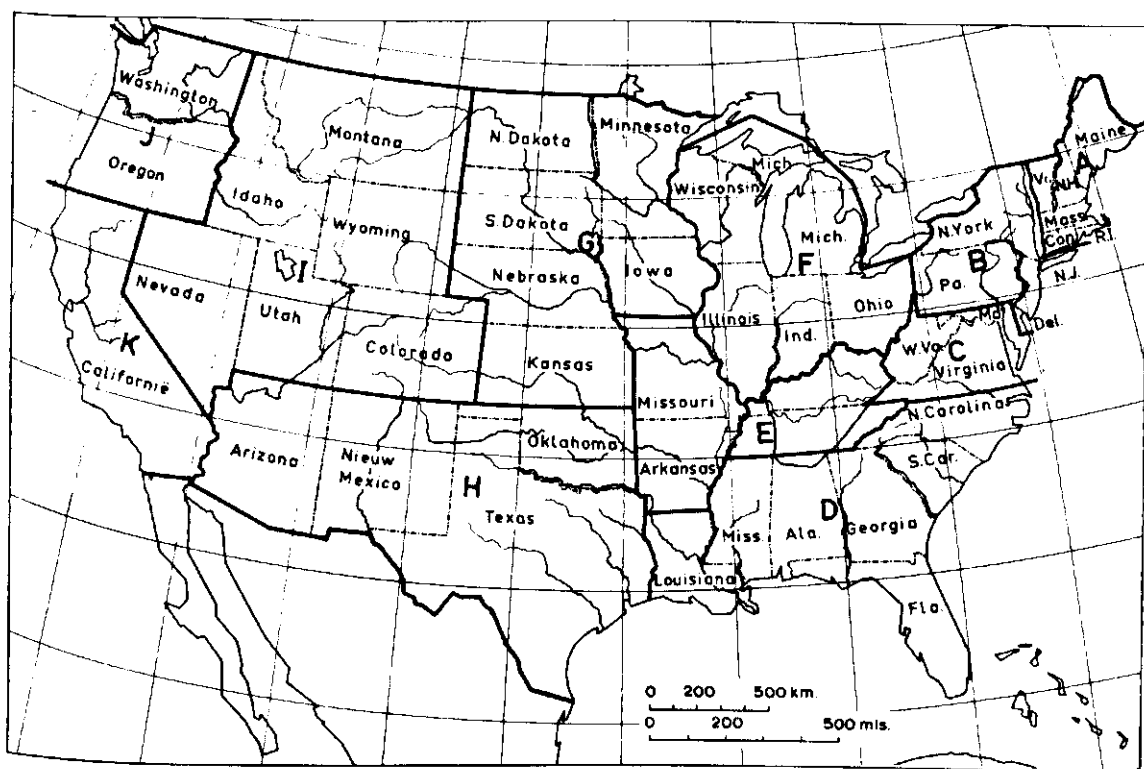
Seat/Nature of program	Institution and projects	Address and staff
Continuation of Selby (41.1)	Soil fertility and manurial studies on vegetables. Influence of factors operating both in the field and the forcing shed on the rhubarb crop. Mushroom production in sheds. Variety trials and cultural investigations with soft fruits. Crop rotations for mobile glasshouses. Variety trials and cultural investigations with lettuce and tomatoes in heated and unheated Dutch light structures. Control of diseases and soil borne pests of tomato. Application of warm air heating and CO₂ to glasshouse crops. Variety testing and cultural investigations with Chrysanthemums and cucumbers. Pot plant investigations with Hydrangeas, Chrysanthemums, Polyanthus and Astilbes. Glasshouse cropping, general Chrysanthemums, mushrooms, cucumbers, pot plants Soft fruit, brassicas Tomatoes and lettuce in Dutch light structures Rhubarb, celery, carrots, horse-radish Outdoor vegetable variety trials	A. Loughton, M. Sc. S. Jubb, B. Sc., N. D. H. A. G. Jones Miss N. M. Haine, N. D. H. M. W. Case, M. Sc. P. C. Rickard, B. Sc. / A. A. Taylor, B. Sc. / J. McLean, N. D. H. / R. F. Cowin, B. Sc.
42. Silsoe 42.1 Engineering	National Institute of Agricultural Engineering The institute is administered by the British Society for Research in Agricultural Engineering which is grant-aided through the ARC. Horticultural engineering research and development work is carried out by: a. Environmental Control Division 8 compartment glasshouses with automatic control of heat and ventilation in each compartment; various other glasshouses; laboratories for each department. - Glasshouse Department Control of environment in glasshouses; soil sterilizing, glasshouse design Irrigating glasshouse crops - Growth Cabinet Department Growth chamber research and development - Physics Department Measurements including light, temperature and CO₂ - Plant Physiology Department Physiology of glasshouse plants in relation to temperature, light, water and CO₂ supply - Soil Physics Department - Spraying Department Application of pesticides and herbicides to tree and ground crops b. Mechanization Division Development workshop, soil physics, biological and chemical laboratories. - Cultivation Department Development of cultivation equipment and harvesting machinery for field crops	Wrest Park, Silsoe, Bedfordshire, England Dir.: C. J. Moss Head: L. G. Morris R. A. H. Johnson/K. W. Winspear D. A. Wells G. A. Carpenter G. F. Bowman Dr. J. V. Lake/J. D. Postlethwaite J. S. Wolfe J. B. Ryass Head: D. I. McLaren J. C. Hawkins/W. Boa

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Silsoe (42.1)	Characterization of the physical properties of soils Handling and processing of fruit and vegetables Labour and machine studies in orchard and market gardens Assessment of damage and physical properties of fruit and vegetables - Implement Testing Department Agricultural and horticultural machinery is tested at the manufacturers' or their agents' request. Horticultural Testing Sub-Section	N. J. Brown J. B. Holt E. S. Devine H. C. Green P. Hebblethwaite P. Richardson
43. Sittingbourne	Woodstock Agricultural Research Centre	Sittingbourne, Kent, England
43.1 Plant protection	Belongs to "Shell" Research Ltd. Research on pesticides, herbicides, etc. Research Development R. and D. Services	Dir.: Dr. R. A. E. Galley D. Yeo, B. Sc. J. G. Reynolds, F. R. I. C. D. H. Bennett, A. M. I., Mech. E.
44. Thurgarton	Fruit Research Centre	Thurgarton, Nottinghamshire
44.1 Plant protection	Private institution, belonging to Boots Pure Drug Company (34.1). Research on fruit, pest, disease and weed control; 14 ha especially established tree fruit.	
45. Wellesbourne	The National Vegetable Research Station	Wellesbourne, Warwick, England
45.1 Vegetables	Under the aegis of the ARC (government). Genetics and plant breeding - Biochemistry Biochemical aspects of potassium nutrition, toxins of pathogenic fungi - Chemistry Plant nutrition, soil fertility, general agronomy: fertilizer requirements of vegetables, uptake of nutrients by seedlings Soil science: effects of aeration on microbial activity and plant growth Uptake of nutrients and their movement in soils and plants - Entomology Carrot fly and cabbage root fly Lettuce root aphid, carrot-willow aphid Cabbage root fly Insect toxicology, insecticide residues in soils, persistence and assay (chemical and biological) - Irrigation Agricultural meteorology, crop and soil water relations Irrigation and growth analysis of cauliflower and peas, soil moisture characteristics Form and function of root systems - Pathology Wilt diseases Parsnip canker, clubroot of crucifers, downy mildews	Dir.: Dr. J. Philp Dr. J. Philp Head: Dr. G. G. Freeman Head: Dr. F. Haworth Dr. D. J. Greenwood Dr. E. R. Page Head: D. W. Wright (Dep. dir.) Dr. J. A. Dunn T. H. Coaker G. A. Wheatley Head: E. J. Winter Dr. P. J. Salter D. H. Drew Head: Dr. W. G. Keyworth Dr. A. G. Channon

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wellesbourne (45.1)	Seed-borne diseases of peas, celery and carrots Virus diseases of lettuce, carrot and spinach; virus purification and serology Virus diseases of rhubarb - Physiology Growth and development, intra- and inter-specific competition Effects of nutrition and weather on growth and yield, growing of seed crops - Plant Breeding Asparagus, tomatoes Onions, peas, parsnips, red beet Brassicaceae, celery Cauliflower, lettuce, beans - Statistics Biometry: growth analysis, response surfaces Biometry: statistical problems in vegetable research - Weeds Ecology, cultural and chemical control of weeds Weed seed germination - Sub-station Vegetable seed multiplication.	R. B. Maude Dr. J. A. Tomlinson Dr. D. G. A. Walkey Head: Dr. J. K. A. Bleasdale R. B. Austin Head: Dr. J. C. Haigh B. D. Dowker Dr. A. G. Johnson Dr. L. E. Watts Head: J. A. Nelder G. Berry/R. Mead Head: H. A. Roberts A. D. Courtney Paglesham, Rochford, Essex, England
46. Wye 46.1 Plant Physiology	Agricultural Research Council (ARC), Growth Substance and Systemic Fungicide Unit Additional laboratories including facilities for radioactive tracer work are under construction. Organic chemistry: synthesis of plant growth regulators, isolation and identification of naturally occurring anti-fungal plant constituents Plant pathology: systemic and direct fungicidal activity of synthetic and natural products. Plant physiology: interaction of gibberellins, kinins and auxins in the growth of plant tissue Organic chemistry: synthesis of plant growth regulators, isolation and chemical examination of hormone inhibitors in plant tissues Plant biochemistry: metabolism of herbicides Plant biochemistry: influence of kinetin on leaf senescence Studies on systemic fungicides Bioassay of plant growth regulators Synthesis of plant growth regulators and growth retardants	Wye College, University of London, Wye, near Ashford, Kent, England Hon. dir.: Prof. dr. R. L. Wain Dr. C. H. Fawcett Dr. D. M. Spencer Dr. S. T. C. Wright Dr. K. Rothwell E. F. Taylor, B. Sc. R. Atkin, B. A. G. A. Carter, M. Sc. P. Cozens P. Knight, B. Sc.
46.2 Plant Physiology	Agricultural Research Council (ARC), Unit of Plant Morphogenesis and Nutrition The unit was previously located at Rothamsted Experimental Station. A set of 12 daylength- and temperature-controlled growth chambers is being constructed, to double the existing installation. Photoperiodism, vernalization, physiology of nutrition. Plant physiology: potassium nutrition, apical growth and phyllotaxis (barley, flax)	Wye College, University of London, Wye near Ashford, Kent, England Dir.: Dr. F. J. Richards Dr. F. J. Richards

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wye (46.2)	Plant physiology: photoperiodism and vernalization (chrysanthemum, Kalanchoe and other species)	Dr. W. W. Schwabe
46.3 Hop	Plant physiology: amine production and metabolism (barley and other species) Department of Hop Research 8 ha of hop gardens, chemical and biological laboratories, glasshouse, kilns for experimental drying of hops, picking machines, oast house. Plant breeding Organic chemistry Plant pathology Plant physiology Manuring and field trials	Dr. T. A. Smith Wye College, University of London, Wye, near Ashton, Kent, England Head: Dr. R. A. Neve Dr. R. D. Hartley Dr. D. J. Royle G. G. Thomas, M. Sc. F. C. Thompson, M. Sc.
47. Yaxley 47.1 Peas and beans	Pea Growing Research Organisation Limited (PGRO) (Originally the Home Grown Threshed Peas Joint Committee). A company, limited by guarantee, supported primarily by means of voluntary levies paid by growers, processors and merchants of peas, Vicia and Phaseolus beans, but receiving also grant aid from the Ministry of Agriculture, Fisheries and Food. Associateship Scheme with world wide membership. Vining peas: improved varieties for canning and quick freezing, weed control, spatial arrangement, varietal susceptibility to downy mildew (<i>Peronospora viciae</i>), pea wilt (<i>Fusarium oxysporum f. pisi</i>) and pea early browning virus (PEBVB). Dwarf French beans: varieties for canning and quick freezing, weed control, manuring and spatial arrangement. Climbing Phaseolus beans: varieties and manuring. Vicia beans: weed control, varieties and aspects of maturity.	Research Station, Yaxley, Peterborough, England Dir.: A. J. Gane J. M. King/G. P. Gent/ W. A. Armsby

United States of America



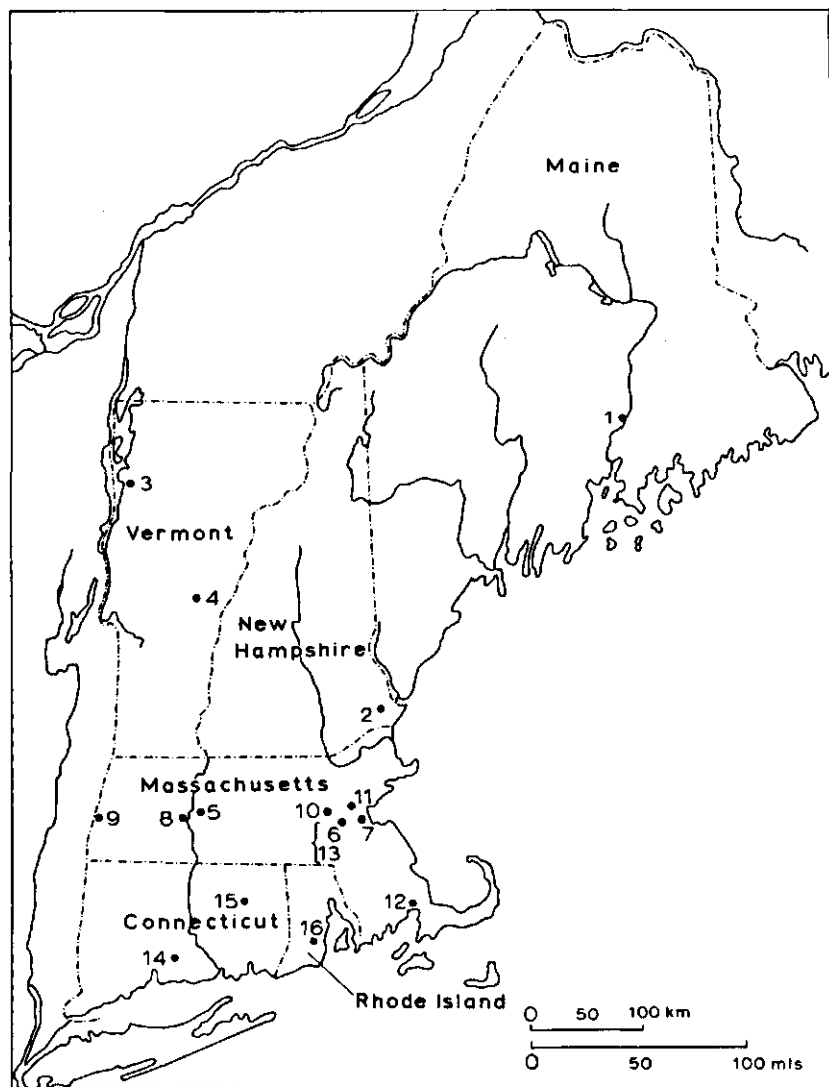
In the following review of horticultural research in the USA the States have been grouped as follows:

- A. New England States: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.
- B. North Atlantic States: New York, Pennsylvania, New Jersey.
- C. Middle Atlantic States: Delaware, Maryland, Virginia, West Virginia.
- D. South Atlantic and Gulf Coast States: North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana.
- E. South Central States: Tennessee, Arkansas, Kentucky, Missouri.
- F. North Central States: Ohio, Indiana, Illinois, Michigan, Wisconsin.
- G. Great Plains Region: Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas.
- H. Southwestern States: Oklahoma, Texas, New Mexico, Arizona.
- I. Mountain States: Colorado, Utah, Nevada, Wyoming, Idaho, Montana.
- J. Pacific Northwest States: Washington, Oregon.
- K. California.
- L. Alaska.
- M. Hawaii.

In the alphabetical key at the end of this book the letters A-M marking the groups of States, have been added to the indication "USA" behind the names of the research workers.

A. New England States

Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island



Maine: 1. Orono. New Hampshire: 2. Durham. Vermont: 3. Burlington, 4. Randolph. Massachusetts: 5. Amherst, 6. Cambridge, 7. Jamaica Plain, 8. Northampton, 9. Stockbridge, 10. Sudbury, 11. Waltham, 12. Wareham, 13. Wellesley. Connecticut: 14. New Haven, 15. Storrs.

General Survey

The northeastern states represent one of the oldest horticultural areas in eastern United States, and one of the first organized groups of people interested in horticulture in the country, the Massachusetts Horticultural Society, was founded February 24, 1829. That organization has done much to increase interest in the development of horticultural plants and to stimulate research. It has received world-wide recognition for its sponsorship of annual exhibits, horticultural fairs, innovations and research. Horticulture is that segment of New England agriculture which is growing and which ap-

pears to have a great deal of potential. Although coastal sections are highly populated and industrialized there remain inland rural areas in which large acreages adapted to apple growing, the principal tree fruit crop, high and low bush blueberry (*Vaccinium*) and, in the southern New England states, peaches and grapes. Much of the entire area, with the exception of the mountainous sections, is adapted to growing strawberries and red raspberries.

The apple industry of New England present centres around the McIntosh variety for which these states are famous, although other varieties are gaining rapidly in prominence. The industry is exceptionally well organized by

alert, ambitious growers who are fully aware of their problems and are constantly on the alert to meet the challenge of them. Privately-owned, controlled-atmosphere storage plants and innovations in bulk handling, storage, grading and transportation are to be observed frequently through the six-state area.

Nursery trees, shrubs and ornamental plants are grown extensively in each of the states. This too represents another segment of horticulture which is growing. While hardy species of deciduous and coniferous trees and shrubs make up the greater part of nursery-grown stock, added emphasis is placed on annuals and potted plants grown in increasing area under glass. State and National Park and highway beautification programs are under way and receiving greater attention as a stimulus to development of a rapidly growing recreational industry.

Research in horticulture and plant sciences is centered in the colleges and universities of the six states, and in other public and privately endowed institutions which will be mentioned later. In recent years investigations have placed less emphasis on cultural practice, and more on problems of genetics and breeding, nutrition, plant growth and development, auxins and other growth substances and their composition and effects. Increasing emphasis is being placed on studies of light effects, the uses of herbicides, and on the interactions of plant nutrients. In these states the problems of hardiness of plants will always receive a great deal of attention. These, and many other projects of importance, all emphasize the need for close cooperation of the physical and biological sciences in order to resolve answers to increasingly basic problems.

Maine

Aroostook County, Maine, has long been known for its tremendous potato production and a research farm for that work is located just south of Presque Isle, Maine.

There is now also considerable interest in development of beets for production of sugar in this same area.

In the southern part of the state there is a growing apple industry, and in the same region a concentration of vegetable growers producing sweet corn for canning and lettuce for Boston market.

The lowbush blueberry industry is also located principally in the southern and southeastern parts of the state, and a great deal of emphasis is being placed on research on this crop.

New Hampshire

Much of New Hampshire is covered with coarse and medium textured soils of glacial till.

The northern half of the state includes steep mountains with shallow soils to bed rock. This land is mainly in forests and is in an area with a short cool growing season. While soils in the south half of the state are derived from glacial till of granitic rock and are therefore fairly shallow, they do respond well to fertilizer and water.

Apples are the most important orchard fruit, grown with high and low bush blueberries, strawberries and red raspberries, the leading small fruit crops. Turfgrass, greenhouse crops, particularly ornamentals, and nursery crops are all increasing rapidly in production, and are quite uniformly distributed through the area south of the White Mountains.

Vermont

The important horticultural areas of Vermont are located in the Champlain Valley, the Connecticut River Valley and in Grand Isle County. The principal horticultural crops grown in the state are apples, strawberries, potatoes, small fruits and truck crops for roadside stands and for market gardens, also woody ornamental and annual bedding plants.

Massachusetts

Massachusetts, centrally located among the New England states, has traditionally been recognized for its leadership in the horticulture of this country. Although the state has become heavily industrialized it still has the most widely diversified horticulture of any of the six-state group, and productive areas are developing further from centres of population.

The principal horticultural industries in Massachusetts and their major locations are:

1. Floricultural and nursery products (about 12.0% of the value of all agricultural products in Mass.), located principally in Middlesex, Essex, Norfolk, Worcester and Plymouth counties.
2. Vegetable crops (about 10% of the value of all agricultural products in the state), located in the Connecticut Valley, north-eastern Mass. and north-central Bristol County.
3. Tree fruits: apple, peach, pear (about 4% of the value of all agricultural products in the state), located primarily in Worcester and Middlesex counties and parts of western Mass.
4. Cranberries (about 3.5% of the value of all agricultural products of Mass.), located in Plymouth and Barnstable counties.

Connecticut

Connecticut, the most southern state in New England, has a quite widely diversified florist crops industry of near 5 million

square feet under glass. Roses, carnations, chrysanthemums, and orchids are the principal crops. While growers are generally spread throughout the state, one of the largest plants is located at Cromwell, Connecticut. Nursery crops are also important, and while centers have developed near Fairfield and New London these crops are grown throughout the Connecticut River Valley.

A vegetable industry of over 10,416 acres is also spread along the Connecticut River Valley and the southern shoreline. Principal crops are tomato, carrots, sweet corn, lettuce, cabbage, peppers and snap beans. Potatoes are grown quite extensively in the Hartford area.

Growing of small fruits and grapes is quite widespread with nearly 9,000 acres in orchards and vineyards, the orchards being grown

throughout the state on higher elevations.

Rhode Island

Much of the state of Rhode Island is in range of the modifying effects of the ocean. Therefore, many horticultural species that will not stand the more rigorous climate of northern New England will develop well here. Ornamental and nursery crops are grown to supply the requirements of a densely populated industrial area and a very large outstate trade. This industry is developed on both sides of Narragansett Bay. Vegetables are grown principally to supply the requirements of a thriving roadside stand business. Apples, peaches and small fruits are grown on higher land with better soil and air drainage in the central and northwestern parts of the state.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-A 1.1 - 5.1

Seat/Nature of program	Institution and projects	Address and staff
Maine		
1. Orono 1.1 <i>General horticulture</i>	University of Maine, College of Agriculture and Agricultural Experiment Station A State institution. - Department of Plant and Soil Sciences Plant breeding Weed control Sugar beet Blueberry nutrition Vegetable quality Potato Herbicides and weed control	Orono, Maine Head: Dr. R. A. Struchtemeyer Assoc. prof. R. M. Bailey K. Goff Dr. P. R. Hepler Dr. W. J. Kinder Assoc. prof. E. F. Murphy Assoc. prof. H. J. Murphy Prof. M. F. Trevett
New Hampshire		
2. Durham 2.1 <i>General horticulture</i>	University of New Hampshire, College of Agriculture and Agricultural Experiment Station A State institution. - Department of Plant Science Genetics and breeding of vegetable crops Physiology and nutrition of tree fruits and blueberries Agronomy, turfgrass research Weed control in horticultural and agricultural crops Etiology and control of diseases of ornamentals Fruit and vegetable breeding Control of apple scab Breeding, genetics and cytogenetics of ornamentals Landscape-gardening	Durham, New Hampshire Chairman: Dr. L. C. Pierce Prof. R. Eggert Assoc. prof. L. J. Higgins Dr. C. A. Langer Dr. L. A. McFadden Assoc. prof. F. M. Meader Prof. dr. A. F. Rich Ass. prof. O. M. Rogers R. B. Pike
Vermont		
3. Burlington 3.1 <i>General horticulture</i>	University of Vermont, College of Agriculture and Home Economics and Agricultural Experiment Station - Department of Horticultural Science and Horticultural Research Center Effect of light, temperature and chemicals on plant growth Ornamentals Strawberries and small fruits Pomology Vegetable culture and climatology	Burlington, Vermont Chairman: Prof. dr. S. C. Wiggans D. J. Beattie R. R. Royce Prof. C. L. Calahan Prof. R. J. Hopp
4. Randolph 4.1 <i>General horticulture</i>	Vermont Technical College - Agricultural Department General horticulture	Randolph Center, Vermont P. B. Hodgdon
Massachusetts		
5. Amherst 5.1 <i>Fruit physiology</i>	University of Massachusetts, College of Agriculture and Agricultural Experiment Station - Department of Plant and Soil Sciences Influence of chemical treatments on flowering, fruit and seed development, abscission of tree fruits, relation of mineral nutrition to physiological disorders of apples, effect of or-	Amherst, Massachusetts Head: Dr. F. W. Southwick

Seat/Nature of program	Institution and projects	Address and staff
13. Wellesley 13.1 <i>Botany</i>	Alexandra Botanic Garden and Hunnewell Arboretum of Wellesley College An area of 24 acres established in 1923 in association with the Department of Biological Sciences. Used in general teaching and educational programs of the college.	Wellesley, Massachusetts Dir.: Harriet R. Creighton Horticulturist: J. Jennings
13.2 <i>Botany</i>	Walter Hunnewell Arboretum Founded in 1852 as the H.H. Hunnewell Arboretum, the 40 acres estate will remain open to visitors requesting permission. The collection of coniferous plants and rhododendrons is one of the finest collections in New England.	845 Washington Street, Wellesley, Massachusetts

Connecticut

14. New Haven 14.1 <i>Plant protection</i>	Connecticut Agricultural Experiment Station Plant pathology, research on mode of action of fungicides - Department of Biochemistry Enzymes in plants, plant respiration - Department of Entomology Insecticide toxicology and biology of economic insects - Department of Genetics Host-parasite genetic interactions Plant cytogenetics and breeding particularly of the cultivated tomato and its relatives Chestnut genetics - Department of Plant Pathology Mode of action of fungicides and chemotherapy of plant diseases Physiology of wilt diseases of plants caused by fungi Chemistry of fungicidal action and disease control in nursery crops Fruit diseases, nematology Fungicides, vegetable diseases Control of plant diseases Transpiration research Substation Windsor, Conn. Diseases of corn and tobacco, chemical weed control, soil management and fertility, land classification and survey	New Haven, Connecticut Dir.: J. G. Horsfall Head: Dr. I. Zelitch Head: Dr. N. Turner Head: Dr. P. R. Day Dr. C. D. Claybery Dr. R. A. Jaynes Head: Dr. A. E. Dimond Dr. L. V. Edington Dr. R. J. Lukens Dr. P. M. Miller Dr. S. Rich Dr. G. S. Walton Dr. P. J. C. Kuiper Head: Dr. G. S. Taylor
15. Storrs 15.1 <i>Physiology</i>	University of Connecticut, Storrs Agricultural Experiment Station - Plant Science Department Ion interactions in plant tissues Testing new varieties of tree and small fruits, cultural and storage research Cytology and genetics of ornamentals Control of woody plant growth by photoperiodic treatment Agricultural climatology, effects of water stress on physiology of plants Vegetable breeding, varietal trials, production and storage of plants	Storrs, Connecticut Head: Prof. dr. A. J. R. Guttay Dr. F. H. Emmert Prof. dr. L. A. Mitterling/ L. Baird Prof. dr. G. A. L. Melquist Dr. S. Waxman Prof. dr. R. E. Janes J. M. Lent/R. G. Mannel

Seat/Nature of program	Institution and projects	Address and staff
Rhode Island		
16. Kingston	University of Rhode Island, College of Agriculture and Agricultural Experiment Station	Kingston, Rhode Island
16.1 <i>General horticulture</i>	- Department of Horticulture Vegetable research Plant nutrition research Genetics and physiology of vegetables Ornamentals, research and propagation Propagation of ornamentals Physiology and storage of plant materials Physiology and storage of fruit	Chairman: Dr. J. T. Kitchin Assoc. prof. dr. G. D. Coots Assoc. prof. dr. A. E. Griffiths Assoc. prof. R. J. Hindle Assoc. prof. W. E. Larmie Assoc. prof. J. J. McGuire Dr. V. G. Shutak



New York State College
of Agriculture at Cor-
nell University

Probably no persons had as much to do with the development of horticulture and agriculture at Cornell University as Dr. Liberty Hyde Bailey and Isaac P. Roberts. Bailey came to Cornell University in 1888 and together with Roberts developed practical and experimental horticulture. The College of Agriculture was founded in 1896. The first appropriation from the State Legislature in 1904 for the construction of a new agricultural building, established the State College of Agriculture at Cornell University. L.H. Bailey was its Dean and much of its growth and philosophy was due to this international figure.

The *New York State Agricultural Experiment Station at Geneva* has been a part of the State College of Agriculture at Cornell University since 1923. The station was founded in 1882 by an act of the State Legislature "for the purpose of promoting agriculture in its various branches by scientific investigations and experiment". It has had a long and outstanding history in fruit research which has served the state, the nation and the world. Originally, all aspects of agriculture were under investigation at the station but at present emphasis is primarily on fruit and vegetable research for the processing industry.

Bronx, The New York Botanical Garden was established in 1891 by an Act of the State Legislature authorizing the Commissioner of Parks to set aside land in Bronx Park, New York City. The Torrey Botanical Club and Dr. and Mrs. Nathaniel Lord Britton were instrumental in its establishment. Dr. Britton had been greatly impressed by the Kew Gardens in England. The New York Botanical Garden was created to establish and maintain a botanical garden, museum and arboretum for plants,

flowers, shrubs and trees; to conduct research and instruction in the same; to exhibit ornamental and decorative horticulture and gardening and to provide entertainment, recreation and instruction. A Board of Managers governs the New York Botanical Garden.

The *Brooklyn Botanic Garden* is one of the four divisions of the Brooklyn Institute of Arts and Science, which is affiliated with the City of New York. The garden was established in 1911 by Prof. Franklin W. Hooper, Director of the Institute and Alfred T. White, an esteemed citizen of Brooklyn, to conduct popular education and scientific research. Mr. White, who with his sisters gave considerable financial support to the Garden, felt that no community could ever be great without beauty and that living beauty could be tied to botanical and horticultural research. The garden was developed on ground which was an ash dump with adjacent waste land. Financial support is from the City of New York, from an endowment of nearly \$5 million, from annual gifts and from grants to support scientific research.

The *Royce Thompson Institute at Yonkers* is a privately endowed, tax exempt, non-profit organization. It was founded by Col. W.B. Thompson to acquire basic knowledge on plant and animal life and develop sound principles for solving problems of plant and animal culture and use. He was convinced that the major problem facing civilization was procurement of adequate supplies of food and fiber for an ever-expanding population in which man's capacity for procreation exceeded his productive ability. An endowment of about \$12 million was set aside by Col. Thompson to erect buildings and purchase land and facilities for research. Over the years this original endowment has grown by supplementary

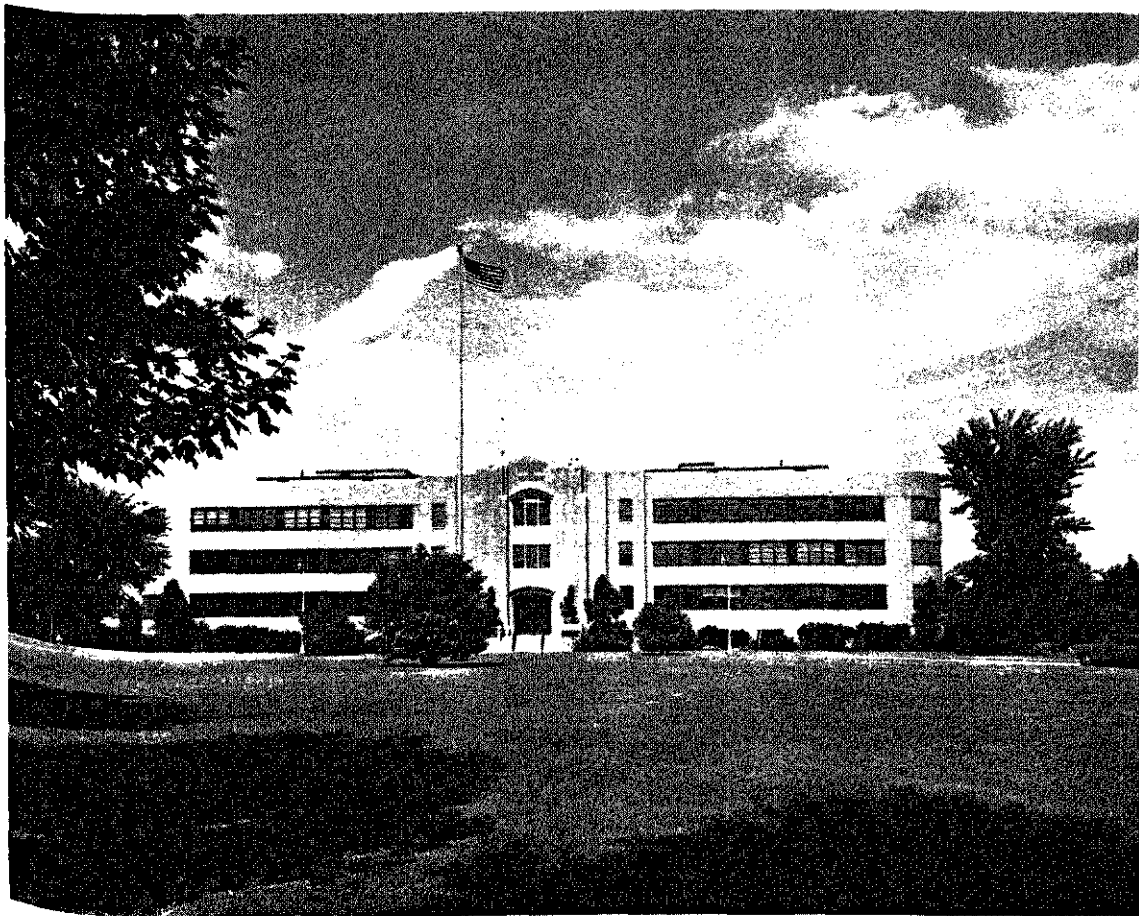
gifts and by astute management of capital accounts so that at the present time capital assets are valued at more than \$ 25 million. The Institute was incorporated in 1924 under the membership laws of the State of New York. Responsibility for operation is vested in a Board of Directors. The Board appoints a Managing Director who has responsibility for developing a suitable research program, procuring staff and executing policies set down by the Board.

Pennsylvania

Pioneers coming to Pennsylvania found an abundance of fruit growing wild and grown by the Indians: apples, peaches, plums, grapes, raspberries, blackberries, dewberries, cranberries, gooseberries and blueberries. It is believed that the peach was brought to this country by the Spaniards when they visited Florida in 1565. The Indian was evidently responsible for its wide spread since the peach was a prized fruit. Early settlers

found many wild growing peach trees. Most of American fruit production was founded on varieties discovered growing wild. Important apple varieties found in Pennsylvania were Maiden Blush, Smokehouse and York Imperial. The latter was discovered near the city of York. The Seckel pear was found near Philadelphia. In early times fruits were grown primarily for drink (wines, brandy cider) and frequently to feed livestock. Only occasionally were they eaten. The beginnings of American grape growing were in Lancaster County in southeastern Pennsylvania.

From 1740 to 1840, Philadelphia was the center of scientific learning in America and held undisputed leadership in horticulture. Three men are largely responsible for Pennsylvania's horticulture: Benjamin Franklin, John Bartram and Richard Peters. Franklin was instrumental in the founding of the Philadelphia Society for the Promotion of Agriculture in March, 1785, the first agricultural organization in America. From it, the



Eastern Utilization Research and Development Division, Agricultural Research Service, USDA, at Wyndmoor near Philadelphia

first horticultural society was organized in 1827, the Pennsylvania Horticultural Society. Bartram was the first American botanist and established the first botanical garden in America in 1728. Bartram's Garden is now a part of the public park system of Philadelphia. Richard Peters was a judge and Philadelphia lawyer. He was primarily responsible in bringing about government recognition of agriculture and in recognizing the importance of instruction and research in agriculture. Bernhard M'Mahon did much to stress scientific horticulture. His book, "American Gardeners Calendar", published in 1806, was the best American work of its time. William Coxe of Burlington, N.J., worked closely with these men in the activities of the Philadelphia Society for the Promotion of Agriculture. Coxe was the pioneer pomologist of America specializing in fruits only. "View on the Cultivation of Fruit Trees", published in 1817, was the first American book on pomology and report of results in the first experimental orchard in

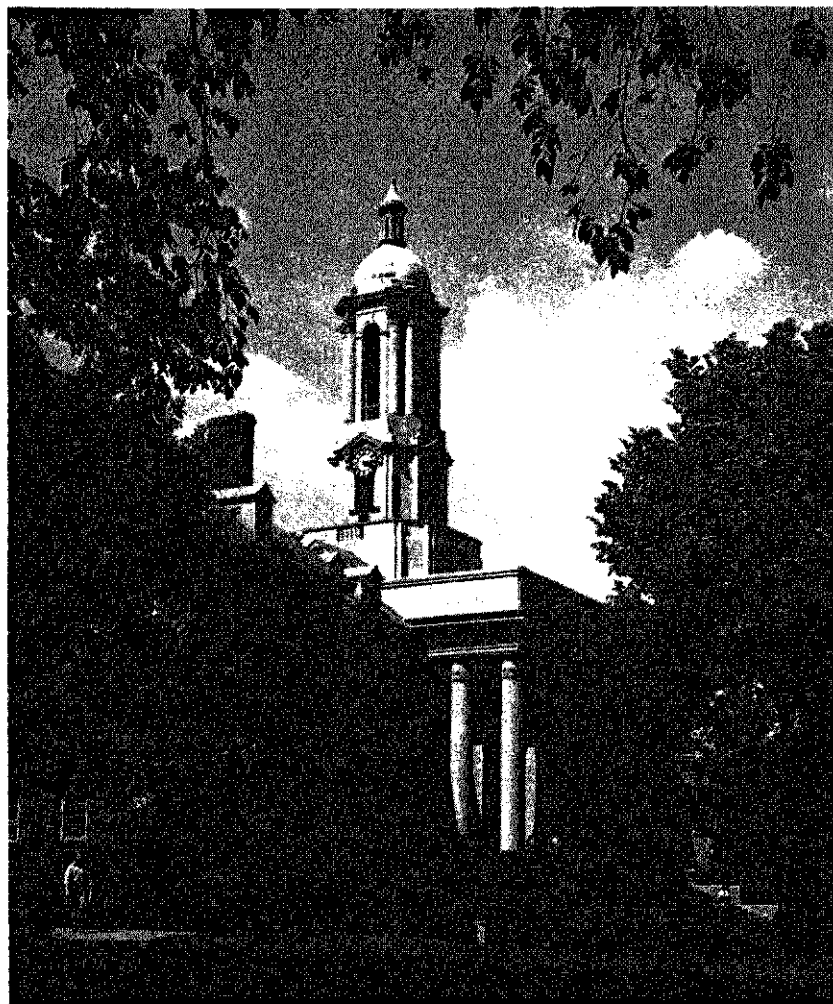
America.

Institutions

Longwood Gardens, located 3 miles east of Kennett Square, is one of the most outstanding horticultural gardens in the United States. It comprises nearly 1,000 acres of natural rolling countryside with about 350 acres which have been made into many gardens of various kinds.

One of the most famous fountain systems of the world, covering 5 acres and illuminated at night with coloured lights, is a special evening attraction.

The land at Longwood Gardens dates back to William Penn who gave a grant of land to George Peirce in 1700. A brick house, which remains, was built in 1730, around which were planted many ornamentals. An arboretum of evergreens and deciduous trees was soon developed. Still standing are a large cucumber magnolia and a ginkgo tree. The property was known locally as Peirce's Park and remained in the family until purchased by



Old Main on the campus of the Pennsylvania State University at University Park

Pierre S. du Pont in 1906 for his personal use as a country estate.

Longwood Gardens is now a permanently endowed private institution operated by the Longwood foundation, a non-profit philanthropic foundation created in 1937.

Pennsylvania State University, College of Agriculture at University Park. This university was founded in 1855 as the Farmer's High School, by professional men, educated farmers and state and county agricultural leaders to give young men "a knowledge of the English language, grammar, geography, history, mathematics, chemistry and such other branches of the natural and exact sciences as will conduce to the proper education of a farmer". In 1862, the institution was renamed the Agricultural College of Pennsylvania and in 1863, after the passage of the Morrill Act, it was designated as the "land-grant college" of the Commonwealth. The university consists of 16 campuses with the main campus located at University Park. Both an undergraduate and a graduate program are offered in agriculture and forestry, business, liberal arts, engineering, mineral industries, home economics, architecture and science. Total student enrollment is about 28,000 with about 19,000 on the main campus. The College of Agriculture provides instruction in the sciences which underlie agriculture, conducts research under the Agricultural Experiment Station and extension through the Agricultural Extension Service.

New Jersey

New Jersey is called the "Garden State" which reflects readily the importance of the horticultural industry in the state. New Jersey

is situated in the center of the belt of heavy population and industry between Washington, D.C. and Boston, Mass. The total value of agriculture in the state is about \$ 400 million, with fruits and vegetables combined amounting to about \$ 75 million. Vegetables, both for fresh market and processing outlets, are about \$ 32 million and \$ 20 million, respectively. Fruits amount to about \$ 23 million and flowers and ornamentals a little less than \$ 13 million.

Institutions

Rutgers, the State University, was founded as Queens College in 1786 by members of the Dutch Reformed Church. In 1825 the name of the college was changed to Rutgers in honour of Col. Henry Rutgers, a former trustee. In 1864, Rutgers' Scientific School was designated as the "land-grant college" of New Jersey, becoming the College of Agriculture at New Brunswick. In 1945 the New Jersey Agricultural Experiment Station became a part of the University. The university has campuses at Newark and Camden and offers courses in engineering, science, liberal arts, medicine, law and agriculture. Total enrollment is about 22,000 students.

Horticultural research is centered at New Brunswick in the Department of Horticulture and Forestry, which has responsibility for research, teaching and extension in floriculture, forestry, landscape design, ornamentals, pomology and vegetable crops. Research is both basic and applied, primarily serving the industry of the state. Two important research areas are breeding and nutrition including minor elements. Many vegetable and fruit varieties introduced from this station are internationally grown.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Geneva (4.1)	Tomato, cucumber and beet breeding and genetics Plant physiology, biochemistry Supporting departments: - Department of Entomology - Tree fruit diseases - Vegetable insects - Nursery insects - Apple insects - Orchard mites - Small fruit insects - Department of Food Science and Technology - Certain aspects of mechanical harvesting - Department of Plant Pathology - Orchard fruit diseases - Small fruit diseases - Nurserystock diseases - Vegetable diseases - Department of Seed Investigations - Germination and analytic purity - Coordinator for USDA plant introduction stations in northeast - Plant disease resistance - Seed diseases and treatment - Genetic purity of seeds Outlying research stations Fruits and vegetables Grapes	Dr. R. W. Robinson Dr. S. Shannon Head: Dr. P. J. Chapman Dr. A. C. David/Dr. F. L. McEwen Dr. F. L. Gambrell Dr. E. H. Glass Dr. S. F. Lienk Dr. G. A. Schaefer Head: Dr. D. R. Hand R. L. LaBelle, M. Sc. Head: Dr. J. M. Hamilton Dr. A. J. Braun Dr. R. M. Gilmer Dr. J. J. Natti/Dr. W. T. Schroeder Head: Dr. B. F. Clark Dr. D. D. Dolan Dr. S. W. Braverman Dr. W. F. Crosier Dr. L. M. Nittler Highland (see 5.1) Fredonia (see 3.1)
4.2 Plant introduction	Northeast Regional Plant Introduction Station Cooperative venture of United States Department of Agriculture, the Agricultural Experiment Stations in the Northeast and the New York State Fruit Testing Association.	Geneva, New York State
5. Highland	Hudson Valley Laboratory	Highland, New York State
5.1 Fruit	Established in 1923 and administered by the New York State Agricultural Experiment Station at Geneva. Present location on the westside of the Hudson river 2 miles north of Highland. The principal crop grown in this area is the apple with an annual production of approx. 8 mill. boxes. McIntosh is the leading variety. This area pioneered in modified atmosphere storage of apples and an appreciable part of the world's controlled atmospheric storage capacity is located in Ulster county. Besides apples, extensive plantings of pears, peaches, sweet and sour cherries and plums. Some grapes, strawberries and red currants. Production primarily for fresh market, in western New York for processing. Sweet corn research is another important program of the laboratory. Fruit nutrition, general fruit culture Insect problems Disease problems Sweet corn	Dr. C. G. Forshey Dr. R. W. Dean Dr. D. H. Palmiter Dr. J. A. Adams
6. Ithaca	Cornell University, State College of Agriculture and New York State Agricultural Experiment Station	Cornell University, Ithaca, N.Y. - 14850
6.1 General horticulture		

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Farmingdale (2.1)	ty Agricultural and Technical College at Farmingdale. Administered by the Department of Floriculture and Ornamental Horticulture, Plant Pathology and Entomology at Cornell University. Research and extension work in production and handling of commercial florist and nursery crops in the important Long Island area. Weed control in florist and nursery crops, gladiolus production Plant diseases, soil-borne organisms, nematodes Insects of ornamental plants	Cornell University: Dr. A. Ring Dr. C. E. Williamson U.S. D. A.: G. V. Johnson, M. Sc.
3. Fredonia	Grape Research Laboratory	Fredonia, New York State
3.1 Viti-culture	Established in 1909. Center for grape research and culture in the east. Two thirds of New York's grape industry is located in this area. Grape culture Grapes Grape insects	Dr. N. J. Shaulis (in charge) D. E. Crowe (technician) T. N. Taft, M. Sc. / Dr. F. F. Taschenberg
4. Geneva	New York State Agricultural Experiment Station	Geneva, New York State
4.1 General horticulture	Primarily fruit and vegetable research for the processing industry: investigations in food science and technology, insect and disease control, plant breeding and genetics, seed testing and improvement, rootstock investigations, and fruit and vegetable culture and nutrition. Equipment: vegetable and orchard plots, laboratories, greenhouses, growth chambers, library and wax museum of fruits and vegetables. The recently completed building for the Department of Food Science and Technology contains one of the most modern food research laboratories in the country. Administration, Jordon Hall Education and research information Horticulture, Hedrick Hall: - Department of Pomology - Grape and apple breeding, cytology - Propagation and rootstocks - Nutrition, physiology, mechanical harvesting, pruning, juvenility - Nutrition, physiology, biochemistry - Physiology, weed control, growth and development, juvenility - Physiology, growth regulators, juvenility - Stone fruit breeding, cold resistance - Small fruit cytology - Cytology, irradiation mutations - Grapes: culture, physiology, environment, mechanical harvesting - Small fruit breeding - Fruit breeding - Apple and cherry breeding, mechanical pruning - Department of Vegetable Crops - Soil-plant-water relationships - Bean and cabbage breeding and genetics - Pea, carrot and squash breeding and genetics - Soil fertility, plant nutrition, evapotranspiration	Dir.: Dr. D. W. Barton R. F. Krauss Head: Dr. J. Einset K. D. Brase, M. Sc. Dr. J. C. Cain USDA R. G. Chan, M. Sc. Dr. O. F. Curtis Jr. Dr. J. G. Dennis Dr. R. C. Lamb Dr. D. K. Ourecky Charlotte S. Pratt, M. A. Dr. N. J. Shulis G. L. Slate, M. Sc. J. P. Watson, M. Sc. Dr. R. D. Way Head: Dr. M. T. Vittum Dr. M. H. Dickson Dr. G. A. Marx Dr. N. H. Peck

Seat/Nature of program	Institution and projects	Address and staff
New York State		
1. Bronx	Bronx, The New York Botanical Garden	Bronx Park, Bronx, N.Y. - 10458
1.1 Potany	Private institution. The garden covers 230 acres including the Bronx River Gorge and Falls, the Hemlock Forest, 40 acres of original forest, huge boulders of the glacial age, meadows and rocky knolls. Plantings include evergreen and deciduous trees; the Pinetum, the Montgomery Conifer Collection of over 200 species of evergreens, a large collection of azaleas, rhododendrons, lilacs and magnolias, a Rose garden of over 7,000 plants of 80 natural species and over 400 cultivars, the Thompson Memorial, Rock Garden, the Herb Garden, a Native Plant Garden and a seasonal outdoor display of many flowering plants. The Botanical Garden has a large conservatory, an herbarium containing nearly 3,000,000 plant species from all parts of the world and one of the foremost research libraries on botany and horticulture in the US. It has undertaken or sponsored over 260 plant expeditions to various parts of the world as part of its taxonomy research program. Research on the characterization of growth promoting factors from natural products, biosynthesis of fungi metabolites, study of cell division in algae and higher plants, effect of light quality on plant growth, ornamental pathology and selective pathogenicity of plants. The educational programs include a cooperative graduate program with Columbia and Fordham University, adult education, and a special program for children. - Administration Bryology, cytology Public relations Museum and herbaria General botany - Staff Taxonomy and geographical distribution of tropical American Lauracea and Malenia Unusual fungal metabolites Mycology: water molds Paleobotany Ecology Horticulture and education Plant physiology: effect of light quality on structure and function Plant pathology: new diseases and pests and control measures Cultivated plant taxonomy, quantitative taxonomy Publ.: The Garden Journal Economic Botany	Dir.: Dr. W. C. Steere Dr. W. C. Steere Ph. Clark (Ass.) Head Cur.: Dr. B. Maguire Cur. of Libr.: Dr. H. W. Pickett Dr. Caroline K. Allen Dr. Marjorie Anchel Dr. Alma Rarksdale Dr. H. F. Becker Dr. P. Dansereau (ass. dir.) T. H. Everett, M. Sc. (ass. dir.) Dr. R. M. Klein Dr. P. P. Pirone Dr. D. J. Rogers Dorothy F. Hansell (Ed.) R. E. Schultes (Ed.)
2. Farmingdale	Ornamentals Research Laboratory	Farmingdale, Long Island
2.1 Floriculture	Established in 1948 by the New York State College and the United States Department of Agriculture Situated on the campus of the State Universi-	New York State

Sent. Nature of program	Institution and projects	Address and staff
Continuation of Ithaca (6.1)	Equipment: Laboratories of various types, radio-isotope facilities, elaborate greenhouses with automatic controls, specially designed growth chambers, controlled atmosphere storages and research facilities, gardens and orchards. Horticulture at the State College of Agriculture and the N.Y. Agricultural Experiment Station is divided into three departments and areas for basic and applied research, teaching and extension. Floriculture and Ornamental Horticulture, Pomology, and Vegetable Crops. These are supported by several departments such as Agronomy, Plant Pathology, Entomology, Agricultural Engineering, and Plant Breeding. An ornamental research laboratory is operated at Farmingdale, Long Island (see 2.1) and a vegetable research laboratory at Riverhead, Long Island (see 9.1) College of Agriculture Economic entomology Farm crops Agricultural Experiment Station Soils Agricultural Extension Service Seed certification Horticulture - Department of Floriculture and Ornamental Horticulture Floriculture: nutrition, culture Floriculture: nutrition, artificial media, leaf analysis Turf management Landscape design Extension specialist in floriculture and ornamentals Floriculture: retail Floriculture: greenhouse culture, temperature, photoperiod Floriculture: breeding potted plants Extension specialist in home grounds Ornamentals: plant materials, plant hardiness Ornamentals: weed control, nursery management Extension in 4-H Ornamentals: physiology, nutrition: radio-isotopes - Department of Pomology Chemical thinning, fruit extension Post-harvest physiology, environmental factors in relation to apple maturity Biochemistry of flavons in horticultural crops Hardiness, growth regulator Nutrition, soil and leaf analysis service Auxins, biochemistry of growth and behaviour of plants Post-harvest physiology, controlled atmospheric storage, apple scale, colour formation, environment and keeping quality Extension, small fruits, grape fresh fruit varieties - Department of Vegetable Crops Tomato, onions, celery and cucurbit breeding Potato production	Dean: Dr. C. E. Palm Assoc. dean: Dr. W. K. Kennedy Dir.: Dr. N. C. Brady Dir.: A. A. Johnson, M. Sc. Plant Science Building Head: Dr. J. G. Seeley Dr. J. W. Boodley Dr. J. F. Cornman R. L. Dwelle/R. J. Scannell, MLA C. C. Fischer, M. Sc. / C. Gortzig, M. Sc. Dr. R. T. Fox Dr. R. W. Langhams Dr. R. E. Lee A. S. Lieberman, M. Sc. Dr. R. C. Mower Dr. A. M. S. Pridham E. F. Schaufler, M. Sc. Dr. H. B. Tukey Jr. Head: Dr. M. B. Hoffman Dr. G. D. Blanpied Dr. L. L. Creasy Dr. L. J. Edgerton Dr. G. H. Oberly Dr. L. E. Powell Dr. R. M. Smock Dr. J. P. Tomkins Head: Dr. H. M. Munger Dr. F. E. Ewing

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ithaca (6.1)	Quality evaluation Post-harvest physiology Culture and nutrition Culture, variety evaluation Physiology Muck (peat) crops Morphology and physiology in horticultural crops Culture, legume crops Plant growing media and structures Potatoes, processing Weed control Extension in 4-H Bean, cabbage and carrot breeding Supporting departments - Department of Agricultural Engineering Mechanical harvesting - Department of Agronomy Agricultural climatology: bioclimatology Micro-climate studies - Department of Entomology - Department of Plant Breeding Potato breeding - Department of Plant Pathology Culture of disease free plants, designing of new growth rooms Nematodes, viruses - Laboratory for Cell Physiology Growth and development - Liberty Hyde Bailey Hortorium A vast collection of pressed and dried plants from all parts of the world - Wiegand Herbarium A collection of 300,000 dried specimens of selected flowering plants. - A.R.Mann Library The second largest agricultural library in the US (250,000 volumes).	Dr. J. D. Hartman Dr. F. M. Isenberg Dr. W. E. Kelly Dr. P. A. Minges Dr. J. L. Ozbun Dr. G. J. Raleigh Dr. Sidki Sadik Dr. R. F. Sandsted Dr. R. Sheldrake Jr. Dr. Ora Smith Dr. R. D. Sweet Dr. L. D. Topolaski Dr. D. H. Wallace Head: O. C. French, M. Sc. E. D. Markwardt, M. Sc. / F. S. Shepardson, M. Sc. Dr. B. E. Dethier Dr. E. R. Lemon Head: Dr. D. Pimentel Head: Dr. R. Plaisted Head: Dr. G. C. Kent Dr. A. W. Dimock Dr. W. F. Mai Dir.: Dr. F. C. Steward Dir.: Dr. H. E. Moore
7. New York	The Brooklyn Botanic Garden	1000 Washington Ave.
7.1 Botany	Private Institution The Botanic Garden includes a greenhouse and many outstanding displays, a Japanese garden, a rock garden, a wild garden, lily pools, a rose garden, an herb garden, an iris garden, a garden of fragrance for the blind and a terrace garden. Education Department Botany and plant pathology	Brooklyn, N.Y. - 11225 Dir.: G. S. Avery
8. Ossining	Kitchawan Research Laboratory	712 Kitchawan Road,
8.1 Botany	Research Department of Brooklyn Botanic Garden (see 7.1) The general objective of the research department is to acquire basic knowledge of plant life, especially on the interrelationships between plants, their diseases and their environments, and how these relate to human welfare.	Ossining, New York State Chairman: Dr. G. Stotzky

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-B 8.1 - 10.1

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ossining (8.1)	Microbiology, clay mineralogy, plant physiology Plant pathology, air pollution Plant pathology, nematology Plant pathology Nematology, science education, laboratory coordination Nematology Microbiology, surface chemistry Microbiology Microbiology, clay mineralogy Microbiology, air pollution	Dr. G. Stotzky Dr. C. R. Hibben Dr. J. T. Walker W. P. Balgooyen C. H. Specht J. F. Bekker Dr. T. Santoro Mrs. L. T. Rem/R. Tsui Miss A. H. Post R. M. Mund
9. Riverhead 9.1 Vegetables	Long Island Vegetable Research Farm Relongs to the vegetable research program of the Department of Vegetable Crops, State College of Agriculture at Cornell University. Its primary purpose is to support the intensive fresh market vegetable industry, located on Long Island. Vegetable culture Potato production and storage Vegetable insects	Riverhead, Long Island, New York State Dr. S. R. Dallyn (in charge) Dr. E. L. Sawyer Dr. M. Semel
10. Yonkers 10.1 General horticulture	The Boyce Thompson Institute Private institution Plant growth, dormancy, seed physiology, response of plants to environmental stress such as air pollution, the nature and control of pests, biochemistry of parasitism, plant virology, plant growth, design of biologically active molecules, insect physiology and virology, transmission of plant viruses by insects, breeding of larch and other trees for improved growth habits, nature of bark beetle attack on western and southern pines and studies on morphogenesis and its modification by plant disease agents. The institute is divided into the following program areas: microbial chemistry, plant chemistry, fruit entomology, plant physiology and pathology, insect physiology and virology, bioregulant chemicals, biocidal chemicals and science education. Plant pathology and botany - Department of Biocidal Chemicals (Diamond) Insecticides Insecticides, plant regulants Fungicides and nematocides - Department of Bioregulant Chemicals Plant pathology - Department of Forest Entomology - Department of Insect Physiology and Virology Insect virology Animal virology Electron microscopy Microbiology Physiology Insect pathology	1086 North Broadway, Yonkers, New York - 10701 Dir.: Dr. G. L. McNew Dr. G. L. McNew Pr. L. Limpel Dr. S. Szabo Dr. J. Turner Dr. B. Torgeson/ A. Goenaga Dr. J. P. Vite/Dr. G. Pitman (Grass Valley, Calif.)/ Dr. R. Gara (Beaumont, Texas) Dr. K. Maramorosch/Dr. R. Granados Dr. G. Streissle Dr. V. Rystriky Pr. S. Orenski Dr. T. Tokumitsu Pr. D. Roberts

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Yonkers (10.1)	- Department of Microbial Chemistry - Obligate parasitism - Phosphate metabolism of diseased tissues - Mycology, hermophilism - Instrumentation - Fungicides - Lipid chemistry of fungi - Department of Plant Chemistry - Plant regulation and fluorine toxicity - Fluoride air pollution - Characterization of histones - Nucleic acid metabolism - Plant growth chemicals - Department of Plant Physiology and Pathology - Seed physiology - Seed dormancy - Bud dormancy - Tissue culture - Nucleotide metabolism - Organic chemistry - Plant virology - Department of Science Education	- Dr. R. W. Owens/Dr. R. C. Staples - Dr. W. Wynn - Dr. F. Crisan A. Renwick - Dr. B. Tweedy - Dr. C. Jack - Dr. L. H. Weinstein/ - Dr. D. McCune - Dr. J. Jacobson R. Mandl - Dr. S. Gross - Dr. D. McLean - Dr. G. L. McNew/Dr. Lela V. Barton - Dr. Alva App - Miss F. Flemion - Dr. W. Tulecke - Dr. D. Wang - Dr. H. Gershon - Dr. R. Bozarth/R. Browning - Dr. L. Miller/Dr. Ruth Stone

Pennsylvania

11. Arendtsville	South Mountain Fruit Research Laboratory	Arendtsville, Pennsylvania
11.1 Fruit	Part of the Pennsylvania Agricultural Experiment Station. Concerned primarily with field research to serve the important fruit industries of Adams, Cumberland, Franklin and York counties.	
	Fruit tree culture, weed control, rootstocks, variety evaluation	Dr. F. N. Hewetson
	Fruit diseases and spray material evaluation	Dr. F. H. Lewis
	Fruit insects and spray material evaluation	D. Asquith, M. Sc.
12. Kennett Square	Longwood Gardens	Kennett Square, Pennsylvania - 19348
12.1 Botany	Private institution.	Dir.: Dr. R. J. Seibert
	One of the most outstanding horticultural gardens in the United States. In the conservatory (2 $\frac{1}{2}$ acres under glass) are displays of begonias, lilies, caladiums, browallias, chrysanthemums, camellias, acacias, rhododendrons and azaleas. Tropical Terrace Garden, Rose House, Fern Passage, Desert House, Economic house of plants valuable to man as food, fiber and medicine, displays of espalier trained fruit trees and orchids, Rock Garden, Herb Garden, pools of tropical waterlilies, several rose gardens, Topiary Garden, Heather Garden and Italian Water Garden.	
	Ornamental plant exploration	Dr. R. J. Seibert
	Ornamental plant taxonomy	Dr. D. G. Huttleston
	Ornamental plant breeding with emphasis on Delphiniums	Dr. R. W. Lighty
	Design and horticultural displays	E. L. Miller
13. North East	Erie County Research Laboratory	North East, Pennsylvania

Seat/Nature of program	Institution and projects	Address and staff
Continuation of North East 13.1 Fruit	Part of the Pennsylvania Agricultural Experiment Station: the staff are members of the university faculty. Staff members located at University Park also conduct research at this laboratory. The laboratory mainly serves the important Concord grape industry in Pennsylvania's section along Lake Erie, but investigations are also conducted on sweet and sour cherries, peaches, raspberries and strawberries. Grape culture, balanced pruning, high vigour Concord grape evaluation Fruit insects: grapes	H. Fleming, M.Sc. Dr. J. A. Cox
14. Philadelphia (Wyndmoor) 14.1 General horticulture	Eastern Utilization Research and Development Division, United States Department of Agriculture, Agricultural Research Service Federal institution. One of the four original Regional Research Laboratories in the US authorized by the federal government in 1938 for conducting basic and applied research to find new and wider uses for American farm commodities. - Engineering and Development Laboratory Dehydration of fruit and vegetable pieces, dehydration of mashed potato products (potato flakes), recovery and use of concentrated fruit aromas. Plant products engineering Unit operations engineering - Plant Products Laboratory Fruit Potato and other vegetables Honey Maple syrup Tobacco Special plants	600 East Mermaid Lane, Wyndmoor, Philadelphia. - 19118 Dir.: Dr. P. A. Wells Chief: R. K. Esken Head: J. Cording Jr. Head: H. I. Sinnamon Chief: Dr. C. F. Woodward Head: Dr. C. H. Hills Head: Dr. W. L. Porter Head: Dr. J. W. White Jr. Head: Dr. C. O. Willits Head: Dr. R. L. Stedman Head: Dr. C. L. Ogg
15. University Park 15.1 General horticulture	Pennsylvania State University, College of Agriculture (Armsby Bld.) Equipment: Laboratories of various types, greenhouses, experimental orchard, ornamental nursery, flower test garden, experimental vegetable farm, large electronic computer, agricultural library. Horticulture, vegetable breeding Agricultural Experiment Station Agricultural Extension Service Resident education and international programs Department of Horticulture (Tyson Building) Responsibility of instruction and research in floriculture, ornamental horticulture, plant breeding, plant nutrition, pomology, fruit and vegetable food technology and vegetable crops. Research is of a basic and applied nature oriented to the industry. Genetics and breeding of ornamentals - Section of Floriculture Plant physiology, greenhouse environment, growth regulators Soils, nutrition, water relations Retail florists: time studies, flower arrangement, post-harvest physiology	University Park, Pennsylvania - 16802 Dean: Dr. R. F. Larson Dir.: Dr. M. A. Farrel Dir.: T. A. Patton, MPA Dir.: Dr. R. B. Dickerson Head: Dr. F. E. Walker Dr. J. W. Mastalerz (in charge) Dr. J. W. White Dr. P. B. Pfahl

Seat/Nature of program	Institution and projects	Address and staff
Continuation of University Park 15.1	- Section of Food Technology - Influences of cultural practices on quality of fruit and vegetables - Section of Ornamentals - Propagation, plant materials, flower gardens - Plant propagation, weed control - Nutrition, pruning - Flower gardens - Section of Plant Breeding - Tomato and sweet corn breeding, corn biochemical genetics - Ornamental and flower breeding and genetics - Section of Plant Nutrition - Nutrition of horticultural crops - Vegetable nutrition and physiology - Section of Pomology - Small fruits, peach varieties, post-harvest physiology - Soil management and nutrition, rootstocks, varieties - Growth and development, growth regulators, tree training, plant environmental relations, mechanical harvesting - Nut varieties, propagation - Section of Vegetables - Cucumber, pepper and tomato breeding and genetics, brassica incompatibility studies, variety trials - Feed control, variety trials - Supporting Departments - Department of Agricultural Engineering - Greenhouse construction - Mechanical and physical properties of fruit and vegetables, mechanical harvesting - Tomato harvesting, plastic mulching equipment - Department of Agronomy - Potato culture - Turf: breeding and management - Fertility, soil modification - Department of Landscape Architecture - Department of Entomology - Department of Plant Pathology - Flower diseases - Mushrooms - Department of Horticulture Extension (Tyson Building) - Fruit and grape culture - Vegetable culture - Fruit culture and post-harvest physiology - Ornamentals - Floriculture (Norristown) - Ornamentals and landscaping - Supporting Extension Departments - Department of Agronomy Extension - Turf management - Potato culture - Department of Plant Pathology Extension - Department of Entomology Extension	- Dr. F. J. McArdle (in charge) R. P. Meahl, M. Sc. (in charge) - Dr. C. Haramaki - Dr. J. E. Brewer Jr. S. Atmore - Dr. R. G. Creech (in charge) - Dr. R. Craig - Dr. C. B. Smith (in charge) - Dr. F. L. Bergman - Dr. C. W. Hitz (in charge) - Dr. C. M. Ritter - Dr. L. D. Tukey W. S. Clark Jr., M. Sc. - Dr. M. L. Odland (in charge) C. J. Noll, M. Sc. - Head: F. W. Peikert, M. Sc. - Dr. R. A. Aldrich - Dr. N. N. Mohsenin K. C. Stephenson, M. Sc. - Dr. J. D. Harrington (in charge) - Dr. J. M. Duich (in charge) - Dr. D. V. Waddington - Head: W. H. Wilson, M. LA - Head: Dr. B. F. Coon - Head: Dr. J. Tammen - Dr. L. E. Kneebone (in charge) - Chairm.: Dr. C. S. Bittner J. O. Dutt, M. Sc. / R. F. Fletcher, M. Sc. - Dr. C. W. Haeseler C. S. Oliver, M. Ed. J. K. Rathmell Jr., M. Sc. A. O. Rasmussen - Dr. J. F. Harper E. C. Pifer, M. Sc. - Chairman: Dr. C. F. Taylor - Chairman: S. G. Gesell, M. Sc.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of University Park (15.1)	South Mountain Fruit Research Laboratory (see 11.1) Erie County Research Laboratory (see 13.1)	Arentsville, PA. North East, PA.
New Jersey		
16. New Brunswick 16.1 General horticulture	Rutgers, University of New Jersey, College of Agriculture State institution Equipment: Laboratories, greenhouses, growth chambers and research farms. Agricultural Experiment Station Instruction Agricultural Extension Service Department of Horticulture and Forestry Fruit nutrition - Section of Floriculture and Ornamentals Nursery management Orchids Extension Plant materials Extension in nursery management Breeding Floriculture Landscape design Extension in landscape design - Section of Forestry Tree physiology Extension - Section of Pomology Fruit breeding Post-harvest physiology Peach and pear breeding Extension Cranberries and blueberries Grapes and small fruit breeding Small fruit nutrition and physiology Small fruit breeding - Section of Vegetables Tomato nutrition and culture Sweet potatoes, broccoli, peppers Asparagus Breeding Extension Tomato breeding, extension Breeding cucumber, castor beans Supporting departments - Department of Entomology Apiculture Nematology Extension Small fruit insects Vegetable insects Floriculture insects Pesticide chemistry Fruit insects - Department of Meteorology	New Brunswick, New Jersey Dean: Dr. L. G. Merrill Act. dir.: Dr. W. A. MacIinn Dir.: Dr. R. H. Merritt Dir.: Dr. J. L. Gerwig (Nichol Avenue) Chairman: Dr. N. F. Childers Leader: Dr. W. E. Snyder Dr. O. W. Davidson M. R. Harrison, M. Sc. Dr. J. R. Feucht L. D. Little Jr., M. Sc. Dr. F. R. Orton Jr. C. A. Otto, M. Sc. R. H. DeBoer, M. Sc. / J. Hall, M. LA R. P. Korbobo Leader: R. F. West, M. F. W. Smith, M. F. / B. B. Stout, M. F. R. Lentz Leader: Dr. L. F. Hough G. Albrigo Dr. Catherine H. Bailey E. G. Christ, M. Sc. Dr. P. Eck W. Nesbitt Dr. C. R. Smith C. Stushnoff Leader: Dr. G. A. Taylor Dr. W. O. Drinkwater Dr. J. H. Ellison W. L. George Jr., M. Sc. W. B. Johnson, M. Sc. Dr. B. L. Pollack Dr. O. Shiffriss Chairm.: Dr. B. B. Pepper Dr. A. W. Benton Dr. W. R. Jenkins Dr. R. R. Kriner P. E. Masucci, M. Sc. Dr. J. R. Reed Dr. H. T. Streu Dr. D. J. Sutherland Dr. F. C. Swift Head: A. V. Heavens, M. Sc.

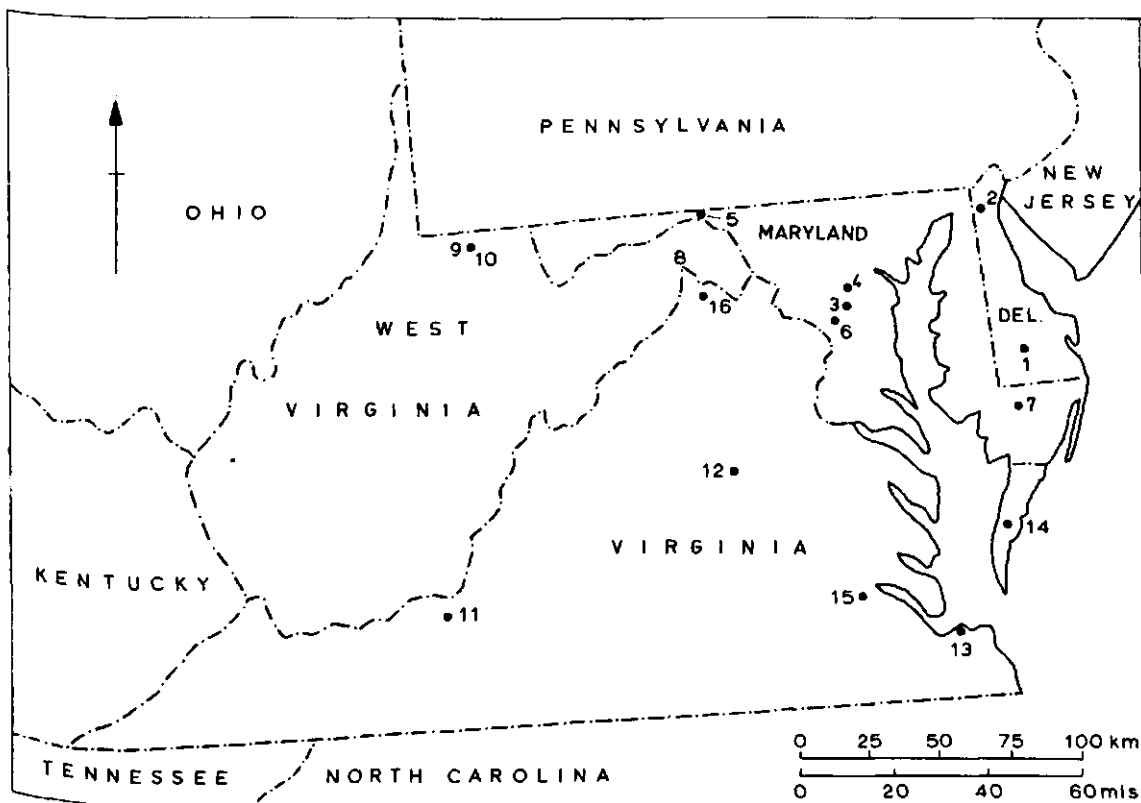
RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-B 16.1

Seat/Nature of program	Institution and projects	Address and staff
Continuation of New Bruns- wick (16.1)	- Department of Plant Pathology - Harvest disorders - Tree fruit diseases - Vegetable diseases - Cranberry and blueberry diseases - Small fruit diseases - Department of Soils and Crops - Plant breeding - Turf - Weed control	- Chairm.: Dr. B. H. Davis - Dr. R. A. Cappellini - Dr. R. H. Draines - Dr. G. D. Lewis - Dr. A. W. Stretch - Dr. E. H. Varney - Chairm.: Dr. W. R. Battle - Dr. R. Engle - Dr. W. V. Welker Jr.

C. Middle Atlantic States

Delaware, Maryland, West Virginia, Virginia



Delaware: 1. Georgetown, 2. Newark. Maryland: 3. Beltsville, 4. College Park, 5. Hancock, 6. Ryattsville, 7. Salisbury. West Virginia: 8. Kearneysville, 9. Morgantown, 10. Reedsville. Virginia: 11. Blacksburg, 12. Charlottesville, 13. Norfolk, 14. Painter, 15. Petersburg, 16. Winchester.

General Survey

Horticulturally speaking these 'Middle Atlantic States' are best known for large mountain orchards and for truck farming on the Delmarva Peninsula (Delaware plus the eastern shore of Maryland and Virginia). The apple leads all horticultural crops in value in the region. Peaches, potatoes, tomatoes, peas, snap beans, lima beans, and strawberries are grown in large quantities also. Agricultural research in the area dates back to the plant introduction work of the US Patent Office before the Department of Agriculture was organized. The major research institutions at present are the Agricultural Research Center at Beltsville, Maryland, and the Agricultural Experiment Stations of the four states that were authorized by the Hatch Act. This act was passed March 2, 1887. All four states established their stations in the year 1888. All four stations were established at agricultural colleges which had

been designated as Land-Grant Colleges, and all have continued at their original locations.

Agricultural research at Beltsville began with the purchase of the Beltsville Farm in 1910 by the United States Department of Agriculture (USDA). Facilities were expanded and many units of the Department began doing research there. By the 1930's it became the logical point for consolidating all research being done at Beltsville, the Arlington Farm, greenhouses on the Capitol Mall, and other locations in the general vicinity of Washington, DC. This consolidation was accomplished officially by the appointment on Aug. 28, 1934 of the first Director of the Beltsville Research Center. It was renamed the Agricultural Research Center following the establishment of the Agricultural Research Service in 1953.

The specific research activities of all these stations has followed much the same pattern. From the beginning, plant materials were

assembled, evaluated, and disseminated. Better cultural practices were an early target. More recent objectives have been improvement through selection and breeding, im-

proved handling and storage methods, and efficient marketing procedures. In recent years, much emphasis is being given to basic research.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-C 1.1 - 3.1

Seat/Nature of program	Institution and projects	Address and staff
Delaware		
1. Georgetown 1.1 <i>General horticulture</i>	University of Delaware, College of Agriculture and Delaware Agricultural Experiment Station, Substation	Georgetown, Delaware Dir.: J. Frank Gordy E. Wisk (Res. associate)
2. Newark 2.1 <i>General horticulture</i>	University of Delaware, College of Agriculture and Delaware Agricultural Experiment Station, Main Station - Department of Horticulture Vegetable breeding, nutrition Plant nutrition, propagation, physiology (ornamentals) Agricultural climatology, vegetable irrigation, physiology Weed control in fruit crops, rootstocks, nutrition Weed control in vegetables, growth regulators, nutrition Extension Horticulture	Newark, Delaware Dir.: Dr. M. S. Cover P. E. Read, M. Sc. (Res. associate) Head: Prof. E. P. Brasher, M. Sc. Dr. C. W. Dunham Dr. D. J. Fieldhouse Dr. V. J. Fisher E. M. Rahn, M. Sc. P. F. Stevens, M. Sc.
Maryland		
3. Beltsville 3.1 <i>General horticulture</i>	Agricultural Research Center Federal institution. - Crops Protection Research Branch Weed investigations: horticultural crops - Fruit and Nut Crops Research Branch Virus pathology Physiology Small fruit and grapes Tree nuts Pome fruit Stone fruit York spot, physiology Tree juvenility, physiology Cytology Pathology, fungal and bacterial Biochemical studies of fire blight and other bacterial diseases Red stele of strawberries, raspberry diseases Grape diseases, strawberry fruit rots - Market Quality Research Division, Beltsville Horticultural crops branch, quality maintenance group Horticultural crops branch, quality evaluation unit Hot water treatment of peaches - Market Quality Research Division, Hyattsville (see 6.1) - New Crops Research Branch Plant introduction Plant material, horticultural crops Survey of fruit clones Glenn Pale Introduction Station - Pioneering Research Group Plant hormones and regulators	Beltsville, Maryland Chief: W. B. Ennis Jr. Ass. chief: W. D. McClellan L. L. Danielson Chief: L. C. Cochran Ass. chief: A. A. Piringer D. H. Scott J. W. McKay H. J. Brooks H. W. Fogle C. B. Shear R. Zimmerman H. Dermen H. L. Keil B. C. Smale R. Converse J. McGrew R. Hardenburg J. Yeatman W. W. Smith/W. Redit Chief: C. O. Erlanson Ass. chief: J. L. Creech H. L. Hyland H. F. Winters H. H. Fisher W. Ackerman J. W. Mitchell

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Beltsville (3.1)	Plant physiology: photoperiodism Plant virology laboratory Fruit thinning - Vegetable and Ornamentals Research Branch Potatoes Onions and carrots Beans and peas Tomatoes and cucurbits Mushroom and microbiological investigations Ornamentals Vegetable seeds Potato pathology Physiology of ornamentals Nature and control of bean diseases Lima bean breeding Biological control of soil-borne diseases Mushroom physiology Genetics and improvement of African violets, daylilies Diseases of shade tree and other ornamentals Genetics and improvement of azaleas and gladioli Diseases of sweet potatoes Potato production and physiology Genetics and improvement of roses, poinsettias, woody ornamentals, carnations Cytogenetics of tuber-forming solanums Sweet potato production, breeding and improvement Effect of environment on seed quality, seed physiology	H. A. Borthwick R. L. Steere P. Marth Chief: V. R. Boswell Ass. chief: A. E. Kehr R. V. Akeley E. W. Davis W. J. Zaumeyer R. E. Webb E. B. Lambert S. L. Fmsweller B. M. Pollack W. Raymer N. W. Stuart/H. M. Cathey R. W. Goth R. E. Wester G. C. Papavizas J. P. San Antonio T. Arisumi C. May R. L. Pryor E. M. Hildebrand G. V. C. Houghland R. N. Stewart R. W. Buck C. E. Steinbauer V. K. Toole
4. College Park	Maryland Agricultural Experiment Station Main Station	College Park, Maryland Dir.: Prof. dr. I. C. Haut
4.1 General horticulture	State institution. - Department of Horticulture Vegetable breeding Cytogenetics, x-ray induced deficiencies in corn Fruit breeding Vegetable variety testing, machine planting and harvesting Vegetable extension Landscape gardening, extension Food processing, statistical quality control Small fruit breeding Nutrition, propagation, photoperiodism in floricultural crops Vegetable crops, nutrition, water relations Mineral nutrition and post-harvest physiology Greenhouse flowering crops, nutrition, growth regulators, culture Vegetable breeding Landscape teaching Fruit extension Fruit tree nutrition, chemical thinning Plant Research Farm Horticultural processing extension Food processing techniques and objective measurement of food quality	Head: Prof. dr. F. C. Stark R. L. Baker, M. Sc. Prof. dr. I. C. Haut Dr. W. L. Hollis H. A. Hunter, M. Sc. C. N. Johnson Dr. A. Kramer F. J. Lawrence, M. Sc. Dr. C. B. Link Dr. C. W. Reynolds Dr. L. E. Scott Dr. J. B. Shanks Dr. R. J. Snyder K. P. Soergel, M. L. A. Dr. G. J. Stadelbacher Dr. A. H. Thompson Dir.: S. H. Todd Dr. B. A. Twigg Dr. R. C. Wiley
5. Hancock 5.1 Fruit	Fruit Laboratory of the Maryland Agricultural Experiment Station State institution. Fruit extension	Hancock, Maryland Dr. B. L. Rogers

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

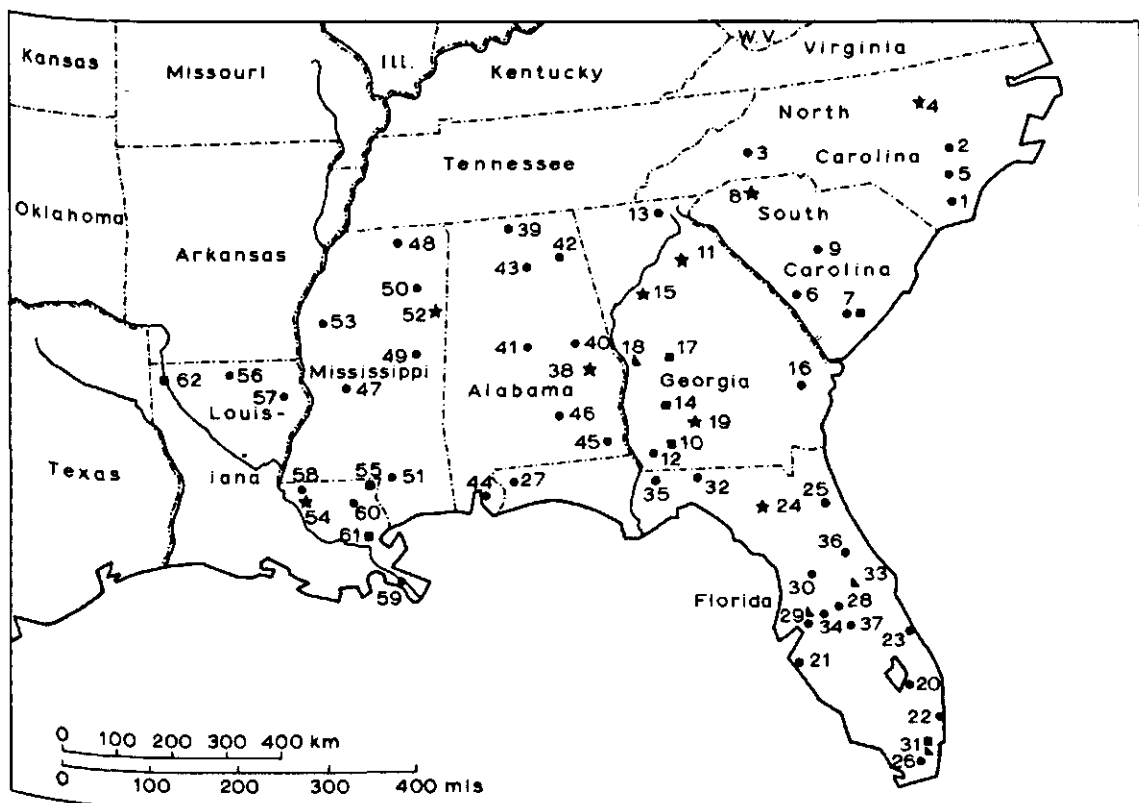
USA-C 6.1 - 11.1

Seat/Nature of program	Institution and projects	Address and staff
6. Hyatts-ville 6.1 Horticultural quality research	Market Quality Research Division of the Agricultural Research Center at Beltsville Horticultural crops branch Transportation and facilities research division Handling and facilities research branch Transportation research branch Wholesaling and retailing research branch	Hyattsville, Maryland Dir.: W.T. Pentzer Chief: A. Lloyd Ryall Ass. chief: J.M. Lutz Dir.: W.C. Crow Chief: W.H. Elliot Chief: J.E. Clayton Chief: R.W. Hoecker
7. Salisbury 7.1 Vegetables	Vegetable Research Branch of the Maryland Agricultural Experiment Station State institution. Farm superintendence Vegetables Vegetable crops	Salisbury, Maryland W.A. Matthews, M. Sc. J.D. Long Dorothy A. White
West Virginia		
8. Kearneys-ville 8.1 Fruit	University Experimental Farm State institution, belonging to the West Virginia Agricultural Experiment Station. Rootstock, colour sport of apples, disease and insect control Fruit research	Kearneysville, West Virginia Superintend.: E. Gould Dr. R. S. Young
9. Morgantown 9.1 General horticulture	West Virginia Agricultural Experiment Station, Main Station State institution. - Department of Horticulture Physiology Small fruits Landscape architecture extension Floriculture and greenhouse management Ornamental horticulture, geranium breeding Extension: small fruit and vegetables Small fruit and vegetables Post-harvest physiology, fruits Sulfur and nitrogen nutrition, apple tree injury, fruit marketing Breeding and propagation of ornamentals, transpiration Weed control, tree fruit nutrition, apple colour, improvement of apple juice Landscape gardening Farm superintendent	Morgantown, West Virginia Dir.: Dr. A.H. Van Landingham Chairm.: Dr. E. G. Scott Dr. W. H. Childs C. W. Collier Jr., M. L. A. A. P. Dye, M. Sc. Dr. W. R. Fortney N. C. Hardin, M. Sc. C. E. Hickman, M. Sc. Dr. M. Ingle R. S. March, A. M. Dr. O. M. Neal Jr. Dr. O. E. Schubert G. E. Steyers, M. Sc. R. F. Sweitzer
10. Reeds-ville 10.1 General horticulture	Reedsville Experimental Farm, belonging to the West Virginia Agricultural Experimental Station Vegetable and fruit research.	Reedsville, West Virginia Superintend.: L. P. Stevens, M. Sc.
Virginia		
11. Blacks-burg 11.1 General horticulture	Agricultural Experiment Station of the Virginia Polytechnic Institute, Main Station State institution. - Department of Horticulture Sweet corn quality, cress study Small fruits Tree fruits, physiology, cork spot, B 995	Blacksburg, Virginia Dir.: Dr. H. N. Young Assoc. dir.: Dr. C. T. Wilson Ass. to dir.: D. H. Duncan Head: Prof. dr. W. P. Judkins Dr. F. S. Andrews H. B. Aroian Dr. J. A. Borden

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Blacksburg (11.1)	Roadside development Landscape architecture Vegetable processing and quality evaluation Tree fruits Orchard mice control, fruit thinning Food technology Greenhouse flowers, flower colour Vegetables, plastic greenhouses, ultra sonic cleaning Post-harvest physiology, harvest and storage of fruits and vegetables Fruit breeding Tree fruit production, intensification techniques Vegetables, mulching, greenhouses, plant growing Tomato and sweet potato variety trials Nursery management Fruit and vegetable processing	D. G. Borkley, M. Sc. A. S. Beecher, M. L. A. Dr. F. W. Cooler F. R. Dreiling, M. Sc. Dr. F. Horsfall Jr. Dr. A. Lopez F. J. Marousky, M. Sc. Dr. P. H. Moosey Jr. Dr. G. E. Mattus Dr. G. D. Oberle Dr. H. A. Rollins Jr. Dr. F. D. Schales F. H. Scott Dr. J. H. Tinga C. B. Wood, M. Sc.
12. Charlottesville	Piedmont Research Station, part of the Agricultural Experiment Station at Blacksburg	Charlottesville, Virginia
12.1 Fruit	Peach production, nutrition	E. L. Phillips
13. Norfolk	Virginia Truck Experiment Station, Main Station	Norfolk, Virginia
13.1 General horticulture	State institution. Plant breeding Horticulture Horticultural extension	Dir.: Dr. W. H. Brittingham Dr. E. A. Borchers M. M. Parker, M. Sc. A. V. Watts
14. Painter	Eastern Shore Branch of the Virginia Truck Experiment Station	Painter, Virginia
14.1 General horticulture	Horticulture	R. L. Waterfield
15. Petersburg	Virginia State College, School of Agriculture	Petersburg, Virginia
15.1 General horticulture	- Department of Horticulture	Act. dir.: M. T. Carter, M. Sc. Head: Prof. dr. W. L. Watson Assoc. prof. L. F. Martin, M. Sc.
16. Winchester	Winchester Fruit Research Laboratory, part of the Agricultural Experiment Station at Blacksburg	Winchester, Virginia
16.1 Fruit	Tree fruit production, apple rootstocks	G. R. Williams

D. South Atlantic and Gulf Coast States

North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana



★ Main stations • Branch stations ● Stations of United States Department of Agriculture (USDA)
▲ Private institutions

North Carolina: 1. Castle Hayne, 2. Faison, 3. Fletcher, 4. Raleigh, 5. Willard. **South Carolina:** 6. Blackville, 7. Charleston, 8. Clemson, 9. Columbia. **Georgia:** 10. Albany, 11. Athens, 12. Attapulgus, 13. Blairsville, 14. Cairo, 15. Experiment, 16. Fleming, 17. Fort Valley, 18. Pine Mountain, 19. Tifton. **Florida:** 20. Belle Glade, 21. Bradenton, 22. Ft. Lauderdale, 23. Ft. Pierce, 24. Gainesville, 25. Hastings, 26. Homestead, 27. Jay, 28. Lake Alfred, 29. Lakeland, 30. Leesburg, 31. Miami, 32. Monticello, 33. Orlando, 34. Plant City, 35. Quincy, 36. Sanford, 37. Winter Haven. **Alabama:** 38. Auburn, 39. Belle Mina, 40. Camp Hill, 41. Clanton, 42. Crossville, 43. Cullman, 44. Fairhope, 45. Headland, 46. Spring Hill. **Mississippi:** 47. Crystal Springs, 48. Holly Springs, 49. Newton, 50. Pontotoc, 51. Poplarville, 52. State College, 53. Stoneville. **Louisiana:** 54. Baton Rouge, 55. Bogalusa, 56. Calhoun, 57. Chase, 58. Clinton, 59. Diamond, 60. Hammond, 61. New Orleans, 62. Shreveport.

General Survey

The states of North Carolina, South Carolina, Georgia, Alabama, Mississippi and Louisiana comprise an area of 290,491 square miles and, together with the State of Florida, constitute the South Atlantic and Gulf Coast Region of the United States. From the standpoint of climate these six contiguous states have factors in common and a factor in distinction. Factors in common are the amount and distribution of the rainfall, the amount of sunshine, and the proximity to large bodies of water.

The mean annual rainfall varies from 48 inches for North Carolina and South Carolina to 55 inches for Louisiana.

The amount of sunshine varies with the length of the light period and the degree of cloudiness. The number of sunny days is greater than the number of partially cloudy or wholly cloudy days.

The proximity to either the Atlantic Ocean or the Gulf of Mexico moderates the temperature level, particularly within a rather narrow belt on the coast. This is particularly the case during the winter and spring months.

The factor in distinction is the differences in elevation at the western or northern borders. In these areas North Carolina and South Carolina have elevations of 4,000 feet or more, Alabama has a maximum elevation of about 2,000 feet, and Mississippi and Louisiana have maximum elevations of about 800 and 500 feet, respectively. These differences in elevation account for the differences in

temperature level and the length of the frost-free growing season. In general, the mountainous districts of North Carolina, South Carolina, Georgia and Alabama have a relatively low temperature level and a relatively short frost-free period (170 - 220 days), whereas the lower elevated areas of Mississippi and Louisiana have a relatively high temperature level and a relatively long frost-free period (215 - 250 days).

Table 1. Commercial production of principal tree and small fruits in the six states (Average for 1951-1960)¹

State	Apples (1,000 bu.) ³	Peaches (1,000 bu.) ³	Pecans ² (1,000 lbs) ⁴	Tung (tons) ⁵	Grapes (tons) ⁵	Strawberries (1,000 lbs.) ⁴	Citrus (1,000 boxes)
North Carolina	1,554	1,170	2,096	none	1,385	3,955	none
South Carolina	a	4,213	4,601	none	1,440	c	none
Georgia	a	3,088	38,280	215	1,285	c	none
Alabama	a	703	18,940	1,647	b	2,300	none
Mississippi	a	312	10,965	48,360	b	c	none
Louisiana	none	92	16,830	14,400	b	18,551	164

¹ From Agricultural Statistics, U.S. Department of Agriculture, 1963.

² Includes varieties and seedlings.

³ 1,000 bushel = 36.368 m³

⁴ 1,000 lbs = 453.6 kg

⁵ 1 ton = 1016 kg

^a The commercial acreage is low but in most states it is increasing.

^b Small quantities are grown for local market.

^c Small quantities are grown for fresh market and processing.

Table 2. Commercial production for fresh market of vegetables in 1,000 cwts¹ in the 6 states. (Average for 1951-1960²).

State	Cabbage	Potato	Sweet potato	Tomato	Cucurbits ³	Snap bean	Other vegetables ⁵
North Carolina	1,209	3,384	2,412	157	1,084	142	757
South Carolina	328	748	962	295	2,717	199	202
Georgia	526	204	992	387	4,121	125	295
Alabama	89	2,430	714	240 ⁴	1,761	54	229
Mississippi	350	353	1,031	44	768	74	24
Louisiana	288	356	4,473	47	323	108	67

¹ 1,000 cwts = 50,802.5 kg

² From Agricultural Statistics, U.S. Department of Agriculture, 1963

³ Includes cantaloupe, cucumbers for slicing and watermelon

⁴ 1964 only

⁵ Includes lettuce, collard, lima bean, peas, radish, sweet corn, spinach, squash and turnip

Organization of Horticultural Research

In common with the people of the United States, the people of these six states have always been seriously concerned with their food and fiber supply. During the colonial period and prior to the establishment of the Land-Grant colleges, most of these states founded and maintained experimental gardens or farms. For example, South Carolina established the South Carolina Testing Garden at Charleston in 1799, and Georgia founded the Georgia Experimental Gardens at Savannah in 1733. Finally, a large number of societies were active in promoting the agricultural and horticultural affairs of these states. For example, there were 11 agricultural and horticultural societies in South Carolina by 1823, and no less than 13 agricultural and horticultural societies in Mississippi by 1858. The primary object of these experimental gardens and societies was to promote the food and fiber supply either by establishing new industries or by improving the efficiency of old industries.

Between 1867 and 1877 growers and agricultural leaders of these six states urged the President of their respective Land-Grant College to conduct experiments on possibilities of establishing new industries, on the adaptation of new varieties, on the reclamation of worn-out land and on the use of manures and

commercial fertilizers. In general, the results were reported in newspapers, in farm journals, at agricultural clubs or farmers' institute meetings. In fact, two states established a tax supported station before the passage of the Hatch Act in 1887 - North Carolina in 1877 and South Carolina in 1886. Finally, passage of the Hatch Act provided for the establishment of an experiment station in conjunction with, but not always at, the same location of the Land-Grant college. Further, with the passage of the Smith-Lever Act in 1914, the state and federal governments became partners not only in the education of all the people, and in the development of basic and applied research in agriculture and horticulture, but also in the dissemination of research results to all the people. At first only one station with its horticultural staff was established in each state. However, because of the differences in climates and soils and the differences in climate and soil requirements of the crops, a comparatively large number of research stations have become established within each state.

Florida

General Survey

The state of Florida is pre-eminently a hor-



Headquarters of the Mississippi Agricultural Experiment Stations, State College. Courtesy: Glenn W. Kilby

ticultural state, with two-thirds of its agricultural income produced by horticultural crops. No other state has so high a proportion of horticulture to total agriculture, and only California has a higher value of horticultural crops. Citrus fruits dominate Florida horticulture, accounting for about 60% of its value, with vegetables a good second at 35%, and ornamental crops third. Florida soils are mostly rather infertile, and it is climate rather than soil which makes Florida the leading state in production of both citrus fruits and winter vegetables. Florida's climate is subtropical, not tropical except for Key West, perhaps. It ranges from warm subtropical in the southern areas to cool subtropical in the northern ones. Thus North Florida is too warm in winter for most deciduous fruits to get adequate chilling, while South Florida has freezing temperatures too often for tropical fruits to be secure. Since oranges and grapefruit are subtropical in their requirements, they have proved better adapted to Florida than any other fruits.

For most of the length of the peninsula there is a central ridge of sand hills with good air and water drainage, while the coastal areas and the whole width of the southern third of the state are low and flat, with drainage problems. In the past the citrus industry has been located mostly along the Ridge, but very recently extensive plantings have been made on poorly drained, coastal soils, with confidence in huge pumps to keep the water table from rising too high even in the rainy season. Such tropical fruits as mango, avocado and lime are mostly grown south of Miami, centered on Homestead.

Organized horticultural research in Florida began only in 1888, when the Florida Agri-

cultural Experiment Station was established in connection with the existing College of Agriculture at Lake City. In 1906 the College was merged with three other state institutions to form the University of Florida at Gainesville, and in 1907 the Experiment Station moved to Gainesville also. Even in 1891, there were small branch stations set up, one far south at Ft. Meyers and the other in the western panhandle at DeFuniak, but these had brief lives. The present system of branch stations dates from 1921, when the Citrus Station was inaugurated. Today there are 11 branch stations and 8 field laboratories scattered over the state. Not all of these are concerned with horticulture, but most of them are.

The United States Department of Agriculture began horticultural research in Florida in 1893, at Eustis. Today it has a large group at Orlando investigating citrus problems and a small one near Miami working on tropical fruits and ornamentals.

The Florida State Department of Agriculture has only been involved in research since the former State Plant Board became its Plant Industry Division in 1961, and only in very recent years had this agency carried on horticultural research.

The Florida Citrus Commission supports horticultural research carried out cooperatively at the Citrus Experiment Station, providing funds for salaries and equipment. The Commission was established by law in 1935, and has supported research since 1943. Two private institutions now carry on horticultural research, both having been established in 1938-39. The Fairchild Tropical Garden in Miami investigates problems of ornamental plant culture, especially of palms, while the Soil Science Foundation in Lakeland is concerned with citrus nutrition.

Seat/Nature of program	Institution and projects	Address and staff
North Carolina		
1. Castle Hayne	Horticultural Crops Research Station	Castle Hayne, North Carolina
1.1 General horticulture	Established in 1946 as a branch station of the North Carolina Agricultural Experiment Station at Raleigh. Breeding and physiology of vegetables, culture of gladiolus	Superintend.: Dr. J. M. Jenkins
2. Faison	Coastal Plain Vegetable Research Station	Faison, North Carolina
2.1 General horticulture	Established in 1946 as a branch station of the North Carolina Agricultural Experiment Station at Raleigh. Physiology and culture of vegetables Diseases of ornamentals	Superintend.: F. B. Boyette Dr. R. D. Milholland
3. Fletcher	Mountain Horticultural Crops Research Station	Fletcher, North Carolina
3.1 General horticulture	Established in 1959 as a branch station of the North Carolina Agricultural Experiment Station at Raleigh. Culture of vegetable crops Physiology and mineral nutrition of fruit plants	Superintend.: H. Blackwell Dr. T. R. Konsler * Dr. D. C. Zeiger
4. Raleigh	North Carolina Agricultural Experiment Station, Main Station	Raleigh, North Carolina
4.1 General horticulture	Established at the University of North Carolina in 1877. With the founding of the North Carolina Agricultural and Mechanical College at Raleigh in 1887, the legislature authorized the transfer of funds supporting the research station to the administrative authorities of the Land-Grant Institution. - Department of Horticultural Science Breeding and physiology of vegetables Nutrition and physiology of tree fruits Ornamentals Weed control Breeding of tree fruits General horticulture Breeding and genetics of potatoes Breeding of vegetables Post-harvest physiology Commercial floriculture Physiology of vegetables Mineral nutrition of vegetables Breeding of sweet potatoes Breeding of fruits - Department of Plant Pathology Diseases of vegetables Diseases of ornamentals Diseases of fruits Virus diseases Diseases of sweet potatoes Diseases of vegetables	Dir.: Dr. R. N. Lovvorn Head: Dr. F. D. Cochran Dr. E. Ballinger/Dr. A. S. Fish Dr. T. F. Cannon Dr. E. E. Chambers Dr. F. E. Correll/Dr. G. J. Galletta M. E. Gardner Dr. F. L. Haynes Dr. W. R. Henderson Dr. L. J. Kushman ** Dr. R. A. Larson Dr. C. L. McCombs Dr. C. H. Miller Dr. D. T. Pope V. H. Underwood Head: Dr. D. E. Ellis Dr. R. Aycock/Dr. F. A. Haasis Dr. C. N. Clayton Dr. T. T. Herbert Dr. L. W. Nielsen Dr. D. L. Strider/Dr. N. N. Winstead

* In co-operation with U.S. Department of Agriculture
 ** In co-operation with U.S. Department of Horticulture

Seat/Nature of program	Institution and projects	Address and staff
5. Willard 5.1 <i>General horticulture</i>	Coastal Plain Research Station Branch station of the North Carolina Agricultural Experiment Station at Raleigh; established in 1905. Culture of horticultural crops	Willard, North Carolina Superintend.: J.W. Summer
South Carolina		
6. Blackville 6.1 <i>Vegetables</i>	Edisto Experiment Station Branch station of the South Carolina Agricultural Experiment Station; established in 1937. Primary object: to conduct investigations specific to the area between the Savannah and Santee rivers from the Sand Hills to the coastal counties. Diseases of cucurbits Breeding of cantaloupes and sweet potatoes Mineral nutrition of vegetables	Blackville, South Carolina Superintend.: Dr.D.F.Cohoon Dr.M.B.Hughes Dr.M.G.Hamilton
7. Charleston 7.1 <i>Vegetables</i>	The Truck Crop Experiment Station State institution. 140 acres of land typical of the area. Genetics and breedings of vegetables Diseases of vegetables Vegetable crop insects	US Highway 17, Charleston, South Carolina Superintend.: Dr.W.C.Barnes Dr.W.R.Terley W.J.Reid Jr.*/E.P.Cuthbert Jr./C.S.Creighton/Augustine Day,M.Sc./R.J.Procasker
7.2 <i>Vegetable breeding</i>	United States Vegetable Breeding Laboratory Federal institution established in 1936. Object: Development superior vegetable crop genotypes adapted to southeastern United States. Breeding and diseases of vegetables Genetics and breeding of vegetables	Charleston, South Carolina Head: Dr.C.F.Andrus Dr.J.C.Hoffman/Dr.E.V.Wann
8. Clemson 8.1 <i>General horticulture</i>	Main Station of the South Carolina Agricultural Experiment Stations State institutions, belonging to Clemson University. Testing of varieties of apple, peach, grape and vegetables, pollination effectiveness of apple varieties, use of commercial fertilizers in the orchard, systems of orchard soil management and methods of pruning. Greenhouse for flower induction, breeding of sweet potatoes and peppers.	Clemson, South Carolina Dir.: Dr.O.B.Garrison
8.2 <i>General horticulture</i>	Simpson Experiment Station Branch station of the South Carolina Agricultural Experiment Station at Clemson, established 1959. It lies about 7 miles east of Clemson, and comprises about 3,000 acres. At present most of the research in horticulture at Clemson is being transferred to this station. Efficient methods in the production of fruits, vegetables and ornamentals, develop-	Near Clemson Dir.: Dr.O.B.Garrison

* In co-operation with U.S.Department of Agriculture

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Clemson (8.2)	ment of new or special crops and of superior varieties of old crops, evaluation of the processing qualities of fruits and vegetables, determination of efficient processing methods, methods to prolong the shelf-life of horticultural products. - Department of Botany and Bacteriology Diseases of vegetables Fusarium wilt of sweet potatoes - Department of Horticulture Post-harvest physiology Special crops and plant breeding Ornamental horticulture Breeding and physiology of vegetables Physiology of tree and small fruits Post-harvest physiology Nutrition of tree and small fruits Physiology of pomological crops and biometrics Processing of horticultural products	Head: Dr. W. W. Epps Dr. J. K. Armstrong Head: Dr. T. L. Senn J. H. Crawford, M. Sc. / J. A. Martin J. P. Fulmer, M. Sc. Dr. W. L. Ogle / P. M. Smith, M. Sc. H. J. Sefick, M. Sc. Dr. E. T. Sims Jr. B. J. Skelton, M. Sc. Dr. G. E. Stembridge L. O. Van Blaricom, M. Sc.
9. Columbia 9.1 Fruit	Sand Hill Experiment Station Branch station of the South Carolina Agricultural Experiment Station at Clemson, established in 1926. Investigations on possibilities in establishing permanent agriculture and horticulture industries on the infertile sandy soil of the area. Physiology and culture of the peach Mineral nutrition of fruit crops Ecology of fruit varieties	Columbia, South Carolina Superintend.: W. H. Rhodes C. E. Gambrell Jr., M. Sc. R. D. Suber Jr.
Georgia	The Georgia Agricultural Experiment Station system has 3 main stations, viz. at Athens, at Experiment and at Tifton.	Dean and Coord.: Dr. C. C. Murray
10. Albany 10.1 Pecan 10.2 Pecan	United States Horticultural Field Laboratory Federal institution. Control of insects and mites of pecans United States Pecan Field Station Federal institution. Physiology and diseases of pecans	Albany, Georgia M. R. Osborn, M. Sc. Albany, Georgia J. H. Hunter, M. Sc.
11. Athens 11.1 General horticulture	College Experiment Station, Main Station State institution, established in 1950. - Department of Horticulture Physiology and culture of greenhouse vegetables Physiology of tree fruits Physiology and culture of vegetables Physiology and culture of ornamentals Physiology and culture of pecans	Athens, Georgia Dir.: G. H. King, M. Sc. Head: Dr. F. E. Johnstone Dr. L. C. Curtis Dr. F. A. Pokorny Dr. R. B. Rutland Dr. D. Sparks
12. Attapul-gus 12.1 Vegetables	Shade Tobacco and Okra Station Branch station, state institution. Culture of okra and other vegetables	Attapul-gus, Georgia Superintend.: E. J. Gibson, M. Sc. P. Golditz, M. Sc.

Seat/Nature of program	Institution and projects	Address and staff
13. Blairsville 13.1 <i>General horticulture</i>	Georgia Mountain Branch Station State institution. Ecology of vegetable crops Diseases of apple Genetics of apple	Blairsville, Georgia Head: J. E. Bailey, M. Sc. Dr. J. Taylor Dr. J. M. Thompson
14. Cairo 14.1 <i>Tung</i>	United States Tung Field Laboratory Federal institution. Breeding, physiology and pest control of tung	Cairo, Georgia M. S. Neff, M. Sc.
15. Experiment 15.1 <i>General horticulture</i>	Georgia Agricultural Experiment Station, Main Station State institution. - Department of Botany and Plant Pathology Diseases of peach - Department of Entomology Vegetable insects - Department of Food Processing Processing of fruit and vegetable products - Department of Horticulture Mineral nutrition and culture of peach Physiology and culture of vegetable crops Breeding and culture of sweet potatoes Culture of small fruits Physiology of peaches and other tree fruits Physiology and culture of ornamentals and vegetables - Regional Primary Plant Introduction Station Vegetable crops Mycology of fungi	Experiment, Georgia Dir.: W. T. Fullilove, M. Sc. Head: Dr. E. S. Ludrow Dr. W. A. Tindler Head: Dr. C. M. Beckham M. Depree, M. Sc. Head: Dr. J. G. Woodruff/ Dr. S. R. Cecil Head: Dr. E. F. Savage Dr. B. B. Brantley Jr. Dr. A. H. Dempsey B. O. Fry, M. Sc. Dr. R. A. Hayden Dr. G. Tereshkovich Head: Dr. W. R. Langford M. L. Corley, M. Sc. Dr. G. Sowell Jr.
16. Fleming 16.1 <i>Vegetables</i>	Tidewater Experiment Station Branch station, state institution. Physiology and culture of vegetables	Fleming, Georgia R. G. Ukkelberg, M. Sc.
17. Fort Valley 17.1 <i>Fruit</i>	United States Horticultural Field Laboratory Federal institution. Control of pecan insects Control of insect vectors of peach and grape diseases	Fort Valley, Georgia, Box O. I. Snapp, M. Sc., (box 527) J. H. Kaloostain, M. Sc. (box 162)
18. Pine Mountain 18.1 <i>Botany</i>	Ida Cason Calloway Gardens Private institution, located between Columbus and Atlanta. Native ornamental trees and shrubs in naturalistic surroundings; large collections of hollies and azaleas; home fruit and vegetable garden with many varieties of common and uncommon kinds of tree fruits, small fruits and vegetables (7 acres). Taxonomy of woody ornamentals Floriculture and woody ornamentals Vegetable crop varieties	Pine Mountain, Georgia Head: Dr. F. C. Galle A. Laurie, M. A. C. Bruce, M. Sc.
19. Tifton 19.1 <i>General horticulture</i>	Coastal Plain Experiment Station, Main Station State institution.	Tifton, Georgia Dir.: Dr. E. P. King

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Tifton (19.1)	- Department of Horticulture - Breeding of sweet potatoes - Breeding of small fruits - Genetics of sweet potatoes - Physiology and culture of vegetables - Physiology and genetics of pecans - Department of Plant Pathology - Diseases of ornamentals - Mosaic diseases of vegetables - Chemical weed control - Diseases of vegetable peas	Head: Dr. S. A. Harmon/ M. T. Deonier, M. Sc. * Dr. W. T. Brightwell Dr. A. Jones* Dr. C. G. Del Valle Dr. R. Worley Head: Dr. C. R. Jackson Dr. D. L. Gill Dr. D. J. Morton Dr. R. B. Taylorson Dr. R. W. Toler

Florida

20. Belle Glade	Everglades Station	Belle Glade, Florida
20.1 Vegetables	State institution, established in 1921, for solution of problems of crop production on the muck soils around Lake Okechobee. Horticultural research began in 1925 and expanded rapidly as discovery of the importance of Cu in plant nutrition on this soil enabled commercial crops to be grown. Vegetables, sugar cane, fiber crops, beef cattle. Chemistry Fertilizers Vegetable varieties, fertilizer, gibberellin responses, crop spacing Vegetable insects and mites Herbicides Celery diseases Cabbage and sweet corn diseases Nematodes on vegetables Breeding beans, celery and sweet corn	Dr. W. T. Forsee (in charge) Dr. H. W. Burdine Dr. V. L. Guzman Dr. E. D. Harris Jr. Dr. J. R. Orsenigo D. P. L. Thayer Dr. C. Wehlburg Dr. J. A. Winchester E. A. Wolf, M. Sc.
21. Bradenton	Gulf Coast Station	Bradenton, Florida
21.1 Vegetables, floriculture	State institution, established in 1925 for study of tomato diseases and since 1951 chiefly working on problems of growing vegetables and gladiolus. Soil chemistry Herbicides, diseases of field sown tomatoes Fertilizers, Ca-control of blossom-end rot of tomato Storage of gladiolus corms Diseases of cucumbers and staked tomatoes Vegetable variety trials, breeding of tomatoes and cantaloupes Insecticide evaluation Gladiolus breeding and diseases Nematodes of vegetables and ornamentals Breeding tomatoes and pole beans Gladiolus fertilizing, herbicides, keeping quality of cut flowers Chrysanthemum strapleaf, fluoride injuries, keeping quality of cut flowers	Dr. E. L. Spencer (in charge) D. S. Burgis, M. S. A. Dr. C. M. Geraldson Dr. E. L. Hobbs Dr. J. P. Jones D. G. A. Kelbert Dr. E. G. Kelsheimer Dr. R. O. Magie A. J. Overman, M. Sc. Dr. J. M. Walter Dr. W. E. Walters Dr. S. S. Woltz
22. Fort Lauderdale	Plantation Field Laboratory	Fort Lauderdale, Florida
22.1 General horticulture	Branch of the Everglades Station. Diseases of fruits, vegetables and ornamentals Turf grasses	Dr. H. I. Borders Dr. E. O. Burt

* In co-operation with U. S. Department of Agriculture

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Fort Lauderdale(22.1)	Vegetable varieties, herbicides, fertilizing and spacing of vegetables, nematodes, wind and cold protection	Dr. H. Y. Ozaki
23. Fort Pierce	Indian River Field Laboratory	Ft. Pierce, Florida
23.1 Citrus, vegetables	Since 1950 operated jointly by the Citrus Station and the Everglades Station. - Citrus Rootstocks Scales and mites, pesticide equipment Fertilizers. - Vegetables Variety trials, tomato breeding, fertilizers, crop spacing, herbicides Tomato breeding and diseases	Dr. M. Cohen Dr. R. C. Bullock Dr. D. V. Calvert N. C. Hayslip Dr. R. E. Stall
24. Gainesville	Florida Agricultural Experiment Station, Main Station	Gainesville, Florida Dir.: Dr. J. R. Beckenbach
24.1 General horticulture	- Department of Entomology Insects on ornamentals and vegetables Turf insects Turf nematodes - Department of Food Technology Physiology of tomato ripening Quality deterioration in legumes, enzymatic browning Grading sweet corn, market quality of watermelon Pesticide residue detection - Department of Fruit Crops Overcoming tangelo incompatibilities, cold tolerance of citrus, deciduous fruit culture Problems of peach seed germination Climatology of fruit trees Breeding peaches, blueberries and blackberries Breeding blackberries, peach fertilizing Precooling citrus fruits, tea culture - Department of Ornamental Horticulture General culture, plastic film greenhouse coverings Nursery culture of woody ornamentals Turf grasses Nutrition of florist crops, especially chrysanthemum Rose stocks, mallow breeding, propagation of roses and pecans Orchid culture, physiology of flowering of florist crops, nutrition - Department of Plant Pathology Breeding egg plant Diseases of ornamentals Diseases of turf grasses Viruses of ornamentals - Department of Vegetable Crops Varietal trials Handling and market quality of tomatoes Market quality and breeding of tomatoes and cantaloupes Herbicides, strawberry culture Breeding legumes (cowpea, pole bean, etc.) Fertilizing, mulches for cold and wind protection Control of transit losses, market quality problems	Head: Dr. L. C. Kuitert Dr. S. H. Kerr Dr. A. A. DiEdwardo Head: Dr. R. A. Dennison Dr. C. B. Hall Dr. F. W. Knapp/ Dr. G. D. Kuhn R. K. Showalter, M. Sc. Dr. C. H. Van Midelem Head: Dr. A. H. Krezdorn Dr. R. H. Biggs Dr. J. F. Gerber R. H. Sharpe, M. Sc. Dr. J. S. Shoemaker Dr. J. Soule Head: Dr. E. W. McElwee R. D. Dickey, M. S. A. Dr. G. S. Horn Dr. J. N. Joiner Dr. S. E. McFadden Dr. T. J. Sheehan Head: Dr. P. Decker Dr. H. N. Miller Dr. T. E. Freeman Dr. R. E. Stouffer Head: Dr. F. S. Jamison Dr. D. D. Gull L. H. Halsey, M. S. A. Dr. S. J. Locasio Dr. A. P. Lorz Dr. V. F. Nettles Dr. B. D. Thompson

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-D 25.1 - 29.1

Seat/Nature of program	Institution and projects	Address and staff
25. Hastings 25.1 Vegetables	Potato Investigations Laboratory State institution, started in 1923 for the study of potato diseases and now dealing with all problems of growing cabbages and potatoes. Soil chemistry: fertilizing, surface mulches Culture and variety trials, herbicides Insecticide evaluation	Hastings, Florida Dr. D. R. Hensel (in charge) Dr. E. N. McCubbin Dr. R. B. Workman
26. Homestead 26.1 General horticulture	Subtropical Station State institution. Problems of vegetable diseases; cultural problems of such tropical fruits as avocado, lime and mango, as well as those of vegetables. Plant pathology, breeding tomatoes and pole beans, tomato diseases Systemic insecticides Culture of tropical and subtropical fruits Avocado fertilizing Tropical fruit culture Tomato fertilizing and irrigation Breeding tomatoes, verticillium wilt of tomato Insects and mites on fruits and vegetables, evaluating insecticides Mango and lychee culture, nematodes on fruit trees	18905 SW 280th St. Homestead, Florida Dr. R. A. Conover (in charge) Dr. R. M. Baranowski Dr. C. W. Campbell Dr. R. W. Harkness Dr. S. E. Malo Dr. R. G. Orth Dr. J. W. Strobel Dr. D. O. Wolfenbarger Dr. T. W. Young
27. Jay 27.1 Fruit	West Florida Station Branch station, state institution, started in 1946 for work on field crops and still is chiefly agronomic. In 1951 horticultural research began in co-operation with workers at the Main Station. Tests of peach, pear, pecan and plum	Jay, Florida Vice dir.: Dr. C. E. Hutton Dr. M. C. Lutrick
28. Lake Alfred 28.1 Citrus	Citrus Station The largest branch station, started in 1919. Lead and arsenic residues Scale and mite control Spreading decline Chromatography and absorption spectra Burrowing nematode Greasy spot Root distribution studies, rootstocks tolerant to burrowing nematode Citrus nematode Precooling, fruit handling, post-harvest residues Mechanized harvesting, pruning machinery Viruses, lemon varieties, nucellar strains Irrigation P nutrition, fluoride air pollution Biological control of insects and mites Nucellar strains, rootstocks tolerant to tristeza Herbicides Micronutrient deficiencies, amino acids	Lake Alfred, Florida Dr. J. H. Reitz (in charge) Dr. R. F. Brooks/Dr. R. B. Johnson Dr. E. P. DuCharme/ Dr. A. C. Tarjan G. J. Edwards Dr. A. W. Feldman/Dr. R. F. Suit F. E. Fisher, M. Sc. Dr. H. W. Ford Dr. C. I. Hannon Dr. F. W. Hayward/ Dr. W. G. Long P. J. Jutras, M. Sc. Dr. L. C. Knorr Dr. R. C. J. Koo Dr. C. D. Leonard Dr. M. H. Muma Dr. A. P. Pieringer Dr. G. F. Ryan Dr. I. Stewart
29. Lakeland 29.1 Citrus	Florida Citrus Commission Horticultural research is only one of several activities of this official state agency,	Lakeland, Florida Head: Dr. L. G. MacDowell

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Lakeland (29.1)	established by law to spend money from a tax on fruit for promoting the citrus industry. Mechanical harvesting Handling fruit Physiology of cold hardiness	G. E. Coppock, M. Sc. Dr. M. F. Oberbacher/Dr. H. M. Vines/A. A. McCornack, M. Sc.
29.2 Soil science	Soil Science Foundation Private institution. Starting as the Soil Science Cooperative in 1939, the present name was adopted in 1946. A large number of citrus growers support the work of the foundation which owns 2 research groves besides his laboratories. Soil problems and other aspects of citrus culture, especially nutritional matters	Lakeland, Florida Techn.dir.: Dr. O. C. Bryan C. N. Nolan
30. Leesburg 30.1 Fruit	Watermelon and Grape Investigations Laboratory State institution for study of watermelon and grape diseases. Plant pathology: watermelon breeding, variety trials of watermelon and cantaloupe, fertilizers and mulches for watermelons Insecticide evaluation, pollination of watermelons by bees Cantaloupe breeding, grape breeding and inheritance Watermelon diseases, herbicides Grape breeding and culture	Leesburg, Florida Dr. J. M. Crall (in charge) Dr. W. C. Alderz Dr. J. A. Mortensen Dr. N. C. Schenck L. H. Stover
31. Miami 31.1 Botany	Fairchild Tropical Garden Private institution. Founded by friends of the late David Fairchild, and supported by memberships, admission fees and gifts; 85 acres, 3,000 species of plants. Woody plant introduction Anatomy and taxonomy of aroids Mangrove ecology Orchid pollination Introduction of palms and cycads Botany: cytology and taxonomy of palms Anatomy of palms and other monocots	13601 Cutler Road, Miami, Florida Dir.: Dr. J. Popenoe Dr. J. Popenoe Dr. M. Birdsey Dr. F. C. Craighead Dr. C. Dodson Superintend.: S. C. Kiem R. W. Read, M. Sc. Dr. P. B. Tomlinson
31.2 Plant introduction	United States Plant Introduction Station Federal institution. Started in 1896 as a small garden for growing plants introduced from tropical areas by David Fairchild's newly organized plant introduction section, it is after World War I transferred to the large Chapman Field on the Ingraham Highway, some miles south of Miami. Growing and distribution of new economic and ornamental plants, some horticultural research. All aspects of tropical and subtropical plant introduction Tropical fruits, spices and flavour plants Ornamental trees and shrubs, coffee, cacao and rubber	13601 Cutler Road, Miami, Florida W. E. Manis, M. A. (in charge) Dr. R. J. Knight P. K. Soderholm

Seat/Nature of program	Institution and projects	Address and staff
36. Sanford 36.1 Vegetables, fruits	Central Florida Station State institution. Vegetable insects Celery and lettuce diseases Vegetable fertilizers, residual effects of Cu and P Nematodes on ornamentals and vegetables, application of soil fumigants Herbicides for vegetables, soybean testing Vegetable varieties, residual effects of Cu and P, peach and blackberry trials Vegetable varieties, breeding tomato and cantaloupe	Sanford, Florida Dr. J. W. Wilson (in charge) Dr. J. F. Darby Dr. R. B. Forbes Dr. H. S. Rhoades Dr. W. T. Scudder Dr. P. J. Westgate B. F. Whitner
37. Winter Haven 37.1 Citrus	Plant Industry Division State institution. Most of the work of this division is regulatory, but some investigations are carried on which may be qualified as horticultural research. Nucellar strains of citrus, administration of Citrus Budwood Registration Program to provide virus-free budwood for the citrus industry Grades and standards for nursery stock	Winter Haven, Florida Act. dir.: H. L. Jones G. G. Norman C. S. Bush

Alabama

38. Auburn 38.1 General horticulture	Alabama Agricultural Experiment Station, Main Station State institution, established in 1883. In Alabama all research at sub-stations and field stations is under the direction of the project leaders at Auburn. - Department of Horticulture Physiology and culture of vegetables Mineral nutrition and physiology of fruit and nut crops Physiology and culture of herbaceous and woody ornamentals Genetics and breeding of pimiento pepper and tomato Processing of fruit and vegetable products Mineral nutrition and irrigation of vegetables Breeding of vegetables, vegetable variety and cultural studies Culture of greenhouse crops Breeding cantaloupes, plums and strawberries and culture of greenhouse tomatoes Physiology and culture of ornamentals Fruit crops	Auburn, Alabama Dir.: Dr. E. V. Smith Head: L. M. Ware, M. Sc. Dr. H. A. Amling Dr. T. Furuta Dr. W. H. Greenleaf H. Harris, M. Sc. W. A. Johnson, M. Sc. Dr. S. T. Jones W. C. Martin Jr. Dr. J. D. Norton F. B. Perry Jr., M. Sc. J. T. Turner, M. Sc.
39. Belle Mina 39.1 Vegetables	Tennessee Valley Sub-Station State institution. Although most research is on field crops and livestock, experiments on varieties of vegetables for processing have been initiated.	Belle Mina, Alabama Superintend.: J. K. Bosick/ H. W. Ivey
40. Camp Hill 40.1 Fruits	Piedmont Sub-Station State institution. Experiments on fruit crops, especially apples	Camp Hill, Alabama Superintend.: E. L. Mayton, M. Sc. / J. M. Sandy Jr.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-D 41.1 - 49.1

Seat/Nature of program	Institution and projects	Address and staff
41. Clanton 41.1 <i>General horticulture</i>	Chilton Horticulture Sub-Station State institution. Research on fruit and vegetables grown in the area	Clanton, Alabama Superintend: C. C. Carlton/ K. C. Short
42. Crossville 42.1 <i>General horticulture</i>	Sand Mountain Sub-Station State institution. Experiments for the benefit of the numerous small farms in the area. Recent research includes nutrition and varietal studies with potatoes which have become a major crop.	Crossville, Alabama Superintend.: S. E. Grissendanner/H. C. Lester
43. Cullman 43.1 <i>General horticulture</i>	North Alabama Horticulture Sub-Station State institution. Fruits and vegetables grown in the area.	Cullman, Alabama Superintend.: M. H. Hollingsworth
44. Fairhope 44.1 <i>Pecans and other crops</i>	Gulf Coast Sub-Station State institution. Pecans, potatoes and other crops, grown in the area.	Fairhope, Alabama Superintend.: H. F. Yeates/ J. E. Barrett
45. Headland 45.1 <i>Vegetables, fruits</i>	Wiregrass Sub-Station State institution. Field crops and livestock. Varietal studies of peaches, plums and vegetables are under way.	Headland, Alabama Ass. superintend.: J. G. Starling
46. Spring Hill 46.1 <i>Ornamentals</i>	Ornamental Horticulture Field Station State institution. Greenhouse and ornamental crops grown in the district.	Spring Hill, Alabama Head: Dr. R. S. Self
Mississippi		
47. Crystal Springs 47.1 <i>Vegetables</i>	Truck Crop Branch Station State institution. Located in the one time intensive Crystal Spring-Hazelhurst truck crops district. Breeding of tomatoes and snap beans, culture of tomatoes in plastic houses, processing of vegetables Weed control of vegetables Diseases and insect pests of vegetables Mineral nutrition of vegetables	Crystal Springs, Mississippi Superintend.: J. A. Campbell, M. Sc. D. A. Aultman, M. Sc. W. O. Thomas, M. Sc. Dr. S. L. Windham
48. Holly Springs 48.1 <i>General horticulture</i>	North Mississippi Branch Station State institution. Mineral nutrition of peach; sweet potatoes, other vegetables.	Holly Springs, Mississippi Superintend.: S. P. Crockett
49. Newton 49.1 <i>Vegetables, fruits</i>	Coastal Plain Branch Station State institution. Variety trials of fruits and vegetables	Newton, Mississippi Superintend.: R. R. Kuykendall, M. Sc. B. E. Waggoner, M. Sc.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

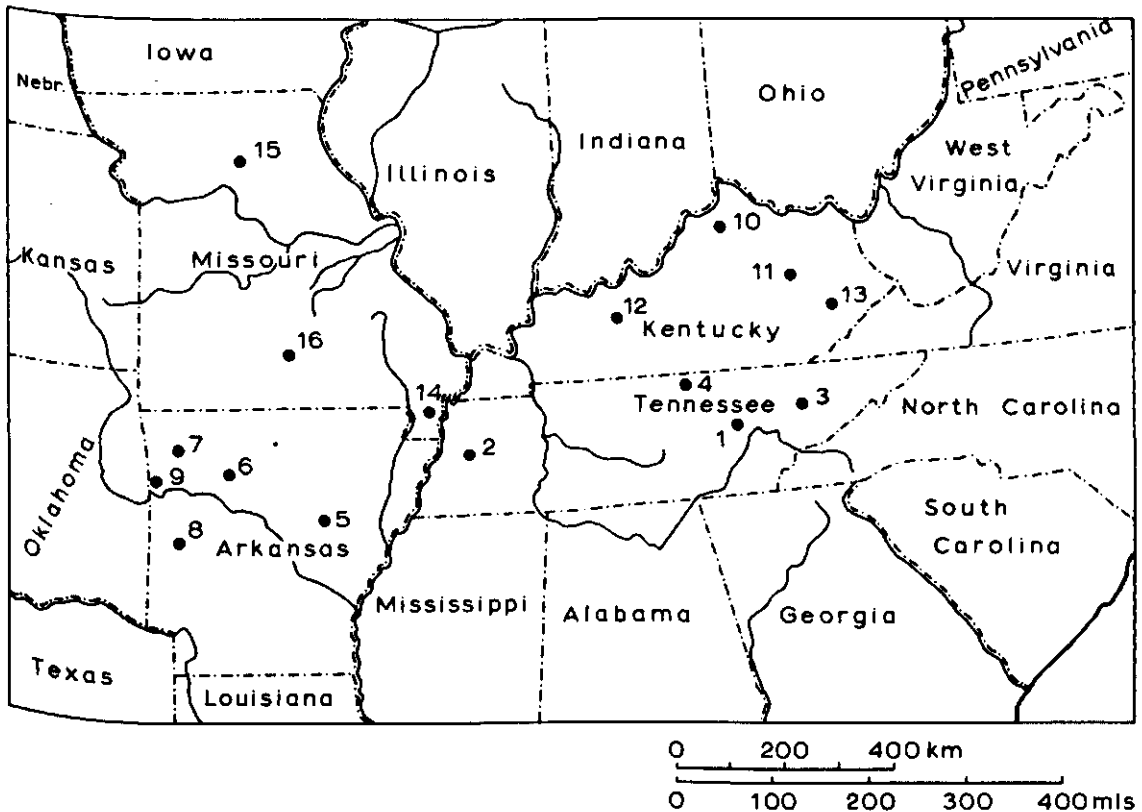
USA-D 32.1 - 35.1

Seat/Nature of program	Institution and projects	Address and staff
32. Monticello 32.1 Pecans	Pecan Investigations Laboratory State institution, established in 1927 only in behalf of the pecan industry. Diseases Insects	Monticello, Florida J. R. Large, M. Sc. A. M. Phillips
33. Orlando 33.1 Citrus	United States Horticultural Field Station Federal institution. It evolved around 1917 from earlier laboratories at Eustis and Plymouth. Through the co-operation of the Florida Research Foundation (organization of growers) the 200 acre Foundation Farm is available for its research staff. - Crops Research Division Citrus: Plant physiology, climatology Virus diseases Rootstocks tolerant to burrowing nematode Citrus rootstocks Tristeza Fungus diseases Citrus breeding and cytology Biochemistry of citrus fruits as related to culture Citrus breeding Mineral nutrition Nematology: Control and biology of plant parasitic nematodes - Entomology Research Division: Humid Areas Citrus Insects Investigations Biology and control Biological control at Citrus Station (see 28.1) - Market Quality Research Division, Horticultural Crops Branch Seasonal changes in citrus fruit Storage and transport of citrus Chemistry and physiology of orange rind tissue Maturity and quality changes in citrus Post-harvest decay of vegetables Post-harvest decay of citrus	2120 Camden Road, Orlando, Florida Leader: Dr. W. C. Cooper Dr. J. F. L. Childs Dr. W. A. Feder Dr. F. E. Gardner Dr. S. M. Garnsey Dr. G. R. Grimm Dr. C. J. Hearn Dr. G. K. Rasmussen Dr. P. C. Reece Dr. P. F. Smith Dr. J. Feldmesser (in charge)/R. V. Revois P. N. Norman/D. K. Reed R. G. Selhime Dr. P. L. Harding (in charge) Dr. W. G. Chace Jr. P. L. Davis Dr. P. L. Jahn Dr. R. H. Segall Dr. J. J. Smoot
34. Plant City 34.1 Vegetables	Strawberry Investigations Laboratory State institution, established in 1927 for the work on strawberry diseases; this laboratory has recently shifted its activity largely to vegetables. Strawberry breeding, variety trials of pepper and cowpea Fertilizing	Plant City, Florida Head: Dr. A. N. Brooks Dr. P. Sutton
35. Quincy 35.1 Vegetables, fruits	North Florida Station State institution, established in 1922 as the Tobacco Investigations Laboratory. Not until 1953 was any horticultural work undertaken. Herbicides Vegetable variety trials, breeding of cantaloupe, pole bean and tomato, effect of shade on vegetables, peach variety trials	Quincy, Florida W. H. Chapman, M. Sc. (in charge) Dr. H. W. Young

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Chase (57.1)	the program was enlarged to conduct research on other vegetables. Breeding and physiology of sweet potatoes Foundation seedstock and physiology of sweet potatoes Vegetable production and outfield studies	Dr. T. P. Hernandez (in charge) Dr. J. R. Barry Jr. W. W. Etzel, M. Sc.
58. Clinton	Idlewild Experiment Station	Clinton, Louisiana
58.1 <i>Fruits, vegetables</i>	State institution, located 35 miles north of Baton Rouge; established in 1957; 200 acres for research on fruits and vegetables. Physiology and culture of fruits and vegetables	Head: Dr. J. C. Miller
59. Diamond	Plaquemines Parish Experiment Station	Diamond, Louisiana
59.1 <i>General horticulture</i>	State institution, located within the citrus industry region of Louisiana; established in 1949. Research on citrus fruit, potato, cabbage, tomato, cantaloupe and ornamentals. Breeding and production of citrus and vegetables Production of vegetables Breeding and production of ornamentals	R. T. Brown, M. Sc. (in charge) A. J. Adams, M. Sc. F. B. Schmitz, M. Sc.
60. Hammond	Fruit and Truck Experiment Station	Hammond, Louisiana
60.1 <i>General horticulture</i>	State institution, established in 1921. Since the station is located within the world famous Hammond strawberry district, most of the research has been centered on this important crop. However, other crops grown in the area are not neglected. Breeding and production of strawberries, culture of ornamentals Culture of ornamentals Genetics and breeding of vegetables Production problems of strawberries	Superintend.: W. F. Wilson, M. Sc. W. L. Brown, M. Sc. Dr. R. J. Constantine W. A. Poillion, M. Sc.
61. New Orleans	United States Southern Regional Research Laboratory	New Orleans, Louisiana Head: Dr. V. H. McFarlane
61.1 <i>General horticulture</i>	Federal institution established in 1936 to develop new products from crops grown in southern US. A recent development is sweet potato flakes, a dehydrated product of the fleshy roots. Consumer acceptance tests have been encouraging. Biochemical phases of new products Engineering phases of new products	Dr. H. J. Deobald J. Spedaro
62. Shreveport	United States Pecan Field Laboratory	Shreveport, Louisiana
62.1 <i>Pecan</i>	Federal institution. Problems in pecan industry in Louisiana and adjacent states. Horticultural phases of pecan Diseases of pecan Biology and control of insects and mites Physiology of pecan	Dr. F. W. Dodge Dr. G. E. KenKnight Dr. W. C. Pierce Dr. G. C. Schaller

E. South Central States

Tennessee, Arkansas, Kentucky, Missouri



Tennessee: 1. Crossville, 2. Jackson, 3. Knoxville, 4. Springfield. *Arkansas:* 5. Baldknob, 6. Clarksville, 7. Fayetteville, 8. Nashville, 9. Van Buren. *Kentucky:* 10. Eden (Cedar) Shale, 11. Lexington, 12. Princeton, 13. Quicksand. *Missouri:* 14. Caruthersville, 15. Columbia, 16. Mountain View.

General Survey

The four-state area, including Arkansas, Kentucky, Missouri and Tennessee, is divided by the Mississippi River with Kentucky and Tennessee east of the river and south of the Ohio River; Missouri and Arkansas west of the river, and for the most part, south of the Missouri River. The Appalachian mountains form the eastern boundary of Tennessee. The Allegheny Plateau extends across eastern Kentucky through Tennessee west of the southeast flowing Tennessee River.

The Bluegrass area of Kentucky lies at the western edge of the Allegheny Plateau. With various interruptions, this area extends into the Central Basin of Tennessee which is drained by the Cumberland River into the Ohio. These areas lie at elevations of 500 to 1500 feet above sea level. From the area lying west of the north flowing Tennessee River, the slope of the land is toward the Mississippi descending from about 800 feet

elevation to about 350 feet at Memphis. The westernmost part of this area and the easternmost part of the states of Arkansas and Missouri as far north as St. Louis, are part of the Mississippi delta, low lying plains, often flooded, offering much for cotton, rice, corn and vegetable production.

Westward, south of the Missouri, the land rises to a height of more than 2000 feet forming the Ozark and Ouachita Mountains. The northern portion of Missouri, lying north of the Missouri River, is an extension of the dissected plain making up Iowa and southern Minnesota. Considerable areas of wind-blown soils occur along the Missouri River. In western Kentucky and Tennessee, areas of loess occur on the Mississippi river highlands.

The climate of these four states is essentially continental except for areas modified by mountain terrain in eastern Tennessee. Arboreal climate is found in the high eleva-

tions of the Appalachians. The dominate weather structures influencing temperature, rainfall, and storm development are the arctic highs and lows that sweep southeast, east of the Rocky Mountain cordillera, moving toward the Gulf of Mexico, and the maritime highs and lows that move northward from the Gulf of Mexico. Rainfall generally increases from northwest to southeast and varies from less than 35 inches per year in northwestern Missouri to more than 50 inches in the Ouachita mountains in southwestern Arkansas and 80 inches in parts of the Appalachians of East Tennessee.

The generally mild climate of the area is occasionally interrupted with short periods of hot or cold weather that provide pleasant variety. The early spring, coupled with long nights, results in some uncertainty about frost during the blooming season for most fruits. However, frost damage is usually slight. Spring is earliest along the Mississippi River and lays somewhat along the eastern and western boundaries of the area.

In each of the four states, horticultural departments were established in the Land-Grant Colleges shortly after the Morrill Act of 1862 was passed.

Four horticultural substations were established in Arkansas to handle specific problems; these are located at Nashville, Van Buren, Clarksville and Baldknob. In Missouri, the State Department of Agriculture established an experiment station at Mountain View and the Missouri Agricultural Experiment Station has a field station at Caruthersville dealing with vegetables. Tennessee has no separate horticultural substations, but carries on work at Jackson, Springfield, Crossville and Knoxville. Kentucky has field work at Princeton, Quicksand and Cedar Shale Farm in Owen County.

The State Departments of Agriculture carry out the regulatory work with regard to nursery inspection, fruit and vegetable inspection, the collection of statistical information and control of pesticide use.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-E 1.1 - 10.1

Seat/Nature of program	Institution and projects	Address and staff
Tennessee		
1. Crossville 1.1 <i>General horticulture</i>	Plateau Experiment Station Branch station of Tennessee Agricultural Experiment Station.	Crossville, Tennessee
2. Jackson 2.1 <i>General horticulture</i>	West Tennessee Agricultural Experiment Station Branch station of Tennessee Agricultural Experiment Station	Jackson, Tennessee
3. Knoxville 3.1 <i>General horticulture</i>	Tennessee Agricultural Experiment Station Main station, state institution. Fruit physiology Tomato and strawberry breeding Vegetable production Fruit and vegetable production Ornamentals Vegetable physiology Ornamental physiology Physiology, radiation	Knoxville, Tennessee Head: Dr. B. S. Pickett Dr. W. E. Roever H. D. Swingle T. R. Gilmore J. S. Alexander Dr. G. M. Campbell H. van de Werken Dr. J. E. Love
4. Springfield 4.1 <i>General horticulture</i>	Highland Rim Experiment Station Branch station of Tennessee Agricultural Experiment station	Springfield, Tennessee
Arkansas		
5. Baldknob 5.1 <i>Strawberries</i>	Baldknob Experiment Station Substation of Arkansas Agricultural Experiment Station	Baldknob, Arkansas H. L. Bowden (in charge)
6. Clarks-ville 6.1 <i>Fruit</i>	Clarksville Experiment Station Substation of Arkansas Agricultural Experiment Station	Clarksville, Arkansas C. J. Westbrook (in charge)
7. Fayetteville 7.1 <i>General horticulture</i>	Arkansas Agricultural Experiment Station Main station, state institution Vegetable research Vegetable breeding Vegetable and ornamental nutrition Plant physiology, food technology Plant breeding Fruit and nut research Food technology Nutrition and management	Fayetteville, Arkansas Head: Dr. W. H. Watts Dr. J. L. Bowers/Dr. J. McFerran Dr. G. A. Bradley Dr. D. A. Kattan Dr. J. N. Moore Dr. R. C. Rom Dr. W. A. Sistrunk Dr. J. E. Valle
8. Nashville 8.1 <i>Peaches</i>	Nashville Experiment Station Substation of Arkansas Agricultural Experiment Station	Nashville, Arkansas E. J. Arrington (in charge)
9. Van Buren 9.1 <i>Vegetables</i>	Van Buren Experiment Station Substation of Arkansas Agricultural Experiment Station	Van Buren, Arkansas H. H. Von (in charge)
Kentucky		
10. Cedar (Eden) Shale 10.1 <i>General horticulture</i>	Cedar (Eden) Shale Experiment Farm Substation of Kentucky Agricultural Experiment Station	Cedar (Eden) Shale, Owen County, Kentucky

Seat/Nature of program	Institution and projects	Address and staff
11. Lexington 11.1 <i>General horticulture</i>	Kentucky Agricultural Experiment Station Main station, state institution Vegetable breeding Floriculture Fruits and nuts Strawberries; breeding, winter injury Herbicides, vegetables Mineral nutrition, ornamentals Vegetable physiology, processing Winter injury Fruits	Lexington, Kentucky Dr. H. C. Mohr/Dr. D. E. Knavel Dr. J. W. Abernathie W. D. Armstrong C. E. Chaplin Dr. D. J. Cotter Dr. J. D. Kelley Dr. D. C. Martin Jr. C. S. Waltman Dr. A. W. Schneider
12. Princeton 12.1 <i>General horticulture</i>	Princeton Experiment Station Substation of Kentucky Agricultural Experiment station	Princeton, Kentucky
13. Quicksand 13.1 <i>General horticulture</i>	Quicksand Experiment Farm Substation of Kentucky Agricultural Experiment Station	Quicksand, Kentucky
Missouri		
14. Caruthersville 14. <i>Vegetables</i>	Campbell Experiment Farm Missouri State agricultural experiment station, Field station	Caruthersville, Missouri
15. Columbia 15.1 <i>General horticulture</i>	Missouri State Agricultural Experiment Station Main station Virus multiplication, floriculture Food processing, microbiology Systemic pesticides, microbiology Mineral nutrition, plant growth regulations Fruit nutrition Vegetable breeding, physiology Pathology Floricultural physiology Soils for floriculture	Columbia, Missouri Head: Dr. R. A. Schroeder Dr. M. L. Fields Dr. R. N. Goodman Dr. D. D. Hemphill Dr. A. D. Hibbard Dr. V. L. Lambeth Dr. D. F. Milikan/H. G. Swartwout Dr. R. N. Rogers J. E. Smith
16. Mountain View 16.1 <i>General horticulture</i>	Mountain View Experiment Station Experiment station of the State Department of Agriculture	Mountain View, Missouri

F. North Central States

Ohio, Indiana, Illinois, Michigan, Wisconsin



Ohio: 1. Canfield, 2. Celeryville, 3. Columbia, 4. Hoytville, 5. Marietta, 6. Ripley, 7. Wooster. Indiana: 8. Johnson, 9. Lafayette. Illinois: 10. Carbondale, 11. Downers Grove, 12. Urbana. Michigan: 13. East Lansing, 14. Graham, 15. South Haven. Wisconsin: 16. Ashland, 17. Hancock, 18. Madison, 19. Spooner, 20. Sturgeon Bay.

General Survey

This region, which can be referred to as the North-Central states, includes Illinois, Indiana, Michigan, Ohio and Wisconsin, with an area of 248,283 square miles. It has a north latitude range from 37°00' at Cairo, Illinois to 47°30' at the northern tip of Michigan's Upper Peninsula; and a west longitude range from 89°42' at the Ohio-Pennsylvania border to 92°54' at the most western part of Wisconsin. As can be seen on the map a part of the boundary line of each of the 5 states is contiguous to one or more of the Great Lakes, all 5 of which comprise the most extensive body of fresh water in the world; Lake Ontario lies to the east of this region and is not shown. The Ohio River forms all of the southern boundary of the Region and the Mississippi River most of the western boundary.

The elevation above sea level varies from 320 feet at Cairo, Illinois to 1441 at the top of Rib Mountain in Wisconsin. However, much of the cropland of the region lies between 500 and 1000 feet, except in the river bottoms of the Ohio, Mississippi and other rivers where it is frequently lower. In the vicinity of the four contiguous Great Lakes

the elevation is usually approximately 600 feet, since the elevation of Lake Superior is 602 feet and that of Lake Michigan, Huron and Erie 20 to 30 feet lower. The elevation increases with distance back from the shore line.

The wide range in latitude provides a suitable climate within the region for the commercial production of each of the important deciduous fruits, more than 30 kinds of vegetables, and many species of ornamentals. A major factor in this crop adaptability is the broad spectrum of soil types, ranging from muck, which usually occurs near the Great Lakes, through sandy loam, loam, and clay loam, to the loess deposits of the hills along the Mississippi, Illinois and Ohio rivers.

The annual precipitation throughout the region is adequate for the crops grown if distributed relatively uniformly during the year, particularly during the growing season. However, yield-reducing droughts may occur during any part of the growing season in each of the 5 states, but are most frequent during July and August. Irrigation is being used increasingly and will probably come to be considered a standard production practice for

some crops, especially on the less water-retentive soils and in the most drought-prone areas.

The effect of large bodies of water on climate relative to fruit adaptation is illustrated by the extensive fruit area along the eastern shore of Lake Michigan. For example, peaches are grown extensively in Michigan, whereas they cannot be grown along the western shore of the lake in Illinois and Wisconsin; the temperature-stabilizing effect of the prevailing southwest, west and northwest winds blowing across the lake makes this possible.

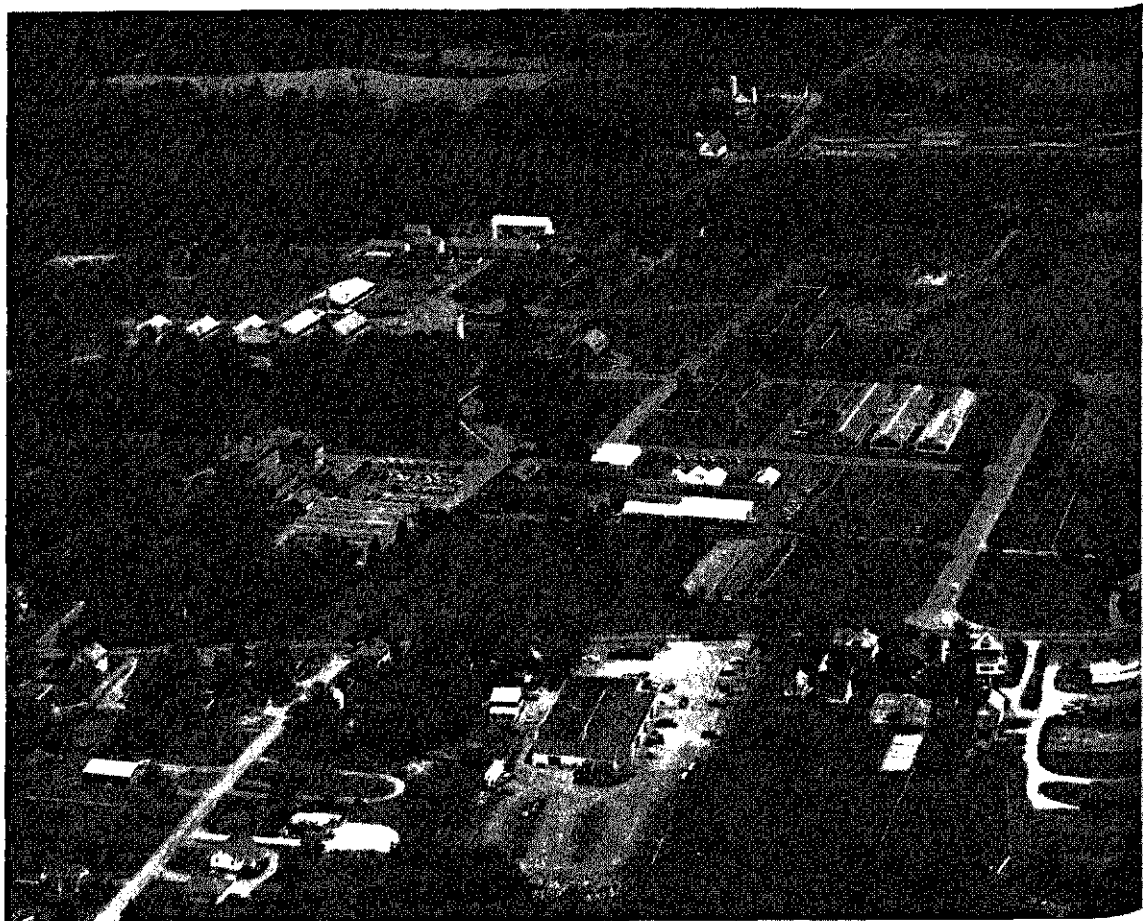
Ohio

Ohio, one of the most important horticultural states, is characterized by a particularly wide diversification of agricultural and horticultural crops and likewise is an outstanding leader industrially. Horticultural produce represents from 10 to 15% of the farmers gross income, in terms of processed

products, the value involves a much higher percentage of total agricultural income.

The most important environmental factors responsible for this pronounced horticultural diversification are (1) wide range of, not extreme, temperatures from south to north; (2) considerable diversity of soil and (3) generally favourable moisture (rainfall) conditions. From an economic viewpoint, the strategic geographical location and large population are very important. Ohio has a very large number of cities with a population over 25,000 well distributed over the whole state except the southeast.

Over 30 vegetable crops are grown commercially of which tomatoes, potatoes, sweet corn, cabbage, celery, onions, peppers, cucumbers, and radish are of greatest importance. Tomatoes grown for processing rank second in importance in the USA while the state ranks first in greenhouse vegetable production. Florist crops such as carnation, snapdragon



Aerial view of one of the two Ohio Agricultural Experiment Stations, at Wooster (Ohio State University). The horticultural Building and laboratories and greenhouses are in the center right.

and chrysanthemum are widely grown in greenhouses throughout the state. Potted plants, likewise, comprise a significant part of the florist industry.

The largest nursery industry in the USA is centered in northeastern Ohio. A wide range of herbaceous and woody ornamentals form the basis for this area of horticulture. Furthermore, nurseries producing specialized crops, such as rhododendrons and yews comprise an outstanding segment of the industry.

The Ohio Agricultural Experiment Station was established at Columbus in 1882 as an institution separate financially from the Ohio State University and has continued as such since that time. Upon removal to Wooster, in 1893, the great proportion of research was conducted at Wooster but since 1929 a significant amount has been carried on by the staff members located at Columbus. Since 1929 the Department of Horticulture and Forestry at the Ohio State University and the Department of Horticulture at the Experiment Station at Wooster have been administered as a single unit. Members of the Department of Horticul-

ture and Forestry have been part time Station personnel since 1929 and since 1964 Experiment Station personnel have also held University appointments as well. This arrangement has resulted in research in all horticultural areas being conducted at both Wooster and Columbus. In addition, horticultural research is conducted at four State Substations, and one County Substation under the direction of Experiment Station personnel. Technicians are supplied to supervise the carrying out of details connected with the research projects established at these centers.

Indiana

The topography of Indiana is hilly in the southern one-third back from the Ohio River bottoms, and gently rolling over most of the remainder of the state, except the northwest corner adjacent to Lake Michigan, where it is relatively flat. Soils range from a loess type in the southern hills through sandy loam, loam, clay loam to muck in the north adjacent to Lake Michigan.

Apples are grown in all parts of the state.



Aerial view of the Purdue University Campus, seat of the Indiana Agricultural Experiment Station at Lafayette

About one-half of the young trees are dwarfs or spur types.

Peaches are grown in all sections of the state, but 22% are in the northwest corner near the south end of Lake Michigan, and 55% are in the southern one-third of the state, where it is warmest.

Leading fresh market vegetables are cabbage, cantaloupes, cucumbers, onions, potatoes, tomatoes and watermelons. The horticultural crops include an extensive greenhouse crop and ornamental industry.

A unique crop in Indiana is mint, grown extensively in the muck area of the northern part of the state. Much of the research on this crop is conducted in the Department of Horticulture.

The Horticulture Department was established at Purdue University in 1884 with the appointment of James Troop as Professor of Horticulture and Entomology. In 1912, Professor Troop was made head of the newly-created Department of Entomology and C. G. Woodbury was made head of the Department of Horticulture thus establishing the basis for the present department.

Early investigations centered on the apple with variety adaptation receiving major attention. The establishment of the Agricultural Experiment Station following the passage of the Federal Hatch Act in 1887, and subsequent Federal and State acts provided the funds and stimulus for the beginning of research in all phases of horticulture. From this basis the present extensive research program has developed.

Illinois

Illinois is called the "Prairie State" because a large percentage of its topography is relatively flat to gently rolling. Parallel to the Mississippi River, which forms the western boundary of the state, and the Illinois River, and between them, are high hills of loess soil. The southern part of the state is covered by this same general type of hills. The northeast corner, extending back from Lake Michigan has areas of peaty or muck soil. The prairie soils are generally suitable for fruit growing, but since they are well suited to grain crops, are used almost entirely for the production of corn, soybeans, oats and wheat. An exception is the south-central, relatively-flat, slowly-drained area, where apples, peaches and strawberries are grown but not as extensively as formerly.

The commercially-grown fruits are apples, peaches, grapes and strawberries. Apples are grown in the south-central area, in the hilly areas of the state. Peaches are grown in the south of the state with a few small plantings along the Mississippi River as far north as Moline. Minimum winter temperature prevents commercial production in most of the northern

two-thirds of the state. Strawberries are grown mostly in the south of the state, and blueberries are grown mostly in a trial way in the same area.

As to vegetables, leading fresh market crops are asparagus, snap beans, cabbage, carrots, cantaloupes, sweet corn, cucumbers, onions, tomatoes and watermelons.

Illinois also produces about 80% of the pumpkins processed in the United States. Illinois is a leading state in the production of greenhouse crops and woody ornamental plants. This industry is located primarily in the counties near Chicago, but also to a lesser extent in the other areas of the state.

The present University of Illinois was established as the Illinois Industrial University in 1868. The importance of horticulture was recognized by the appointment of T. J. Burrill as Professor of Botany and Horticulture in 1869; he retained this appointment until his retirement in 1912. Technically, research in horticulture began with his appointment to the staff of the newly-created Illinois Agricultural Experiment Station in 1887. However, he conducted experiments in horticulture from his first appointment and his world-famous report that fireblight was caused by bacteria was published in 1880 and he described and named the causal organism in 1882.

Horticulture was organized as a separate department in 1899, with J. C. Blair as head, a position in which he served until his retirement in 1939. As presently organized the department includes the 3 divisions of Pomology, Vegetable Crops, and Floriculture and Ornamentals.

Michigan

The Michigan fruit industry is concentrated along the western side of the lower peninsula because of the stabilizing effect on the climate from the presence of Lake Michigan along its entire western boundary. This makes possible the commercial production of a more extensive list of fruit species than in any of the other states in this group.

The soils vary from sandy and gravelly loams in the western part of the state to mucks in the south-central part which are well-suited to some vegetable crops such as celery and onions. The greatest concentration of fruits is in the 3 southwestern counties. Significant amounts of the bramble fruits are also grown.

Michigan has an extensive industry of greenhouse crops and a wide-spread nursery industry, including not only many species of herbaceous and woody ornamentals but also strawberry and other fruit plants.

Horticulture has been taught at Michigan State University since 1857. Liberty Hyde Bailey, a native of Michigan and a graduate of the institution, was head of the department from 1885 to 1888. He designed the first

horticulture laboratory (Eustace Hall) in the United States. Research has followed the pattern of most of the Land-Grant Colleges, i. e., modest experimentation in the beginning, broadened in scope, as funds and knowledge became available, by dedicated and far-seeing leaders who laid the foundations for the development of the present departments in which all phases of horticulture are investigated.

Wisconsin

The production of horticultural crops for sale and many enterprises closely related to these activities constitute important aspects of Wisconsin's agriculture. Fruits, flowers, vegetables and woody ornamentals are grown extensively in the state. Vegetable crops for canning are the largest segment of the horticultural industry.

Wisconsin's climate is a typical north temperate zone continental climate exhibiting wide extremes of summer and winter temperatures. Lakes Superior and Michigan and the Mississippi River modify conditions in areas adjacent to them and provide restricted regions for specialized horticultural development, particularly tree fruits.

Much of Wisconsin's topography is gently rolling. The soils range from extensive muck and peat areas in the central and southeastern parts of the state to sand areas in the central, northeast and northwest areas. Along the shores of Lakes Superior and Michigan are large areas of red clay that are generally unsuited for horticultural crops. The Door Peninsula in northeast Wisconsin is limestone derived.

Horticultural production is centered in

areas uniquely favored by soil, climate or markets. Cranberries are located in the marsh areas of central and northern Wisconsin, which is the only state in this group that produces them commercially. Tree fruits are concentrated in the Door Peninsula, southeastern counties near Lake Michigan, Mississippi River Valley and the Bayfield Peninsula on Lake Superior. Canning crops are extensively grown in the southern and eastern section of the state with extensive acreage of potatoes, green beans and cucumbers in the central sand plain. Ornamental crops are produced near large urban centers with a few scattered nurseries in other areas.

Temperate zone fruit production began in the middle of the 19th century as farm orchards. Large commercial plantings occurred early in the 20th century. The first cranberry bogs were developed in the 1870's and new ones are still being developed. Canning crop production started after the turn of the century and has continued to flourish to the present. Organized horticultural research began as early as 1868 through the co-operation of the then struggling University of Wisconsin and the Wisconsin Horticultural Society. This initial effort was chiefly variety testing and was destined to be short lived. The first true research program in horticulture began in 1889 with the appointment of Emmett S. Goff as Professor of Horticulture. The research program has continued to grow at Madison since that time. Branch stations for horticultural, as well as other agricultural research, were established in several areas of the state in the period after 1910.

In 1959 the main research plantings of the Department were moved from Madison to a new farm 25 miles north of Madison.

Seat/Nature of program	Institution and projects	Address and staff
Ohio		
1. Canfield 1.1 <i>General horticulture</i>	Mahoning County Experiment Farm County substation under the direction of the Experiment Station	Canfield, Ohio C. A. Morrison
2. Celeryville 2.1 <i>Vegetables</i>	Muck Crops Substation State institution, 20 acres	Celeryville, Ohio E. Postema
3. Columbus 3.1 <i>General horticulture</i>	Ohio State University, College of Agriculture and Home Economics Department of Botany and Plant Pathology Nematology Department of Horticulture and Forestry - Division of Floriculture and Ornamental Horticulture Propagation, nutrition, physiology of hardiness, plant evaluation Growth regulators, nutrition, photoperiod, temperature relations Soil aeration, growth regulators, photoperiod, temperature relations Nutrition, physiology of viability, photoperiod, growth regulators - Division of Food Processing and Technology Variety evaluation for processing, quality evaluation Food plant sanitation and methodology, food equipment application Pesticide and fall-out removal using radio-isotope techniques; kraut manufacture and use - Division of Pomology Fruit setting and development, apple thinning, plum rootstocks Size controlling and hardy stocks, apple breeding - Division of Vegetable Crops Tomato breeding, greenhouse and field variety evaluation Post-harvest physiology of tomatoes, vegetable weed control Foliar analysis and mineral nutrition of vegetable crops Department of Zoology and Entomology	Columbus, Ohio Chairm.: Dr. B. S. Meyer Dr. G. E. Smith Chairm.: Dr. F. S. Howlett Head: Dr. L. C. Chadwick Dr. D. C. Kiplinger Dr. R. O. Miller Dr. K. W. Reisch Head: Dr. W. A. Gould Dr. W. D. Bash Dr. J. R. Geisman Dr. F. O. Hartman Dr. F. S. Howlett Head: Dr. W. N. Brown Dr. E. K. Alban Dr. F. S. Howlett Chairm.: Dr. G. E. Wharton
4. Hoytville 4.1 <i>Vegetables</i>	Northwestern Substation State institution. 40 acres vegetables primarily for processing.	Hoytville, Ohio C. S. Zimmerman
5. Marietta 5.1 <i>Vegetables</i>	Vegetable Crops Substation State institution, 24 acres. Vegetable research for the early fresh market.	Marietta, Ohio H. M. Racer
6. Ripley 6.1 <i>General horticulture</i>	Southern Substation State institution.	Ripley, Ohio W. A. Wilson

Seat/Nature of program	Institution and projects	Address and staff
7. Wooster 7.1 General horticulture	Ohio Agricultural Research and Development Center State institution. Department of Botany and Plant Pathology Tomato breeding for tobacco mosaic resistance, greenhouse vegetable diseases Fruit crop diseases, fruit viruses Vegetable crop diseases Department of Horticulture - Division of Food Processing and Technology Fruit processing and quality retention, development of new fruit juice drinks - Division of Pomology Chemical weed control in fruit crops, soil management, peach thinning, stone and small fruit variety evaluation, small fruit training Fruit tree nutrition, foliar analysis, grape culture Tree fruit nutrition, foliar analysis, soil-plant-water relations, grape culture and variety evaluation, citriculture Apple thinning, irrigation and water relations, physiological responses of apples to pesticide sprays, fruit auxins and growth regulators Size controlling and hardy stocks, apple breeding Apple maturity indices, post-harvest physiology, handling and storage - Division of Vegetable Crops Atmospheric CO₂ relations with greenhouse crops, post-harvest physiology, storage and handling Foliar analysis and mineral nutrition of vegetable crops Potatoes and tomatoes, environmental physiology, cultural practices for processing Department of Zoology and Entomology Insects of fruit crops Fruit insects Insects of vegetable crops Grape insects	Wooster, Ohio Dir.: R.M.Kottman Ass.dir.: Dr.J.M.Beattie Dr.L.J.Alexander H.F.Winter Dr.J.D.Wilson Chairm.: Dr.F.S.Howlett Dr.J.F.Gallander Head: Dr.R.G.Hill Jr. Dr.J.M.Beattie Dr.G.A.Cahoon Dr.C.W.Donoho Jr. Dr.F.S.Howlett Dr.D.W.Kretchman Dr.D.W.Kretchman Dr.F.S.Howlett Dr.G.A.Marlowe Jr. Dr.H.Y.Forsythe Jr. Dr.R.W.Rings Dr.J.P.Sleesman G.W.Still
Indiana		
8. Johnson 8.1 Vegetables	Southwestern Indiana Horticultural Farm State institution. Research on melons and sweet potatoes	P.O., Owensville, Indiana Superintend.: C.Sims
9. Lafayette 9.1 General horticulture	Indiana Agricultural Experiment Station, Main Station State institution. - Department of Botany and Plant Pathology Breeding and genetics of scab-resistant apples Tomato genetics and breeding - Department of Horticulture Genetics, breeding and production of vegetables, mint culture Post-harvest physiology and marketing of horticultural crops	Lafayette, Indiana Dir.: Dr.N.J.Volk Head: Dr.J.R.Shay/ Dr.E.B.Williams Dr.M.L.Tomes Head: Dr.E.C.Stevenson K.M.Brink, M.Sc.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Lafayette (9.1)	Physiology-biochemistry of DNA-RNA in germinating seeds Post-harvest physiology of horticultural crops Physiology of floricultural crops Fruit varieties and culture, physiology of thinning Genetics and breeding of vegetables Genetics, breeding and production of market garden and greenhouse vegetables Physiology of rooting in ornamentals Food science and processing, chemistry of quality retention in processed foods Market grades and standards for floricultural crops Genetics and breeding of fruit crops, genetics of vegetables Physiology of flowering and fruiting Physiology of winter hardiness in ornamentals Physiology of senescence and hormone action Food science, food processing Physiology of vegetables, fruit setting Floriculture and ornamentals, nutrition Physiology of dwarfing fruit crops Nutrition, physiology of weed killers Nutrition of horticultural crops	Dr. J. H. Cherry Dr. H. C. Dostal/Dr. Ruth Kuc Dr. D. J. Durkin Dr. F. H. Emerson Dr. H. T. Erickson/R. S. Grenard/ Dr. C. M. Jones Dr. L. Hafen Dr. C. E. Hess Dr. J. E. Hoff C. E. Hoxsie, M. Sc. Dr. J. Janick Dr. S. L. Lam Dr. F. O. Lanphear Dr. A. C. Leopold P. E. Nelson/R. W. Trudeau Dr. E. B. Oyer C. Pfeiffer, M. Sc. Dr. R. B. Tukey Dr. G. F. Warren Dr. G. E. Wilcox
9.2 General horticulture	Purdue University State institution. - Department of Entomology. - Department of Horticulture.	Lafayette, Indiana

Illinois

10. Carbon-dale	Co-operative Small Fruit Research Center Federal institution established in 1959 as a co-operative endeavour of Southern Illinois University and the Small Fruit and Grapes Investigations unit of the U.S. Department of Agriculture.	U.S. Department of Agriculture, Plant Industry Department, Southern Illinois University, Carbondale, Illinois 62903
10.1 Fruit	Breeding, variety evaluation and culture of strawberries Cytology of Rubus, breeding blackberries and raspberries, blueberry variety evaluation, culture of blackberries, blueberries and raspberries	Head: Dr. R. C. Blake Dr. J. W. Hull
10.2 Fruit	Southern Illinois Horticultural Experiment Station State institution, established in 1950, jointly supported by the Department of Horticulture at the University of Illinois (Urbana) and the Southern Illinois University (Carbondale) Genetics, cytology and breeding of the peach, variety trials of tree and small fruits, peach nutrition	Carbondale, Illinois Superintend.: Prof. dr. J. B. Mowry
11. Downers Grove	Drug and Horticultural Experiment Station State institution.	Downers Grove, Illinois
11.1 General horticulture	Extraction and identification of active compounds from drug plants Physiology of vegetable herbicides	R. Voight, M. D. (Head, Dep. Pharmacognosy, Univ. of Ill.) in charge Dr. H. J. Hopen (P. O. Urbana)

Seat/Nature of program	Institution and projects	Address and staff
12. Urbana 12.1 Plant Protection	State Natural History Survey This state supported organization is housed on the University of Illinois campus but has a separate budget and administrative board. Some staff members hold joint appointments with the Illinois Agricultural Experiment Station. Incidence of plant and insects and diseases, control methods. - Applied Botany and Plant Pathology Diseases of shade and forest trees Diseases of flower crops Diseases of woody ornamentals - Economic Entomology Orchard insects Insects of flowers and woody ornamentals Vegetable insects Insects of tree and small fruits	Urbana, Illinois Chief: Dr. H. B. Mills Head: Dr. J. C. Carter Dr. J. L. Forsberg Dr. D. F. Schoeneweiss Head: Dr. G. C. Decker Dr. J. E. Appleby Dr. W. H. Luckman Dr. R. H. Meyer (P. O. Carbondale)
12.2 General horticulture	University of Illinois, College of Agriculture - Illinois Agricultural Experiment Station, Main Station Department of Food Science Controlled atmosphere storage of vegetables, sweet corn maturity Department of Horticulture - Floriculture and Ornamentals Physiology of ornamentals Turfgrass management Floricultural physiology, chrysanthemum breeding Culture and evaluation of bedding, foliage and greenhouse crops Post-harvest physiology of flowers, production and physiology of ornamentals Physiology Evaluation and propagation of woody plants Floriculture production - Pomology Genetics, cytology and breeding of pears and grapes Anatomy and histology of horticultural crops Genetics, cytology and breeding of the apple Honey bees in fruit pollination Interrelations of colour, maturation, ripening and quality in fruits Tree nut and persimmon breeding Nitrogen translocation in the apple Anatomy of development in fruit plants Mineral nutrition and nitrogen metabolism Genetics, cytology and breeding of brambles and strawberries - Vegetable crops Effect of environment on sweet corn development Physiology of pollen germination Physiology of vegetable herbicides Physiology of tomato ripening Taxonomy and genetics of sweet corn and cucurbits Genetics of quality factors in tomatoes Use of sandy soils for vegetable production	Urbana, Illinois Dean: Dr. O. G. Bentley Dir.: Dr. M. B. Russell Head: Dr. R. T. Milner A. I. Nelson/Dr. M. P. Steinberg/Dr. Lun-Shin Wei Head: Dr. C. J. Birkeland Dr. L. Beevers J. D. Butler, M. Sc. J. R. Culbert, M. Sc. G. M. Fosler, M. Sc. Dr. J. B. Gartner Dr. T. K. Hodges J. C. McDaniel D. S. Saupe, M. Sc. Dr. H. C. Barrett C. Y. Chu, M. Sc. Dr. D. F. Dayton Dr. E. R. Jayco Dr. F. V. Lott J. C. McDaniel Dr. N. H. Ozerol Dr. R. K. Simons Dr. J. S. Titus Dr. C. C. Zych Dr. C. Y. Arnold Dr. D. B. Dickinson Jr. Dr. H. J. Hopon Dr. J. P. McCollum Dr. A. M. Rhodes Dr. A. E. Thompson Dr. J. S. Vandemark

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Urbana (12.2)	Department of Plant Pathology Turfgrass diseases Soil fungicides in vegetable production Bacterial and fungus diseases of fruits Viruses of horticultural plants	Head: Dr. W. M. Bever Dr. M. P. Britton Dr. M. B. Linn Dr. D. Powell Dr. H. H. Thornberry
Michigan		
13. East Lansing	Michigan Agricultural Experiment Station, Main Station	East Lansing, Michigan
13.1 <i>General horticulture</i>	State institution. Department of Botany and Plant Pathology Vegetable diseases Fruit diseases Department of Entomology Fruit insects Vegetable insects Department of Horticulture - Floriculture Physiology Marketing Cytology and genetics - Landscape Horticulture Nutrition Taxonomy Physiology - Pomology Nutrition, translocation, growth regulators Dwarfing understocks Post-harvest physiology, controlled atmosphere storage Post-harvest physiology Harvest and handling mechanization Growth regulators Small fruit physiology Nutrition, plant analysis laboratory Variety evaluation Nutrition, weed control Physiology, pest control Genetics and breeding, rootstocks - Vegetable crops Plant nutrition Genetics and breeding Physiology Weed control, physiology Growth regulators, especially gibberellins, physiology	Chairm.: Dr. W. B. Drew Dr. D. J. de Zeeuw/Dr. H. H. Murakishi Dr. E. J. Klos Chairm.: Dr. G. E. Guyer Dr. A. J. Howitt/Dr. P. H. Wooley Dr. R. L. Janes Chairm.: Dr. H. J. Carew R. W. Keppeler, M. Sc./Dr. R. F. Lindstrom/Dr. R. F. Stinson P. R. Krone Dr. K. C. Sink Jr. Dr. H. Davidson C. E. Lewis, M. Sc. Dr. R. A. Mecklenburg Dr. M. J. Bukovac Dr. R. F. Carlson Dr. D. H. Dewey Dr. D. R. Dilley H. P. Gaston, M. Sc. Dr. C. L. Hamner Dr. J. Hull Dr. A. L. Kenworthy Dr. G. M. Kessler Dr. R. P. Larsen Dr. A. F. Mitchell Dr. J. E. Moulton Dr. R. L. Carolus/Dr. J. P. Downes Dr. S. Honma/Dr. D. Markarian/ Dr. C. E. Peterson Dr. C. W. Nicklow Dr. S. K. Ries Dr. S. H. Wittwer
14. Graham	Graham Horticulture Experiment Station	Graham, Michigan
14.1 <i>General horticulture</i>	State institution.	Superintend.: J. Gilmore
15. South Haven	South Haven Horticulture Experiment Station	South Haven, Michigan
15.1 <i>Fruit</i>	State institution. Genetics and breeding of stone fruits, blueberries and strawberries, stone fruit understocks	Superintend.: S. Johnston, M. Sc./ Dr. J. E. Moulton

Seat/Nature of program	Institution and projects	Address and staff
Wisconsin		
16. Ashland 16.1 General horticulture	University Experimental Farm State institution. Supervision of research plots, including strawberries and potatoes	Ashland, Wisconsin Superintend.: G.H. Tenpas
17. Hancock 17.1 Vegetables	University Experimental Farm Nutrition and variety testing of vegetables, supervision of research plots	Hancock, Wisconsin Superintend.: M. D. Groskopp
18. Madison 18.1 General horticulture	Wisconsin Agricultural Experiment Station, Main Station State institution. Department of Entomology Corn rootworm and other soil insects Fruit crop insecticides, biology of apple maggot, virus vectors in strawberries Evaluation of insecticides for vegetables Department of Horticulture Techniques for breeding onions, carrots, red beets, green beans - Floriculture and Ornamentals Oedema in geraniums, poinsettia, cultural problems Grade standards for flower crops Adaptation of woody ornamentals, selection of strains of Juniperus - Pomology Weed control in cranberries and strawberries, small fruit culture Physiology of rootstock effects - Vegetable Crops Breeding peppers, broccoli and tomatoes Weed control in vegetable crops on upland soil, influence of herbicides on plant anatomy Breeding and genetics of potatoes, woody ornamental breeding Cytogenetics of Solanum species Genetics and cytogenetics of Solanum species Potato culture and varietal trials Environmental effects of "tip-burn" of lettuce, weed control in crops on muck soils - Other Research Biology of weeds, root competition studies Breeding of disease resistant tobacco, tobacco culture Nutrition of tobacco, nitrogen relationships in soil Plant anatomy in relation to nutrient deficiency, disease incidence, herbicide effect and growth regulators Department of Plant Pathology Nematology in relation to horticultural crops Diseases of cranberry, strawberry, raspberry, genetics of Venturia inaequalis Pea and bean diseases Diseases of ornamental plants Stone fruit viruses Diseases of lettuce Cabbage and cucumber diseases	Madison, Wisconsin Dir.: R. K. Froker, M. A. Chairm.: Dr. R. J. Dicke Dr. J. W. Apple Dr. G. M. Boush Dr. R. K. Chapman Chairm.: Dr. W. H. Gabelman Dr. G. E. Beck Dr. L. M. Berninger Dr. E. R. Hasselkus Dr. M. N. Dana Dr. S. J. Leuty O. B. Combs, M. Sc. Dr. E. T. Haltvick Dr. R. W. Hougas Dr. S. J. Peloquin Dr. P. R. Rowe Dr. J. A. Schoenemann Dr. T. W. Tibbitts Dr. L. G. Holm W. B. Ogden, M. Sc. Dr. L. A. Peterson Dr. B. E. Struckmeyer Chairm.: Dr. G. S. Pound Dr. K. R. Barker Dr. D. M. Boone Dr. D. J. Hagedorn Dr. A. C. Hildebrandt Dr. J. D. Moore Dr. L. Sequeira Dr. P. H. Williams

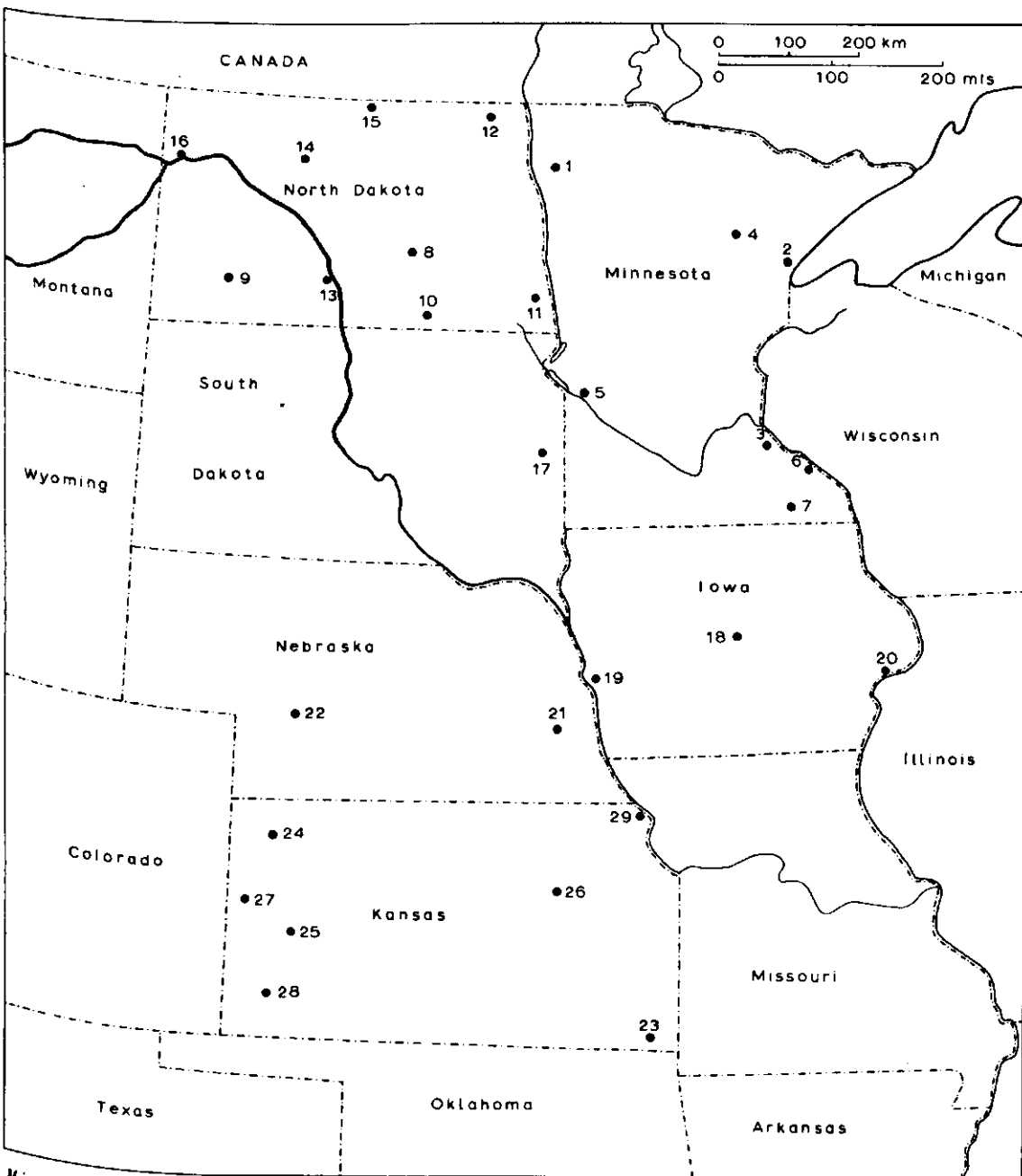
RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-F 19.1 - 20.1

Seat/Nature of program	Institution and projects	Address and staff
19. Spooner 19.1 <i>General horticulture</i>	University Experimental Farm State institution. Supervision of research plots, including strawberries and potatoes	Spooner, Wisconsin Superintend.: A. M. Strommen, M. Sc.
20. Sturgeon Bay 20.1 <i>Fruit</i>	University Experimental Farm State institution. Culture of cherries, apples and straw- berries, strawberry breeding.	Sturgeon Bay, Wisconsin Superintend.: Dr. F. A. Gilbert

G. Great Plains Region

Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas



Minnesota: 1. Crookston, 2. Duluth, 3. Excelsior, 4. Grand Rapids, 5. Morris, 6. St. Paul, 7. Waseca. North Dakota: 8. Carrington, 9. Dickinson, 10. Edgeley, 11. Fargo, 12. Langdon, 13. Mandan, 14. Minot, 15. Rolla, 16. Williston. South Dakota: 17. Brookings. Iowa: 18. Ames, 19. Council Bluffs, 20. Muscatine. Nebraska: 21. Lincoln, 22. North Platte. Kansas: 23. Chetopa, 24. Colby, 25. Garden City, 26. Manhattan, 27. Tribune, 28. Ulysses, 29. Wathena.

wide from north to south. Its area is 77,047 square miles. The state contains no large bodies of water and borders on none, though there are numerous small lakes in the northeast corner. The Missouri river bisects the state north and south and it or its branches form the principal drainage system. The greater part of the state is plain and the principal herbage is grass.

The climate is continental. The winter temperature average is low; the temperatures of all seasons are variable with widely different extremes. January temperatures average from 10°F to 20°F. in different zones. Record lows may reach -40°F. Summer extremes likewise are wide, occasionally 100°F being recorded.

The average number of frost free days ranges from 100 in the Black Hills to 160 at the eastern end of the southern border.

Horticulture. The low temperature extremes in winter, the dry, often semi-arid climate in summer, the frequent occurrence of late spring and early fall frosts all limit the range of horticultural crops seriously and determine one of the primary directions of research in that field, namely the securing of varieties of flowers, fruits, vegetables and ornamental plants adapted to the climate. Exploration, introduction, breeding and routine comparisons of existing species and varieties have been and remain the objects of procedure.

The commercial value of horticultural products is low compared with livestock and field crops which are the chief source of income in the state. Vegetable crops, for local urban supplies, potatoes for both local and interstate shipment, a limited production of flowers and vegetables under glass, and nurseries for the propagation of decorative plant and windbreak material and small transplants for home vegetable and flower gardens account for the commercial production.

Interest in home gardening including fruits is keen. The short growing season and the rigorous climate, both temperature and precipitation-wise, the relative isolation of individual homes and communities, and the natural appreciation of people for the products of the garden, create a background very favourable for home gardening.

Horticultural research. Organized horticultural research in South Dakota centers on the South Dakota Agricultural Experiment Station located with the University of South Dakota at Brookings. Historically one remarkable man, Dr. Niels Hansen, for 42 years Professor of Horticulture at the University, gave leadership, inspiration and active participation to research in his field, especially in exploration and breeding, to produce new varieties, particularly of fruits. Dr. Hansen introduced literally scores of new

apples, crabapples, cherries and other fruits, the results of crossing his extensive collection of species and varieties.

The home gardens and orchards of South Dakota have been enriched for years by Dr. Hansen's energetic advocacy and pushing of the new varieties originating under his direction. Since Hansen's death more research has been devoted to potatoes, tomatoes and other vegetables and to all forms of plant culture leading to the improvement of home living conditions.

It is not known exactly how many horticultural varieties have been introduced from the South Dakota Agricultural Experiment Station but Professor McCrory has stated that 334 are on record, 271 of fruits and nuts, 44 of woody ornamentals, 7 of herbaceous ornamentals, and 12 of vegetables. A few of the better known are the Dolgo crab, Sapa and Opata cherry-plums, Hopa rosybloom flowering crab; Cisterna red-leaved hybrid cherry-plum; Waneta, Toga and Kaga plums; Sioux sand cherry; and Anoka apple.

Iowa

A complex of geography, climate, economy, and population, historically and presently, determine the character of horticulture in Iowa. Iowa is located near the center of continental United States from east to west, somewhat nearer the northern boundary than the southern, and approximately in the center of the North American continent. It lies between latitudes 40° 24" and 43° 30" North and longitudes 90° 5" and 96° 40" west. The climate is continental in character and is subject to considerable variations in temperature in short periods of time and to unpredictable droughts with considerable variations in time and distribution of precipitation.

In general the climate is favourable for forage crops, small grains, Indian corn maize and soya beans, a wide range of vegetables and a very satisfactory range of temperate zone ornamental trees, shrubs and flowers. Both fruit trees and small fruits call for adjustments of variety, protection and cultural practices to overcome the vicissitudes of climatic extremes, particularly of unseasonable low temperatures.

In Central Iowa snowfall and rainfall together average 30 inches annually. The average length of the growing season is 156 days. North west Iowa has an average of 140 frost free days; the south border of the state has 170.

Twenty five per cent of the soil of the United States which is rated grade 1 on the basis of productiveness is located in Iowa, and the state contributes about 10% of the total national food supply. Soil is not a limiting factor in the production of horticultural crops.

Horticulture. Commercial vegetable production in Iowa centers in potatoes, onions, cabbage and melons for the fresh market, sweet corn, tomatoes and cucumbers for processing. Almost the whole range of vegetables is produced for local markets and, except possibly for melons, in all parts of the state. Home gardening is practiced everywhere in both town and country. The commercial crops are consumed both within and beyond the borders of the state. The largest production of potatoes, onions and cabbage occurs in drained lake beds of peat or organic soils in the north central counties, especially Kossuth, Hancock, Winnebago, Cerro Gordo, and Mitchell. Sweet corn for canning tends to center in the east central counties including Story, Marshall, Powsheik, Grundy, Blackhawk and Bremer. Tomatoes and cucumbers for canning and pickling and largely grown in the Mississippi Valley, especially in Scott, Louisa, and Muscatine counties. Melons for local markets appear in isolated small plantings over a wide area of the state but those grown for shipment are produced mostly in Muscatine and Lee counties in the south east corner of the state on sandy soils in the Mississippi Valley.

Apples are the only tree fruit grown commercially in Iowa and most of them are marketed in the state. The majority of the orchards is found on the loess soils in the Mississippi Valley from Clinton to Keokuk and in the Missouri Valley from Council Bluffs to the Missouri line. Many are also located in the neighbourhood of the cities and large towns in the central counties such as Cedar and Polk. Equally favourable sites and locations may be found in most of the southern two-thirds of the state but planting is limited by economic factors. Home orchards are widely distributed, even in the northern counties.

Iowa is notable for the wholesale production of nursery plants covering a very wide range of hardy and semi hardy perennial flowers, shrubs, shade trees, ornamentals, and fruit trees. The largest wholesale operators of nurseries in the country are located here largely because of excellent soils, partly because of a combination of other fortuitous circumstances. The largest acreages are found in Fremont county in the south west corner of the state and in Polk, Franklin, Lloyd and Lynn counties farther east. Local nurseries are found in every county. In 1964 there were 273 producing nurseries with approximately 8000 acres in actual production.

Floriculture commercially is represented chiefly by the glasshouse culture of cut flowers and pot plants. Nearly every city and town has a greenhouse range. There are approximately $4\frac{1}{2}$ million square feet of glass devoted to florists' crops in Iowa.

Horticultural research in Iowa is determined principally by two factors (1) the annual

range and distribution of its temperatures over long periods of years, and (2) the needs and desires of its citizens. The many soil types found in the state, nearly all ranking above average in fertility, afford no serious problems in the production of those vegetables, fruits or ornamentals which are adapted to the climate which cannot be solved by modifications and adaptations of such standard cultural practices as selection of adapted localities and sites, drainage, irrigation, fertilization and pest control. Major topographical determinants are also absent in a state where elevations above sea level range between 1675 feet at the highest to 480 feet at the lowest. Adjustments to local topography, however, are always desirable and often necessary as they affect exposures to wind, light, flooding and erosion on individual sites.

The human factor as related to needs and desires as related to horticultural research is naturally complex. It has varied, often changed radically, from pioneer times 100 to 150 years ago, when home food production of edible vegetables and fruits was the prime horticultural objective, to a modern highly sophisticated civilization which depends chiefly on commercial production for its horticultural foods and emphasizes the culture of ornamentals in its home gardens.

The search for climatically adapted varieties of flowers, vegetables, ornamental shrubs, shade and shelter trees, and particularly for fruit trees, was the first and greatest horticultural research undertaking in Iowa. It continues to rate high in importance, but it differs from early variety testing techniques by the introduction of plant breeding to producing new varieties having better adaptations to the climate of the state and the marketable and ornamental qualities of horticultural plants and their products. The uncertain distribution of summer rainfall is requiring investigations in irrigation, a field in which horticulture has done and continues to do work since 1923. Problems of soil management and fertilization as applied to special crops are in constant study. Storage for the preservation of apples, cut flowers, potatoes and sweet potatoes to prolong their seasons of usefulness has a large place in horticultural research in Iowa. Growing in importance in its research efforts are investigations in marketing, involving packaging, quality control and determination of standards of excellence particularly for nursery and flower products. As funds, time and personnel permit, workers, often private individuals but more generally professional researchers in the universities and experiment stations, share problems and phases of the field and one by one solve its infinite multitude of questions. Historically, fruitful fields of horticultural

tural research which have resulted in notable contributions to the literature include: Importations and evaluation of varieties of apples from abroad, especially from Russia. Budd.

Effects of low winter temperatures on injury to and killing of many species of fruits and ornamental plants. Numerous researchers and private observers.

Introduction of new varieties of apples, pears, peaches and plums by plant breeding. Patton, Beach, Pickett, Lantz.

Introduction of new varieties of raspberries, junipers, chrysanthemums and geraniums. Maney, Volz.

Extensive investigations on the effects of various storage temperatures and conditions, harvest maturity, and variety on the keeping of apples in common and controlled storages. Plagge and Maney.

Adaptation of understocks to the propagation of apples and roses. Maney.

Hydroponic techniques applied to greenhouse plants. Pickett, Volz, Sherwood.

Quick freezing for home and market storage of fruits and vegetables. Plagge.

Fertilization and soil management of apple orchards. Pickett.

Literature relating to the above investigations is contained in bulletins of the Iowa Agricultural Experiment Station, Proceedings of the Iowa State Horticultural Society, State House, Des Moines, Iowa, Proceedings of the American Society for Horticultural Science and various horticultural journals of the time.

Active research in horticulture in Iowa proceeds under public, semipublic and private organizations and institutions. Consistent, continuing, long time research sustained by scientifically trained personnel is chiefly developed in the Iowa Agricultural Experiment Station in Iowa State University at Ames, Iowa, under the guidance of the Department of Horticulture.

Nebraska

Nebraska is a very large state, the most westerly of the North Central group of states. Its total area is 77,227 square miles of which only 615 are water covered. It is nearly rectangular in shape with the long axis from east to west, 420 miles, and the north axis from north to south, 207 miles. The northern border is essentially the 43° North latitude, the southern is the 40° North latitude. It lies between the 95° and 104° West longitude. The Missouri river bounds the entire northeast corner and the east side of the state and its tributaries drain the northern quarter of the area.

Much of the soil is fertile. Little of horticultural interest, either commercially or amateur, has developed here. Windbreaks however have received major attention.

The climate is characteristically inland with rapid changes in temperature both winter and summer and tending to extremes. Late spring and early fall frosts interfere seriously with the dependable production of horticultural crops from year to year.

The average rainfall, including snow, varies from 28 inches in the east to 13 inches in the west, inadequate for most horticultural crops to attain perfection, unless supplemented by irrigation. Fortunately two thirds of the precipitation occurs in the growing season. In general the humidity through the year is low.

Horticultural research centers in the Department of Horticulture and Forestry at the University of Nebraska, in Lincoln. Notable plant breeding however has been done by several private individuals. Theodore Williams of Benson introduced 34 varieties of native plums and hybrids between the American species of *Prunus salicina* from Asia. Included among them is the widely planted variety, Omaha. The Marshalls of Arlington have introduced 8 varieties of ornamental trees and shrubs, the Plumfield Nurseries of Fremont, 6 fruits and 26 ornamentals. The Sass family, Hans, Jacob and Henry E., a son of Jacob, produced and named 3 new varieties of lilacs, and a great number of new varieties of iris, *Hemerocallis*, lilies and peonies. Many of the iris varieties were sensational and their work was nationally recognized by numerous awards including 2 Stout and 4 Dykes medals.

Most famous of the early staff members in Horticulture at the University was Dr. Charles E. Bessey, who, though primarily a botanist headed the combined departments of Horticulture and Botany and was dean of the Industrial College. Later chairmen of the separated departments were F.W. Taylor, Professor F.W. Card, R.A. Emerson, R.F. Howard and C.C. Wiggans. Two individuals who were not chairmen of the department but who contributed greatly to its work over many years were E.H. Hoppert, an extension specialist and H.D. Werner, responsible for a successful breeding program with vegetables. Out of this were released 10 new varieties of potatoes and 2 of tomatoes. Forestry was combined with horticulture in 1924.

C.C. Wiggans summarized the horticultural research activities of the department over the years as follows: *

1. Routine but necessary variety testing to evaluate the many new introductions under local conditions.
2. Studies to improve such production practices as pruning, spraying, mulching, rotations, fertilizer use and harvesting methods.

* Alderman, Development of Horticulture on the Northern Great Plains, P.92, 1962

3. Processing, utilization and storage problems with potatoes and other crops.
4. Study of effects of low temperature on apple tree roots led to conclusion that budded trees were not adapted to Nebraska conditions.
5. Studies of subsoil moisture depletion indicated that it is the cause of the most productive life of Nebraska apple orchards.
6. Stock-scion relationships in the apple proved to be responsible for certain unusual developments on production, trunk character and tree form.
7. Suitable adjustment of day length and temperature under controlled conditions was found to insure blossom formation and seed set in potatoes.
8. Relation of environmental conditions to wound healing on potatoes has been studied.
9. Physiological explanations are being sought for the effect of environmental conditions on tuber formation and other specific reactions of potatoes.
10. Effects of irradiation on seeds of woody plants have received some attention.

The North Platte Experiment Station also carries an excellent horticultural research program under the direction of Glen Vieh-meyer. It has introduced 21 varieties of garden chrysanthemums and 31 of penstemon and, in cooperation with the U.S. Department of Agriculture, 2 varieties of strawberries. The Nebraska State Horticultural Society, organized in 1869 was active in its early years in the first phases of horticultural research. It sponsored six so called experiment stations, the Arlington, Chambers, Minden, Purdum, Sandoz and Valentine, whose observations were recorded annually in the reports of the society for a number of years. With the organization of the agricultural experiment stations this phase of the work of the society gave place to emphasis on exhibitions, educational meetings and general promotion of horticultural plantings. Its support of the research program of the department of horticulture at the University has been most helpful.

The Nebraska Federation of Garden Clubs became well organized about 1935 and became very active and helpful in the promotion of ornamental home gardens and in supporting public gardens. It operates as a separate organization from the state horticultural society.

Kansas

The state of Kansas is located very near the geographical center of the United States. Its area is 82,270 square miles. It is rectangular in shape, 410 miles from east to west and 208 miles from north to south. It lies between latitudes 37° and 40° North and

longitudes 94°30' and 102° West. The highest altitude is 4135 feet and the lowest 700 feet above sea level. Its climate is continental in character, subject to rapid changes from high to low temperatures in all seasons of the year. Extremes may vary from 100°F or more in summer to 10°F to 20°F on rare occasions in winter. The average annual temperature is 55°F ranging from 58°F in the southeast to 52°F in the northwest.

Agriculture. Agriculturally Kansas is a wheat and beef state with important productions also of corn (maize), soya beans, forage grasses, sheep, hogs and poultry. Horticulturally, the Kaw Valley produces commercial crops of potatoes and nursery plants. Apples are grown along the Missouri river and its tributaries in the northeast corner of the state and in the Arkansas River Valley where peaches are also produced on certain sandy soils. Market gardens are found in the vicinity of all cities in the eastern third.

Kansas is rather on the northern edge of pecan growing territory but the pecan is native and excellent hardy varieties are grown. In spite of the rigors of its continental climate, Kansas with an earlier spring and a longer summer than its neighbours to the north and northeast, is far enough south to admit a somewhat wider range of ornamental trees and shrubs. Crepe myrtle (*Lagerstroemia indica*) and *Pyrocantha* sp., for example, appear in parks and ornamental plantings everywhere along the east side of the state and flowering dogwood (*Cornus florida*) is native to the woodlands.

The florist industry is concentrated around the population centers in Eastern Kansas and the Wichita area and includes the production of pot plants, cut flowers and bedding plants. The nursery industry also is located chiefly in the eastern area with individual nurseries ranging from large wholesale to small retail establishments.

There is a somewhat special interest in ornamental garden at home in Kansas where the percentage of home ownership is above the national average. It has been estimated that Kansas home owners have a 275 million dollar investment in their horticultural plantings and their interest in increasing and improving them justifies intensifying research in the field of ornamental horticulture.

Historically horticultural research in Kansas was directed to testing the adaptation of the varieties of fruits, vegetables and ornamentals of the Atlantic seaboard, New York, Pennsylvania and other established states. Gradually, the production of new varieties by breeding and adaptations of irrigation to offset summer droughts and inadequate rainfall have been added. Refinements of techniques such as grafting of hardy pecans on

desirable stocks, planting of semi-dwarf apple types, and the use of plastics in greenhouses, are examples of numerous individual problems which constantly require attention in such a field as horticulture.

In common with the other north central states horticultural research is carried on chiefly through the agency of the agricultural experiment station as part of Kansas State University at Manhattan, Kansas. It has an active well staffed department of horticulture equipped with central building, various greenhouses, service buildings for its gardens, orchards, grass plots, and tools, laboratories of the biochemical type

and others. Besides the horticultural farm at the University, the department operates research farms at Wathena in northeastern Kansas, which experiments chiefly with apples, peaches and small fruits. The southeast Kansas experimental farm at Chepota deals chiefly with pecans. In southwestern Kansas the farm at Ulysses experiments chiefly with vegetables and problems of their irrigation. There are also branch stations at Colby, Garden City and Tribune. Organizations within the state which are principally concerned with horticulture are: The Kansas State Horticultural Society, The Federated Garden Clubs of Kansas.

Seat/Nature of program	Institution and projects	Address and staff
Minnesota		
1. Crookston 1.1 General horticulture	North West Experiment Station Substation, state institution.	Crookston, Minnesota Ass. prof. B. C. Beresford, M. Sc.
2. Duluth 2.1 General horticulture	North East Experiment Station Substation, state institution.	Duluth, Minnesota Ass. Superintend.: Ass. prof. H. J. Hopen
3. Excelsior 3.1 Fruit	Minnesota Fruit Breeding Farm State institution, cooperative relationship with United States Department of Agriculture	Excelsior, Minnesota Superintend.: Prof. dr. L. C. Snyder Ass. Superintend.: Assoc. prof. T. S. Weir, M. Sc.
4. Grand Rapids 4.1 General horticulture	North Central Experiment Station Substation, state institution	Grand Rapids, Minnesota N. H. Grimsbo
5. Morris 5.1 General horticulture	West Central Experiment Station Substation, state institution.	Morris, Minnesota W. H. Gray, M. Sc.
6. Saint Paul 6.1 General horticulture	University of Minnesota, College of Agriculture Department of Horticulture Tree fruit breeding and cultivation Vegetable physiology Vegetable breeding Ornamental horticulture Potato breeding Hardiness physiology Ornamental plant breeding Food technology Breeding ornamental landscape plants Tree fruit breeding Nursery and turf management, propagation and turf management studies Floriculture	Saint Paul, Minnesota Head: Prof. dr. L. C. Snyder Assoc. prof. dr. E. T. Anderson C. Ayres, M. Sc. / Prof. dr. R. E. Mylund Prof. dr. T. M. Currence / Prof. dr. A. E. Hutchins / Prof. dr. O. C. Turnquist Assoc. prof. dr. C. G. Hard Assoc. prof. dr. F. I. Lauer Dr. L. I. Paul / Assoc. prof. C. J. Weiser, Ph. D. Assoc. prof. dr. R. Mullin Ass. prof. Shirley T. Munson, M. Sc. Ass. proc. R. H. Phyllips, M. Sc. Assoc. prof. T. S. Weir, M. Sc. Assoc. prof. dr. D. B. White Assoc. prof. dr. P. E. Widmer
7. Waseca 7.1 General horticulture	Southern Experiment Station Substation, state institution.	Waseca, Minnesota Dr. E. C. Frederick
North Dakota		
8. Carrington 8.1 General horticulture	Carrington Experiment Station Branch station, state institution. Potatoes, vegetables, ornamentals and fruits	Carrington, North Dakota
9. Dickinson 9.1 General horticulture	Dickinson Experiment Station Branch station, state institution. Vegetables and fruits	Dickinson, North Dakota

Seat/Nature of program	Institution and projects	Address and staff
10. Edgeley 10.1 <i>Fruit</i>	Edgeley Experiment Station Branch station, state institution.	Edgeley, North Dakota
11. Fargo 11.1 <i>General horticulture</i>	North Dakota State University, Agricultural Experiment Station Discovery of varieties of fruits, flowers, vegetables and ornamental plants adapted to the climate; devices for protection of plants from unfavourable temperatures, winds and droughts. Vegetable breeding Evaluation of ornamentals Potato breeding Potato production problems Culture problems with vegetables Cultural problems with fruits Shelterbelt studies	Fargo, North Dakota Head: Dr. E. P. Lana Assoc. prof. D. G. Hoag Assoc. prof. dr. R. H. Johansen Ass. prof. dr. D. C. Nelson Ass. prof. dr. E. W. Scholz Ass. prof. N. S. Holland, M. Sc. Assoc. prof. J. J. Zaylskie
12. Langdon 12.1 <i>General horticulture</i>	Langdon Experiment Station Branch station, state institution. Potatoes and ornamentals	Langdon, North Dakota
13. Mandan 13.1 <i>Fruit</i>	United States Northern Great Plains Field Station Federal institution (US Department of Agriculture). Fruit breeding and variety evaluation Tree establishment and shelterbelt studies Publ.: Farmer's Bull. No. 1522. "The Home Fruit Garden on the Northern Great Plains"	Mandan, North Dakota W. A. Otto E. J. George
14. Minot 14.1 <i>General horticulture</i>	Minot Experiment Station Branch station, state institution. Potatoes, fruits and ornamentals	Minot, North Dakota
15. Rolla 15.1 <i>Botany</i>	International Peace Garden Cooperative operated by Canada and the US.	Rolla, North Dakota Chief: J. O. Stormon (pres.)
16. Williston 16.1 <i>General horticulture</i>	Williston Experiment Station Branch station, state institution. Potatoes, vegetables and ornamentals	Williston, North Dakota

South Dakota

17. Brookings 17.1 <i>General horticulture</i>	University of South Dakota, South Dakota Agricultural Experiment Station State institution. Apple and grape breeding Forestry: shelterbelt spacing, hybrid trees Landscape design, turf and woody plants Cultural practices in forestry	Brookings, South Dakota Head: Prof. dr. R. M. Peterson Assoc. prof. P. F. Collins, M. Sc. Assoc. prof. W. G. Macksam, M. I. G. L. Jensen, M. Sc.

Iowa

18. Ames 18.1 <i>General horticulture</i>	Iowa State University, Agricultural Experiment Station State institution, coordinated with the US	Ames, Iowa

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Ames, Iowa (18.1)	Department of Agriculture and with industrial organizations and others who sustain research fellowships; advisory relationships with the numerous organized horticultural bodies of the state. Equipment: Buildings, storages, greenhouses, farms, orchards, gardens, nurseries, laboratories, machinery and a trained staff of 30 to 40 workers. Department of Horticulture Packaging, marketing and propagation of nursery plants Apple breeding, orchard management Identification of trees and shrubs of nursery age Fruit variety evaluation; winter hardiness of apple trees Pomology Breeding geraniums and chrysanthemums; hydroponics Rose breeding, variety evaluation of tulips and roses Fruit growing, particularly strawberry breeding and culture; problems with herbicides Problems concerning uses and culture of fine turfgrasses Ground covers for shade, hillsides, erosion and soil problem areas Market standards and quality in floral products, physiological responses of florists plants Vegetable breeding, especially potatoes, onions and tomatoes, herbicide weed control in vegetable crops plantings	Head: Dr. J. P. Mahlstedt Prof. B. S. Pickett, M. Sc. Prof. A. E. Cott, M. Sc. Prof. H. E. Nichols, M. Sc. Prof. dr. J. C. Schilleter/F. D. Rauch, M. Sc. /H. Weyland, M. Sc. / Dr. F. H. Schulte Prof. E. S. Volz, M. Sc. Assoc. prof. dr. G. J. Buck Assoc. prof. dr. E. L. Denisen Assoc. prof. dr. E. C. Roberts Assoc. prof. B. F. Vance Ass. prof. dr. C. H. Sherwood Ass. prof. dr. J. L. Weigle
19. Council Bluffs	Council Bluffs Station	Council Bluffs, Iowa
19.1 Fruit	Branch station, state institution.	
	Culture of fruits, especially apples, grapes, raspberries and strawberries on hill soils (loess) in western Iowa	Superintend.: C. C. Doll, M. Sc.
20. Muscatine	Muscatine Station	Muscatine, Iowa
20.1 Vegetables	Branch station, state institution.	
	Culture of potatoes, sweet potatoes, tomatoes, sweet corn, muskmelons, watermelons and other vegetables involving irrigation in a sandy soil in the Mississippi Valley.	Superintend.: L. E. Peterson
Nebraska		
21. Lincoln	University of Nebraska, Department of Horticulture and Forestry	Lincoln, Nebraska
21.1 General horticulture	State institution.	
	Physiology	Chairman: Prof. dr. J. O. Young
	Forestry: windbreaks, weed control	Prof. W. T. Bagley, M. Sc.
	Horticulture: vegetables, breeding	Ass. prof. D. P. Coyne, Ph. D.
	Turf, weed control	Ass. prof. dr. A. E. Dudeck
	Physiology: hardiness	Assoc. prof. dr. E. J. Kinbacher
	Climatology	Ass. prof. B. E. Neild, M. Sc.
	Horticulture: vegetables, plastic green-houses	D. S. Nuland, M. Sc.

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-G 21.1 - 28.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Lincoln, Nebraska (21.1)	Horticulture: potatoes Instruction (Extension) Ornamentals, propagation turf Horticulture: climatology Environment, cold, heat, drought Horticulture: extension	Assoc. prof. dr. R. B. O'Keefe J. L. Mohler Ass. prof. H. M. Pellett Assoc. prof. dr. N. J. Rosenberg Ass. prof. dr. C. Y. Sullivan Assoc. prof. W. C. Whitney/ Ass. prof. C. B. Billings, M. Sc.
22. North Platte 22.1 <i>General horticulture</i>	North Platte Experiment Station State institution. Varieties of garden chrysanthemums, penstemon and strawberries.	North Platte, Nebraska Superintend.: Ass. prof. G. Viehmeyer
Kansas		
23. Chepota 23.1 <i>Pecans</i>	Southeast Kansas Experimental Farm Branch station, state institution.	Chepota, Kansas W. Winzer (in charge)
24. Colby 24.1 <i>General horticulture</i>	Colby Experiment Station Branch station, state institution.	Colby, Kansas
25. Garden City 25.1 <i>General horticulture</i>	Garden City Experiment Station Branch station, state institution.	Garden City, Kansas
26. Manhattan 26.1 <i>General horticulture</i>	Kansas State University, Agricultural Experiment Station State institution. Department of Horticulture Equipment: Central building, various greenhouses, service buildings for its gardens, orchards, grass plots and tools, biochemical and other laboratories. Ornamental horticulture Fruit production with emphasis on physiological problems Plastics for greenhouses Ornamental horticulture Vegetable crops University Horticultural Farm Vegetable breeding, especially cucurbits Ornamental horticulture, turfgrass Christmas tree production Propagation problems Extension	Manhattan, Kansas Head: Dr. R. P. Ealy Prof. dr. R. W. Campbell Assoc. prof. dr. W. J. Carpenter W. Derthing, M. Sc. Assoc. prof. dr. J. K. Greig Jr Ass. prof. B. Hadle, M. Sc. (in charge) Assoc. prof. dr. C. V. Hall Prof. dr. R. A. Keen P. L. Roth, M. Sc. C. Long Ass. prof. dr. C. R. Roberts/ J. P. Slusher
27. Tribune 27.1 <i>General horticulture</i>	Tribune Experiment Station Branch station, state institution.	Tribune, Kansas
28. Ulysses 28.1 <i>Vegetables</i>	Southwestern Kansas Experimental Farm Branch station, state institution Vegetables and their irrigation	Ulysses, Kansas Dr. C. Basham (in charge)

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-G 29.1

Seat/Nature of program	Institution and projects	Address and staff
29. Wathena 29.1 Fruit	Northeastern Kansas Experimental Farm Branch station, state institution. Apples, peaches, small fruit	Wathena, Kansas Ass.prof.E. Abmeyer (in charge)

The southeastern one-third and two-thirds of the upper half of the state consist of undulating plains, steep ridges, and high peaks. Virtually the entire state is in the drainage basin of the Colorado River. The principal gorge is the world famed Grand Canyon.

The temperature range between day and night is extreme, especially at elevations above 5,000 feet where the nights are cool and comfortable. The southern section of Arizona has a delightful winter season which has made the area a mecca for winter tourists, retired persons and health seekers. At lower elevation in the Gila and Colorado River valleys a few locations often escape killing frosts for 2-3 years in succession. Most of the truck crops are grown in the southwestern part of the state. In this area rainfall generally averages about 5 inches per year, with few areas receiving as much as 10 inches. Major vegetable crops are lettuce, cantaloupe, potatoes, watermelons, onions, carrots, celery, broccoli, cabbage and cauliflower. Most of the lettuce is moved in packed cartons, but 3.7 per cent is wrapped in cellophane before being packed. With the end of the

bracero program, mechanical harvesting is increasing. More labour saving equipment will be in the fields soon for all vegetable crops. Principal vegetable producing areas are located in Apache, Cochise, Greenlee, Mohave, Navajo, Pima, Santa Cruz and Yavapai counties. The largest acreage is in Maricopa (49,000 acres) and Yuma (33,000 acres) counties.

Citrus (grapefruit, oranges and lemons) is produced only in Maricopa and Yuma counties. Freezes in January, 1963, caused considerable damage to lemons and grapefruit, and has influenced subsequent yields. There are approximately 23,000 bearing and 32,500 non-bearing citrus trees in the state.

Total grape production averages about 5 tons per acre.

Ornamental horticulture in the past 10 years has increased 91%, but still contributes a very small portion to the agricultural income. Nursery crops account for 91% of all income attributed to ornamental horticulture. Bedding plants production is an important segment of the flower industry. The ornamental industry is centered in Maricopa and Yuma counties.



Aerial view of Oregon State University in the heart of the Willamette Valley. In background: Willamette River and foothills of Cascade Range

Seat/Nature of program	Institution and projects	Address and staff
Oklahoma		
1. Bixby	Vegetable Research Station	Bixby, Oklahoma
1.1 Vegetables	Substation, state institution.	Superintend.: J.E. Marshall
2. Sparks	Pecan Research Station	Sparks, Oklahoma
2.1 Pecans	Substation, state institution.	Superintend.: H.L. Davis
3. Stillwater	Oklahoma Agricultural Experiment Station	Stillwater, Oklahoma
3.1 General horticulture	Main station, state institution. - Department of Botany and Plant Pathology Vegetable diseases - Department of Entomology Vegetable insects - Department of Horticulture Floriculture and nursery culture Vegetable breeding, particularly sweet potatoes Fruit crop culture Floriculture and nursery management Vegetable culture	Dir.: Dr.L.E.Hawkins Head: Dr.W.W.Hansen Prof.L.S.Morrison/Dr.F.B.Struble Head: Dr.D.E.Howell Dr.R.F.Walton Head: Prof.W.R.Kays Prof.W.R.Kays Dr.H.B.Cordner Prof.H.A.Hinrichs Prof.R.N.Payne Prof.F.A.Romshe
4. Stratford	Peanut Research Station	Stratford, Oklahoma
4.1 Peanuts	Substation, state institution.	Foreman: W.N.Stokes
5. Woodward	United States Southern Great Plains Field Station	Woodward, Oklahoma
5.1 General horticulture	Federal institution. Sorghum culture	Superintend.: E.H.Mc Ilvain Jr. R.A.Hunter
Texas		
6. Brownwood	Pecan Field Station	Box 589, Brownwood, Texas
6.1 Pecans	Substation, state institution. Pecan breeding and testing	 L.D.Pomberg(in charge)
7. Bryan	Texas Agricultural Experiment Station	College Station, Bryan, Texas
7.1 General horticulture	Main station, state institution. - Department of Entomology Insect taxonomy Pecan and fruit insects - Department of Plant Sciences Plant pathology Virology Plant nematodes Forest genetics - Department of Soil and Crop Sciences Vegetable breeding and testing Processing and post harvest physiology Floriculture marketing, production and nursery management Landscape horticulture Fruit breeding Fruit production Turf management Floral plants, propagation, use and marketing	Dir.Dr.E.E.Patterson Head: Dr.J.C.Gaines Dr.H.R.Burke Dr.D.R.King Head: Dr.D.W.Rasberg Dr.R.S.Hallewell Dr.W.H.Thames Dr.J.P.Van Buijtenen Head: Dr.M.E.Bloodworth Dr.H.T.Blackhurst Dr.F.E.Burns A.F.DeWorth J.J.Franklin Dr.E.T.Graham Bluefford Hancock G.G.McBee J.D.Manring

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Bryan, Texas (7.1)	Nutrition, hormone physiology Woody plants, identification, production, adaptation Pomology, pecans	Dr. D. R. Paterson H. C. Thompson Dr. J. B. Storey
8. Fort Worth	Forth Worth Botanic Garden	3220 Botanic Garden Drive, Fort Worth, Texas
8.1 Botany	Municipal botanic garden founded in 1933. Consists of 75 acres with one display and two service greenhouses. Forestry, horticulture Horticulture	Dir.: S. Fikes D. Nivens
9. Iowa Park	Iowa Park Experiment Station	No. 16 Iowa Park, Texas Superintend.: L. E. Brooks
9.1 General horticulture	Substation, state institution. Vegetable and fruit crops adapted to north central Texas; peaches, pecans, vine crops and tomatoes. General horticulture	V. I. Woodfin
10. Montague	Montague Fruit Field Station	Montague, Texas
10.1 Fruit	Substation, state institution. Fruit investigations	V. A. Randolph (in charge)
11. Prairie View	Agricultural and Mechanical College	Prairie View, Texas Dean: G. L. Smith
11.1 General horticulture	Substation, state institution. Horticulture	Dr. E. W. Owens
12. Stephen- ville	Stephenville Station	No. 20, Stephenville, Texas Superintend.: B. C. Langley
12.1 General horticulture	Substation, state institution.	T. E. Denman
13. Weslaco	Weslaco Station	No. 15, Weslaco, Texas Superintend.: W. R. Cowley
13.1 General horticulture	Substation, state institution. Subtropical research. Insect ecology and biological control Horticulture Agricultural meteorology Vegetable disease identification Citrus Weed physiology and control Irrigation and drainage Viral phytopathology, fruit disease and breeding Pathology Entomology	J. W. Balock R. T. Correa/P. W. Leeper D. J. Haddock Dr. D. M. McLean N. P. Maxwell Dr. R. M. Menges V. I. Myers Dr. E. O. Olson Dr. B. Sluth Dr. D. A. Wolfenbarger
14. Yoakum	Yoakum Station	Yoakum, Texas
14.1 Plant protection	Substation, state institution. Plant disease investigations. Tomato and peanut diseases Watermelon diseases, nematology	Dr. A. L. Harrison (in charge) T. E. Boswell
New Mexico		
15. Alcalde	Espanola Valley Branch Station	Alcalde, New Mexico Superintend.: P. M. Trujillo
15.1 General horticulture	State institution. Agronomy; fruit and vegetable variety trials	

Seat/Nature of program	Institution and projects	Address and staff
16. Las Cruces 16.1 General horticulture	New Mexico State University, New Mexico Agricultural Experiment Station Main station, state institution. - Department of Botany and Entomology General entomology Pea aphids Fruit and ornamental insects - Department of Horticulture Ornamental horticulture, propagation and morphology Post harvest physiology, maturity, fruit culture Physiology of vegetables, vegetable variety trials, dormancy and rest in woody plants Ornamentals, plant identification, landscape design, florist crop production Plant breeding, esp. pecans and chili	University Park, Las Cruces, New Mexico Dir.: Dr. P. J. Leyendecker Assoc. dir.: Dr. M. L. Wilson Head: Dr. J. G. Watts Dr. J. L. Auclair Dr. S. Coppock Head: Dr. F. B. Widmoyer Dr. D. T. Sullivan Dr. J. N. Corgan Dr. E. R. Jensen Dr. R. M. Nakayama
17. Los Lunas 17.1 Fruit	Middle Rio Grande Branch Station State institution. Fruit tree production research is being moved to this station since the climate is similar to that of the majority of the apple growing areas. Physiology of fruit trees: nutrition and fruit thinning	Rt. 1, Box 28, Los Lunas, New Mexico Superintend.: H. D. Jones Dr. M. Nour
Arizona		
18. Mesa 18.1 Vegetables	Mesa Branch Station State institution. Physiology of vegetables, development of mechanical harvesters for vegetable crops. Post harvest physiology Vegetable breeding Vegetable insects Vegetable, field crops and citrus insects Horticultural biochemistry Vegetable diseases	Mesa, Arizona Superintend.: Dr. W. D. Pew Dr. P. M. Bessey W. T. Bond/R. E. Foster II R. W. Brubaker Dr. P. D. Gerhardt G. C. Sharples Dr. W. J. M. Stone
19. Phoenix 19.1 Botany	Desert Botanical Garden of Arizona Private institution, founded in 1938, 150 acres. Temperature range 125-20°F; cacti and leaf-succulents. Cacti, desert trees and shrubs Agave	Box 547, Tempe, Arizona Dir.: W. H. Earle J. H. Weber
20. Superior 20.1 Botany	Boyce Thompson Southwestern Arboretum Private institution, founded in 1928, consists of 900 acres of which 30 are in the arboretum. Introduction of plants to the more arid parts of the Southwest: Acacia, Atriplex, Callistemon, Condalia, Eucalyptus, Melaleuca, Pistacia, Rhus, Anacardiaceae, Cactaceae, Leguminosae and Myrtaceae.	Box 307, Superior, Arizona Dir.: J. E. Thompson Jr. Ass. dir.: B. W. Benson
21. Tempe 21.1 Citrus	Salt River Valley Branch Station State institution. Citrus physiology Pathology of horticultural crops Nematology	Tempe, Arizona Superintend.: Dr. R. Hilgeman Dr. L. M. Blank Dr. H. W. Reynolds

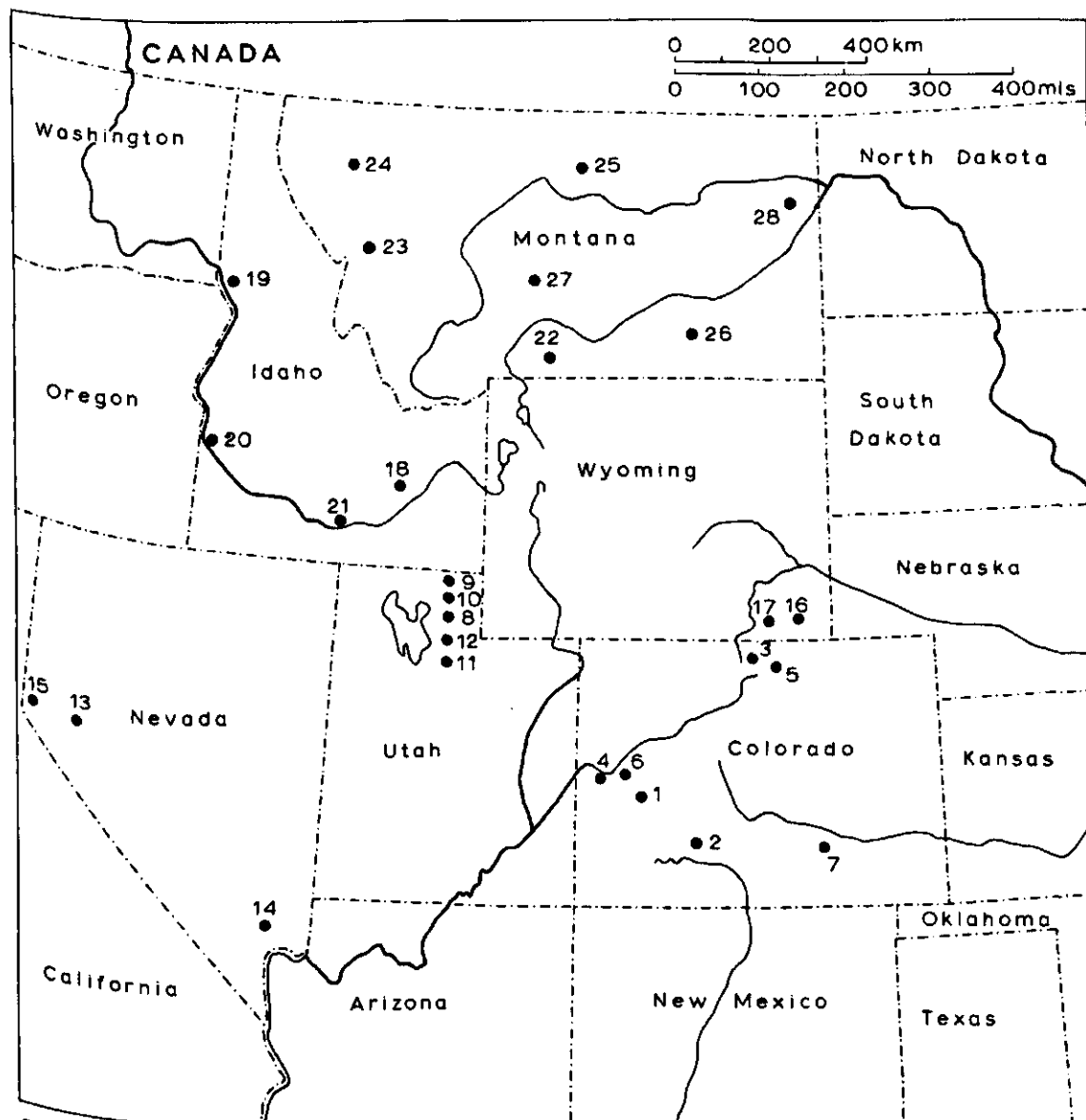
RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-H 22.1 - 23.1

Seat/Nature of program	Institution and projects	Address and staff
22. Tucson 22.1 <i>General horticulture</i>	University of Arizona, Arizona Agricultural Experiment Station Main station, state institution. - Department of Entomology Taxonomy of insects - Department of Horticulture Vegetable genetics Landscape horticulture Landscape design Physiology of ornamental plants Physiology of fruit trees Extension: vegetables Extension: fruit crops and landscaping - Department of Plant Pathology Diseases of ornamental crops Soil borne diseases Forest tree diseases Virus diseases Root diseases	Tucson, Arizona Dir.: Dr. R. K. Frevert Head: Dr. L. A. Carruth Dr. F. G. Werner Act. head: Prof. S. Fazio Dr. W. P. Bemis Dr. L. Burkhart Prof. J. S. Folkner Dr. Le Moyne Hogan Dr. J. R. Kuykendall Dr. N. F. Oebker H. F. Tate Head: Dr. G. A. Gries Dr. S. M. Alcorn Dr. Alice M. Boyle Dr. P. D. Keener Dr. M. R. Nelson Dr. R. B. Streets
23. Yuma 23.1 <i>Vegetables, citrus</i>	Yuma Valley and Yuma Mesa Branch Station State institution. Vegetable and citrus research. Vegetable production Citrus physiology Citrus diseases	Yuma, Arizona Superintend.: F. Pritchard J. H. Park N. Reimers Dr. R. M. Allen

I. Mountain States

Colorado, Utah, Nevada, Wyoming, Idaho, Montana



Colorado: 1. Austin, 2. Center, 3. Fort Collins, 4. Grand Junction, 5. Greeley, 6. Hotchkiss, 7. Rocky Ford. Utah: 8. Farmington, 9. Logan, 10. Ogden, 11. Provo, 12. Salt Lake City. Nevada: 13. Fallon, 14. Logandale, 15. Reno. Wyoming: 16. Cheyenne, 17. Laramie. Idaho: 18. Aberdeen, 19. Moscow, 20. Parma, 21. Twin Falls. Montana: 22. Bozeman, 23. Corvallis, 24. Creston, 25. Havre, 26. Huntley, 27. Moccasin, 28. Sidney.

Colorado

Horticultural crops produced commercially in Colorado, return about 60 million dollars annually to growers. It is of direct importance to the economical life of Colorado by the contribution to transportation, chemical

supplies, containers, power equipment and labour used in the growing and marketing of the crops. The potato crop dominates the horticultural crops accounting for about 40%, fresh and processed vegetables crops 27%, fruit crops (apples, peaches, pears, cherries,

etc.) 16%, under-glass crops (carnations) 16%, flower and vegetable seeds 1% of the total dollar income to the state. There is a rapid expansion now under way in the field of ornamental horticultural plants including trees, shrubs and outdoor flowering plants and in turf grass.

Colorado's climate is modified by the Rocky Mountain range which cuts down through the center of the state. It has the highest mean altitude of any state and crops are grown at elevations which vary from 4,200 to 9,200 feet above sea level. The major crops are grown in areas which in general have low average precipitation, low humidities, intense sunlight and few cloudy periods.

The major fruit, potato and fresh vegetable crops are produced in districts with an annual total precipitation of 8 inches. The apple crop is grown at elevations from 4,300 feet to 6,200 feet above sea level while the major potato growing area is located at an elevation of 7,600 feet above sea level.

The development of irrigation in Colorado and the southwest goes back to the Pueblo Indians and irrigation works probably were built between 1200 and 1400 A.D. The Spanish colonists, according to the authentic records, were issued court decrees for irrigation rights on Colorado streams in 1852, near the town of San Luis, Colorado. Since that time Colorado has developed a network of irrigation canals and storage reservoirs which has set, not only the legal pattern on water usage from rivers but determined the history and development of horticulture in Colorado. The history of research in horticulture goes back to date of the establishment of Colorado State University in 1870 although the first official research report was not made until 1883. The agricultural experiment station was officially established in 1888 following the passage of the Federal Hatch Act. Colorado Agricultural Experiment Station now operates 8 branch stations. The Arkansas Valley Branch Station has been in continuous operation since 1888 and the research work there pioneered in the development of the western cantaloupe industry by the development of the first disease resistant cantaloupe variety at Rocky Ford, Colorado, in 1905. Most of the horticultural research conducted there now involves the onion crop introduced by the stations in 1924 and canning of tomatoes. Horticultural research work is conducted on three fruit branch stations at Austin, Hotchkiss and Grand Junction, on the San Luis Valley Branch Station at Center, Colorado, on the USDA Potato Field Station at Greeley, Colorado and on the Arkansas Valley Station at Rocky Ford.

Utah

The horticulture industry in Utah was started

the first day the Mormon pioneers reached what is now Salt Lake City in 1847. Five acres of potatoes were planted the day of arrival. Fruit tree seed and scions were also brought by these pioneers with standard varieties being planted in 1850.

Most of the cultivated lands of the state are at an elevation of between 4,200 and 5,000 feet. Only the Dixie area in the southwestern corner of the state is lower in elevation, averaging 4,000 feet.

The most important agricultural areas for crop production have a growing season of from 120 to 150 days. The weather is dry with relatively little fog and wind and not many cloudy days. The days are bright and warm, and the nights relatively cool. Only 7% of the land area receives more than 20 inches of precipitation a year. About 41% receives from 10 to 20 inches, 46% from 5 to 10 inches, and 6% less than 5 inches annually.

Although the seasonal distribution of precipitation within the state varies, in the major crop-producing area, which is the north-central part of the state, the maximum precipitation comes in the spring and the minimum in the summer months. The fruit and vegetable plantings are concentrated in this area which includes Utah, Box Elder, Davis, Weber, Salt Lake and Cache counties.

Irrigation water is usually plentiful in this area. The water is impounded in mountain reservoirs or diverted from streams to the fields in canals.

Principal vegetable crops grown in Utah are tomatoes, potatoes, snap beans, dry onions, bunching onions, peppers, cucumbers, sweet corn, lettuce, squash, peas, celery, eggplant, carrots, beets, parsley, cauliflower and cabbage. The important processing crops are tomatoes, snap beans, sweet corn, cucumbers, carrots, peas and cabbage.

Principal fruit crops in Utah are sweet apples, peaches, sour cherries and pears. There are also some apricots and raspberries.

Nevada

Around the turn of the century the state of Nevada boasted a thriving pomological industry. Shortly thereafter, with the onset of a mining depression, the industry gradually failed and horticultural research was dormant until 1960 when interest revived.

A small horticultural business struggled throughout the years but recently a strong interest in greenhouse crops and ornamentals has developed.

The major horticultural crops in western Nevada are potatoes, cantaloupe, onions and garlic; in southern Nevada tomato plants, onions, radishes and lettuce. Production in the remainder of the state is negligible.

Wyoming

Horticulture enterprises in Wyoming appear to be small when the area of the state is considered. This is due to low population density and to the fact that much of the area of the state is grassland and forest.

Vegetables for market are grown on about one hundred farms throughout the state. The dollar sales from these amount to \$ 152,000. Thirty farms produce some fruit for sale having an annual value of \$ 25,500.

Fifty thousand acres of dry beans are grown each year on irrigated land and yield about 685,000 cwt. valued at \$ 5,100,000.

Potatoes are grown on 4,000 acres, with a yield of about 660,000 cwt. Three thousand of these are irrigated producing potatoes for table stock and chipping. Seed potatoes are grown on about 1,000 acres of dryland. These are primarily produced for export to other states.

Greenhouse and nursery operations in the state amount to approximately one million dollars retail per year. This may be broken down into products (seed, etc. \$ 364,800; farm selling \$ 321,800; nursery trees and shrubs \$ 39,700; cut flower \$ 200,300 and vegetable plants \$ 124,800).

One canning company is located within the state contracting about 900 acres each year. Their products are cut string beans, whole sweet corn, creamed corn, table beets, carrots, pie pumpkin, pork and beans.

The USDA Cheyenne Horticultural Field Station is located within the state. Personnel employed at the station have developed many new varieties adapted to high plains area of the United States.

Idaho

The principal horticultural crop in Idaho is the potato. Potatoes are grown principally in the Snake and Upper Snake areas from Twin Falls to Idaho Falls. Other vegetable crops of importance include onions, mostly Sweet Spanish; sweet corn and lima beans for processing; green peas and spinach for freezing. Food processing is Idaho's most rapidly growing industry. Recently there has been an increased interest in the production of snap beans for processing. It is expected that the acreage devoted to this crop will increase considerably in the immediate future. The production of greenhouse tomatoes is increasing rapidly. The natural hot water

springs provides an abundance of low-cost heat for greenhouse operations. A very active vegetable seed industry has been established in Idaho for a long time. Idaho produces the major proportion of the following vegetable seed for the United States: green beans, onions, leaf lettuce, carrots, sweet corn and peas. Lesser amounts of radish, turnip, parsnip and other minor vegetables are also grown for seed production purposes. Apples, prunes, sweet cherries and peaches are the leading fruit crops. These are grown principally in the Boise and Payette River Valleys in southwestern Idaho and are sold for fresh market. There is a limited production of pears, apricots, cane fruits and strawberries. Most of the strawberries are produced for processing rather than for the fresh market.

Montana

Since Montana is pre-eminently a grain and livestock producing state, horticultural enterprise accounts for only about 2.5% of the agricultural income. The best estimate of the contribution of horticultural enterprise to the economy of Montana is that the annual value of horticultural endeavour is between \$ 9,000,000 and \$ 10,000,000, as a minimum.

Horticulture in Montana is characterized by a modest assemblage of small businesses, engaged in intensive agriculture with varying degrees of specialization. Some horticultural enterprises, such as floriculture and home gardening, are rather generally distributed throughout the state; others, such as sweet and sour cherry production, are concentrated in relatively limited areas, as a result of climatic factors or association with centers of population, as florists' shops and garden centers.

Horticultural research in Montana began with the organization of the Montana Agricultural Experiment Station at Bozeman in 1893, when S.M. Emery was appointed the first station director and horticulturist. A staff in horticulture has been maintained at Bozeman almost continuously since that time. A Horticultural Branch Station (now the Western Montana Branch Station) was established in 1907 at Corvallis for the principal purpose of research in production of McIntosh apples which were being planted extensively in the Bitter-root Valley of western Montana at that time.

Seat/Nature of program	Institution and projects	Address and staff
Colorado		
1. Austin	Western Colorado Branch Station	Austin, Colorado
1.1 <i>Fruit</i>	State institution. Tree fruit nutrition and management research Post harvest physiology and leaf-analysis research	Superintend.: E. Rogers, M.Sc. C. Peters
2. Center	San Luis Valley Branch Station	Center, Colorado
2.1 <i>Vegetables</i>	State institution. Potato nutrition High altitude vegetable crops physiology; head lettuce	Dr. G. Klacan Dr. F. Moore III
3. Fort Collins	Colorado State University, Agricultural Experiment Station	Fort Collins, Colorado Dir.: Dr. S. S. Wheeler
3.1 <i>General horticulture</i>	Main station, state institution.	
3.2 <i>General horticulture</i>	Colorado State University Research Foundation Main station, state institution. - Department of Horticulture Research problems of turf grasses and winter hardiness Canning of crops; plant physiology research on problems of vegetable crops for processing; cultural problems related to mechanical production and harvesting Genetics and plant breeding, canning of tomatoes and onions Genetics and plant breeding: potatoes and cucurbits Iris breeding Floriculture; carnations, environmental research, CO ₂ , light and temperature effects Floriculture; carnation breeding, foundation cuttings, environmental research with carnations and roses Floriculture: carnation research, irrigation regimes and soil factor problems Post harvest physiology: potatoes and apples	Fort Collins, Colorado Dir.: Dr. G. C. Olson Head: A. M. Binkley, M.Sc. G. A. Beach, M.Sc. Dr. J. Ellis Dr. R. L. Foskett Dr. D. Denna Prof. C. Jorgensen Prof. K. Goldsberry Prof. W. D. Holley Dr. J. J. Hanan Dr. M. Workman
4. Grand Junction	Western Colorado Branch Station	Grand Junction, Colorado
4.1 <i>Fruit</i>	State institution. Fruit breeding and rootstock research	Superintend.: Dr. R. Ure
5. Greeley	USDA Potato Field Station	Greeley, Colorado
5.1 <i>Potatoes</i>	Federal institution. Plant pathology: potato breeding and disease research	Superintend.: Dr. S. Alfieri
6. Hotchkiss	Western Colorado Branch Station	Hotchkiss, Colorado
6.1 <i>Fruit</i>	State institution.	
7. Rocky Ford	Arkansas Valley Branch Station	Rocky Ford, Colorado
7.1 <i>Vegetables</i>	State institution. Tomato genetics	Superintend.: J. Swink

Seat/Nature of program	Institution and projects	Address and staff
Utah		
8. Farmington	Farmington Station	Farmington, Utah
8.1 General horticulture	Branch station, state institution. Vegetables, ornamental, small fruit culture and stone fruit virus research.	R.P. Draper (in charge)
9. Logan	Utah Agricultural Experiment Station	Logan, Utah
9.1 General horticulture	Main station, state institution. - Department of Agricultural Economics Fruit marketing Fruit tree values and marketing - Department of Agronomy Meteorology, temperature and frost resistance on stone fruit Fruit tree nutrition Fruit tree irrigation - Department of Botany and Plant Pathology Vegetable crops diseases Basic virus research Fluorine damage and iron chlorosis (enzyme studies) Iron nutrition and water relations of fruit trees Diseases affecting insect pollinators - Department of Horticulture Lima bean breeding Small fruit culture and weed control Extension Tomato culture and weed control Post harvest physiology of fruit and vegetables Food preservation and processing Ornamentals: extension Nutrition and rest of fruit trees Culture of ornamental shrubs - Department of Zoology Insects on fruit trees Vegetable and ornamental insects: extension Safe use of pesticides: extension USDA Collaborators Pollination of vegetable seed crops Vegetable seed physiology Pollination of canning crops Nematodes with small and stone fruit Tomato breeding for curly top resistance Stone fruit virus diseases Bee management and biology	Dir.: Dr. D. W. Thorne Dr. E. W. Lamborn E. M. Morrison, M. Sc. Dr. G. L. Ashcroft Dr. R. L. Smith Dr. S. Taylor Head: Dr. O. S. Cannon Dr. G. W. Cochran/Dr. A. S. Dhaliwal Dr. G. W. Miller/Dr. G. W. Welkie Dr. H. H. Wiebe Dr. G. M. Baker Head: Dr. L. H. Pollard Dr. J. L. Anderson A. B. Call, M. Sc. Dr. A. R. Hamson Dr. L. E. Olson Dr. D. K. Salunkhe Dr. A. Stark Dr. D. R. Walker Dr. B. G. Wesenberg Dr. D. W. Davis Dr. G. Knowlton R. S. Roberts, M. Sc. Dr. G. E. Bohart Dr. W. F. Campbell H. E. Dorst, M. Sc. Dr. G. D. Griffin/E. C. Jorgenson, M. Sc. Dr. M. W. Martin Dr. B. N. Wadley W. P. Nye, M. Sc.
10. Ogden	Ogden Station	Ogden, Utah
10.1 Fruit	Branch station, state institution. Fruit tree culture and variety studies	O. C. Kirk (in charge)
11. Provo	Brigham Young University	Provo, Utah
11.1 General horticulture	Private institution. General fruit culture Floriculture and ornamental culture Fruit nutrition, irrigation and breeding	C. Ashton E. Reimschuessel, M. Sc. Dr. L. Whitton

Seat/Nature of program	Institution and projects	Address and staff
12. Salt Lake City 12.1 <i>General horticulture</i>	University of Utah State institution. - Department of Botany Plant-water relations Air pollution of ornamentals Floriculture: genetics	Salt Lake City, Utah Head: Dr. I. B. McNulty Dr. M. Treshow Dr. R. K. Vickery/Dr. S. Flowers
Nevada		
13. Fallon 13.1 <i>General horticulture</i>	Fallon Branch Station State institution.	Fallon, Nevada J. McCormick, M. A.
14. Logandale 14.1 <i>General horticulture</i>	Logandale Branch Station State institution. Greenhouse crops	Logandale, Nevada G. D. Robinson, M. Sc.
15. Reno 15.1 <i>General horticulture</i>	Nevada Agricultural Experiment Station Main station, state institution. Drought physiology, greenhouse crops	Reno, Nevada Dir.: Dr. D. W. Bohmont Dr. R. H. Ruf Jr.
Wyoming		
16. Cheyenne 16.1 <i>General horticulture</i>	USDA Cheyenne Horticultural Field Station Adaptation of horticultural varieties to high plains area.	Cheyenne, Wyoming
17. Laramie 17.1 <i>General horticulture</i>	Wyoming Agriculture Experiment Station Main station, state institution. Horticulture: extension Horticulture: disease and culture problems	Laramie, Wyoming Dir.: Dr. N. W. Hilston L. C. Ayers, M. Sc. Dr. C. W. McAnelly
Idaho		
18. Aberdeen 18.1 <i>General horticulture</i>	Aberdeen Branch Experiment Station State institution. Potatoes Crop diseases	Aberdeen, Idaho Prof. W. C. Sparks Dr. W. M. Iritani/Dr. L. Sanford (USDA)/Prof. C. E. Dallimore
19. Moscow 19.1 <i>General horticulture</i>	Idaho Agricultural Experiment Station Main station, state institution. Diseases of horticultural crops Vegetable culture problems, mainly with potatoes Ornamental horticulture and landscape gardening	Moscow, Idaho Dir.: Dr. J. E. Kraus Dr. A. W. Helton Dr. G. W. Woodbury Prof. W. H. Snyder
20. Parma 20.1 <i>General horticulture</i>	Parma Branch Experiment Station State institution. Breeding hybrid onions and hybrid carrots Tree crop culture problems Vegetable crops Genetics: onion Diseases	Parma, Idaho Superintend.: D. F. Franklin Dr. W. Kochen Dr. R. F. Foley Dr. G. McCollum (USDA) Prof. W. R. Simpson

Seat/Nature of program	Institution and projects	Address and staff
21. Twin Falls 21.1 <i>General horticulture</i>	Twin Falls Branch Experiment Station State institution. Crop diseases	Twin Falls, Idaho Dr. L. L. Dean/Dr. L. Laferriere
Montana		
22. Bozeman 22.1 <i>General horticulture</i>	Montana Agricultural Experiment Station Main station. State institution. - Department of Botany and Bacteriology Rumen bacteria in relation to cellulose digestion Floristic studies, agrostology Virus diseases of stone fruits, potato diseases Diseases of ornamental plants and potatoes Virus diseases of potatoes - Department of Plant and Soil Science Genetics, wheat breeding Breeding of vegetables, potatoes, herbaceous ornamentals, hardiness of cherry varieties, horticultural biosystematics Turf studies, woody ornamentals	Bozeman, Montana Dir.: Dr. J. A. Asleson Head: Dr. R. C. McBee Dr. W. E. Booth Dr. M. M. Afanasiev Dr. H. S. MacWithey Jr. Dr. R. I. Hamilton Head: Dr. E. R. Hehn Prof. H. N. Metcalf Prof. G. E. Evans
23. Corvallis 23.1 <i>Fruit</i>	Western Montana Branch Station State institution. Biology and control of cherry fruit flies, fruit variety evaluation Plant nutrition	Corvallis, Montana Act. superintend.: Prof. D. R. Merkley Prof. D. Graham
24. Creston 24.1 <i>General horticulture</i>	Northwestern Montana Branch Station State institution, started in 1949 to serve the research needs of ranchers in the Flat-head District of northwestern Montana. Potato culture and variety evaluation	Creston, Montana Superintend.: Prof. C. W. Roath
25. Havre 25.1 <i>General horticulture</i>	North Montana Branch Station State institution, started in 1913 to serve the research needs of northern Montana ranchers. Dryland shelterbelts, dryland fruit culture and variety evaluation	Havre, Montana Superintend.: Prof. C. Windecker
26. Huntley 26.1 <i>General horticulture</i>	Huntley Branch Station State institution, started in 1910 to assist ranchers in solving problems related to irrigated crop production on the Huntley Irrigation Project. Vegetable production Tomato breeding, ornamental horticulture, dry bean production	Huntley, Montana Superintend.: Prof. J. L. Krall Prof. A. L. Richardson
27. Moccasin 27.1 <i>Vegetables</i>	Central Montana Branch Station State institution, started in 1907 to assist ranchers in solving problems in the Judith Basin of central Montana. Dryland shelterbelts, potato and vegetable evaluations and culture	Moccasin, Montana Superintend.: A. L. Dubbs

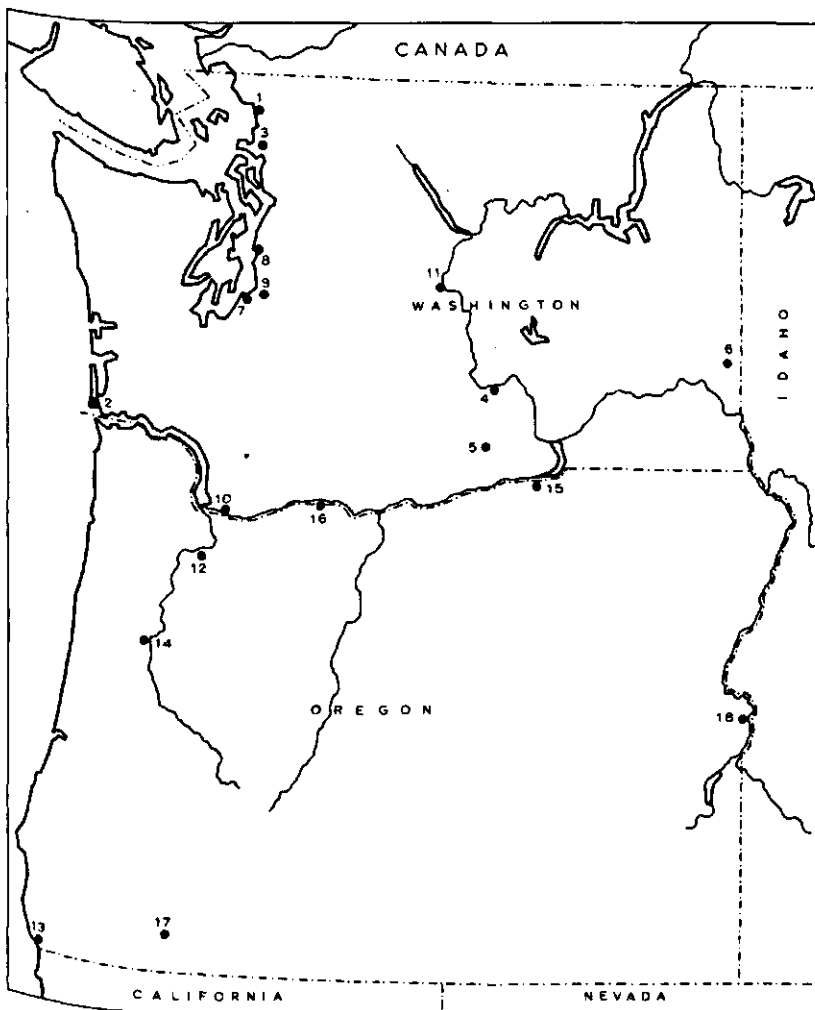
RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-I 28.1

Seat/Nature of program	Institution and projects	Address and staff
28. Sidney 28.1 <i>General horticulture</i>	Eastern Montana Branch Station State institution, started in 1947 to assist ranchers in solving problems in irrigated and dryland agriculture in eastern Montana. Dry bean production and variety evaluation, potato production, ornamental horticulture	Sidney, Montana Superintend.: Prof. G. P. Hart- man

J. Pacific Northwest States

Washington, Oregon



Washington: 1. Bellingham, 2. Long Beach, 3. Mount Vernon, 4. Moxee, 5. Prosser, 6. Pullman, 7. Puyallup, 8. Seattle, 9. Sumner, 10. Vancouver, 11. Wenatchee, 12. Aurora, 13. Brookings, 14. Corvallis, 15. Hermiston, 16. Hood, 17. Medford, 18. Hood River, 17. Medford, 18. Ontario.

0 50 100 km
0 50 100 miles

Several states have a greater total production of fruits, nuts, vegetables and speciality horticultural crops than the states of the Pacific Northwest, but certain of these crops are produced in abundance in this region. The Pacific Northwest states lead all states in the production of apples, winter pears, black raspberries, trailing blackberries for processing, filberts, snap beans, and Irish potatoes. They are second in the production of Bartlett pears, prunes, walnuts, and strawberries. Although ranking third after fruits and vegetables in this region, ornamental crops are increasing at a faster pace. The region leads the nation in the production of bulbs, shade trees,

evergreen trees and shrubs, and is the sole commercial producer of English holly. The Pacific Northwest produces approximately 30% of the U.S. production of apples and 32% of the pears, with Washington having the greatest production. The region also produces 17% of the nation's plums and prunes and roughly 22% of its cherries. Oregon leads in the production of these stone fruits. Washington is a substantial producer of peaches and apricots. The two states produce 31% of the country's berries, and Washington is a leading producer of juice grapes. The two states produce all the nation's filberts and approximately 6% of its walnuts. It is estimated that 6% of the vegetables grown in the U.S.

come from Northwest states. These are principally for processing. Oregon leads the nation in snap bean production and approximately 28% of national production is from Oregon and Washington. The Northwest states, including Idaho, also produce 20% of the nation's sweet corn and 35% of the peas for processing.

The Northwest has a variety of climatic settings as a result of variations in surface form and elevation. The influence of the Pacific Ocean is modified by two parallel mountain ranges as distance increases inland from the coast line. The Cascades dominate the region and serves to divide both Oregon and Washington into two climate sub-regions: the mild, comparatively wet west and the more extreme, drier east.

Tree fruit research in the region during the past 50 years has been directed principally at finding varieties suited to climate and soils of the region and the demands of an export market. The latter has also required considerable research in handling and storage. The selection of virus-free varieties and rootstocks resistant to certain disease problems and low winter temperatures has received considerable attention. Orchard management research has concerned itself with soil management, irrigation, orchard heating, pest and disease control, pollination and chemical control of fruit set. The breeding of small fruits and vegetables for processing and for resistance to certain serious disease problems has received considerable attention in recent years. Management problems in these crops, as in the fruits and ornamentals, are the same the world over. The general trend in recent years has been toward more basic inquiry into the physiology and genetics of these horticultural crops, as both growers and researchers have become more sophisticated and refined in their understanding of crop problems.

Organized horticultural research in the Northwest had its beginning with the establishment of the Oregon Agricultural Experiment Station in 1888 and the Washington Agricultural College and Experiment Station in 1892. There was a Horticultural Department at Oregon State Agricultural College as early as 1890, working on such problems as the use of paris green in controlling "codlin" moth.

Branch Stations to study area problems soon followed. The Hood River Station was established in 1912 to help solve problems in this rapidly expanding apple center. Although at first a station for field demonstrations only, the present Western Washington Experiment Station at Puyallup has been interested in horticultural problems since 1894. At present there are six branch stations in Washington and five in Oregon that have established the research services of the State Universities in most of the Northwest's leading horticultural districts.

The University of Washington Arboretum at Seattle was established in 1935 to introduce, test, and distribute new or rare trees and shrubs. This activity is under the administration of the University's School of Forestry. The Pacific Bulb Grower's Research and Development Station at Harbor, Oregon, for lily bulb research is supported with funds supplied by the bulb growers and jobbers, but is under the administration of Oregon State University with the aid of a bulb grower's advisory committee.

The United States Department of Agriculture has been active in horticulture research at both the central and branch stations in Oregon and Washington from the beginning. The Federal-State research activities have been on a co-operative basis and the USDA workers were considered as members of the staff of these stations.

The Washington State Department of Agriculture's Horticultural Division co-operating with the State University and the State Agricultural Experiment Station manages a State Nursery (Bellingham) and a Plant Introduction and Quarantine Station (Moxee) for the purpose of providing certified, true-to-name, pathogen-free nursery stock to Washington fruit growers. The Oregon State Department of Agriculture, established in 1931, works in a similar manner with Oregon State University.

A number of commissions and councils have been established to encourage and financially support horticultural research in the Northwest. The Washington State Apple Commission, Fruit Commission, Potato Commission, and Wine and Grape Growers Council are examples in Washington, while Oregon has its Filbert Commission, Nursery Advisory Council and Oregon Strawberry Council.

Seat/Nature of program	Institution and projects	Address and staff
Washington		
1. Bellingham 1.1 <i>General horticulture</i>	Washington State Nursery Established in 1912. In 1954 the Washington State Department of Agriculture, Division of Horticulture, the Washington State University and the Washington State Agricultural Experiment Station took over this station for greenhouse and field testing of berry plants and potatoes for plant and seed certification, the emphasis being virus diseases, field testing of tree fruits, virus testing of dry beans in greenhouse, variety testing of strawberries, raspberries, elderberries and potatoes.	Bellingham, Washington Dep. supervisor: R. Kern Superintend.: R. O. Holland
2. Long Beach 2.1 <i>Small fruit</i>	Coastal Washington Station State institution, established in 1923 as a branch station for blueberry and cranberry research with major emphasis on control measures for insects, diseases and weeds; soil management and frost control. Nutrition, weed control, frost control and plant hardiness Cranberry storage and handling research	Long Beach, Washington Superintend.: Dr. C. C. Doughty A. Y. Shawa, M. Sc.
3. Mount Vernon 3.1 <i>General horticulture</i>	Northwestern Washington Station Established in 1947 as a branch station of the Washington State Agricultural Experiment Station at Pullman. Peas, cabbages, sweet corn, vegetable seed crops, Brussels sprouts, miscellaneous vegetable crops, small fruit crops, ornamental crops and Christmas trees. Physiology and culture of small fruits and and vegetables, greenhouse crop production with special reference to CO ₂ and light effects Insect control studies on cabbage and seed crops and potatoes Etiology and control of soil-borne pathogens, particularly on peas and strawberries, and nematode control on horticultural crops Weed control in horticultural and agricultural crops	Mount Vernon, Washington Superintend.: Dr. R. A. Norton P. M. Eide, M. Sc. Dr. W. A. Haglund D. V. Peabody, M. Sc.
4. Moxee 4.1 <i>Fruit</i>	Plant Introduction and Quarantine Station Established in 1944; co-operation of the Division of Horticulture of the State Department of Agriculture, the Washington State University and the Washington State Agricultural Experiment Station for executing the Nursery Improvement Program which is designed to supply certified fruit trees to state's fruit tree industry.	Moxee, Washington Dep. supervisor: R. Kern Dir.: Dr. E. C. Blodgett/ M. D. Aichele; both stationed at Prosser (5)
5. Prosser 5.1 <i>Plant protection</i>	Irrigation Station Part of the Washington Agricultural Experiment Station system; established in 1919. Research on all phases of growth and management of all major irrigated crops in Washington with the exception of apples and pears.	Prosser, Washington Superintend.: H. P. Singleton, M. Sc.

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Wenatchee Washington (11.1)	Mechanical harvesting Fruit storage and warehouse equipment Pear insects Fruit tree viruses Virus therapy Fungus and bacterial diseases of fruit trees Fruit tree varieties, stock-scion relations and herbicides Insect control with chemosterilants Apple insects Fruit tree virus diseases and therapy Tree fruit physiology Post-harvest physiology of fruits Biological control of insects Cold storage engineering Post-harvest diseases of fruits Pesticide residue analysis Human toxicology of pesticides Weather relations to fruit	A. Berlage, M. Sc. ² / G. R. Stoford ² S. W. Burt, M. Sc. ² Dr. E. C. Burts ¹ P. Cheney, M. Sc. ² Dr. P. C. Cheo ¹ Dr. E. P. Covey ¹ Dr. E. S. Degman ^{1, 2} Dr. F. H. Harries ² Dr. S. C. Hoyt ¹ Dr. H. C. Kirkpatrick ² Dr. G. Martin ² / Dr. E. A. Stahly ² Dr. M. W. Williams ² Dr. K. L. Olsen ² / H. A. Schomer, M. Sc. ² W. J. O'Neill, M. Sc. ¹ G. O. Patchen, M. Sc. ² Dr. C. F. Pierson ² J. F. Armstrong, M. Sc. ³ H. R. Wolfe, M. Sc. ³ / Dr. W. F. Durham ³ J. W. Holcomb / A. H. Jones, M. Sc. / R. W. Surface (all ⁴)

Oregon

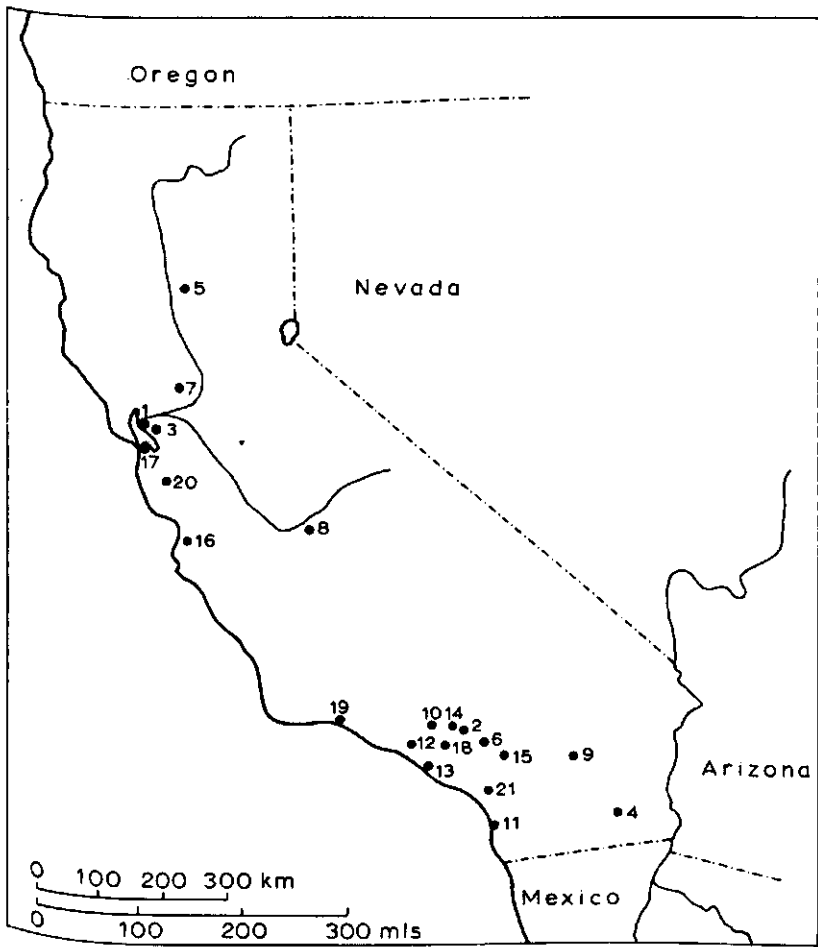
12. Aurora	North Willamette Experiment Station	Aurora, Oregon
12.1 General horticulture	Branch station of Oregon Agricultural Experiment Station (Corvallis). Small fruits, vegetables and nursery crops. Physiology and culture of small fruits and vegetables Physiology and breeding of ornamental nursery crops Culture of small fruits and vegetables	Superintend.: Dr. R. M. Bullock Dr. R. L. Ticknor W. A. Sheets
13. Brookings	Pacific Bulb Growers Research and Development Station	Brookings, Oregon
13.1 Floriculture	Co-operative venture between Pacific Bulb Growers Association, Oregon State University, University of California and USDA, administered by a joint growers' Advisory Committee and a Technical Research Committee appointed by the Dean of Agriculture of Oregon State University. Lily bulb production problems, breeding and variety testing, soil management, insect and disease control, virus diseases and vectors, storage, handling, subsequent greenhouse forcing, basic physiology. Nutrition and certain aspects of growth and development, breeding and variety testing Bulb physiology of flowering, storage and greenhouse forcing Lily viruses Bulb nematodes Lily bulb virus vectors	Dr. A. N. Roberts ⁵ Cr. L. T. Blaney ⁵ Dr. F. P. McWhorther ^{2, 5} Dr. H. J. Jensen ⁵ Dr. D. Coudriet ²

¹ Washington State University² United States Department of Agriculture³ United States Public Health Service⁴ United States Department of Commerce Weather Bureau⁵ Oregon State University

Seat/Nature of program	Institution and projects	Address and staff
14. Corvallis 14.1 General horticulture	Oregon Agricultural Experiment Station Main station. State institution co-operating with USDA. - Department of Agricultural Engineering Design and development of new or improved equipment for mechanizing harvesting and handling operations - Department of Botany and Plant Pathology Soil-borne diseases, diseases of ornamentals Electron microscopy of bulb viruses Non-virus diseases of tree fruits, fungus genetics Rose diseases, bacterial diseases Tree fruit fungicides Nematode diseases of plants, nematode ecology, control by soil fumigation Diseases of bulbs and florist crops Virus diseases of tree fruits Virus diseases of strawberry, nut diseases Diseases of small fruits and vegetables - Department of Entomology Vegetable insects Small fruit pests Tree fruit and nut insects Soil pests Nursery and ornamental pests - Department of Food Science and Technology Freezing and concentration of fruits and vegetables Anthocyanin pigments in fruits Chlorophylls Canning of fruits and vegetables Enzymes in fruits and vegetables - Department of Horticulture Physiology and nutrition of vegetable crops Vegetable crops breeding and genetics Physiology of ornamental plants Tree fruit nutrition Weed control Small fruit physiology and nutrition Post-harvest physiology of fruits Small fruit physiology and culture Vegetable crops physiology and nutrition Physiology and culture of walnuts and filberts Physiology and nutrition of ornamentals, tree fruit rootstock-scion relations Floriculture, physiology and culture Small fruit breeding and genetics Tree fruit physiology, pear rootstocks Tree fruit breeding and genetics	Corvallis, Oregon Dean/Dir.: W. T. Cooney, M. Sc. Head: J. B. Rodgers, A. E. D. E. Rooster, M. Sc. Head: Dr. R. A. Young Dr. T. C. Allen Dr. H. R. Cameron Dr. I. W. Deep Dr. N. D. Dobie Dr. H. J. Jensen Dr. F. P. McWhorter Dr. J. A. Milbrath Dr. P. W. Miller (USDA) Dr. E. K. Vaughan Head: Dr. P. C. Pitcher Dr. H. H. Crowell Dr. R. G. Rosenstiel S. C. Jones, M. Sc. H. E. Morrison, M. Sc. Dr. K. Swenson Head: Dr. H. W. Schultz D. V. Beavers Dr. R. F. Cain Dr. C. E. Samuels G. W. Varseveld, M. Sc. Dr. H. Y. Yang Head: Dr. S. B. Apple Dr. J. R. Baggett/Dr. W. A. Frazier Dr. L. T. Blaney Dr. O. C. Compton Dr. G. Crabtree Dr. R. Garren Dr. E. Hansen Dr. H. B. Lagerstedt Dr. H. J. Mack J. H. Painter, M. Sc. (USDA) Dr. A. N. Roberts S. E. Wadsworth G. F. Waldo, M. Sc. (USDA) Dr. M. N. Westwood Dr. Q. B. Zielinski
15. Hermiston 15.1 General horticulture	Umatilla Station Branch station. State institution in co-operation with USDA. Research on crops suitable for the newly developed Hermiston Irrigation District. Winter hardiness of pome fruits, stone fruits and nuts; variety testing of asparagus; development of diseases resistance in watermelons; testing of new horticultural crops for the surrounding irrigated area.	Hermiston, Oregon

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Hermiston Oregon (15.1)	Fruit and vegetable production problems including variety testing, weed, insect and disease control and winter hardiness.	Superintend.: T.P. Davidson
16. Hood River	Mid Columbia Station	Hood River, Oregon
16.1 <i>Tree fruit</i>	Branch station. State institution. Control of entomological orchard pests; control of tree fruit diseases; soil fertility; winter hardiness and pollination; cultural practices. The main crops under study are: pears, apples, cherries and peaches. Tree fruit rootstock-scion relations, post-harvest physiology of pome fruits, environmental factors effecting maturity and quality of pears and apples, orchard management problems and fluoride investigations on selected tree fruit crops Diseases of apples and pears Biology and control of entomological orchard pests	Superintend.: W.M. Mellenthin, M.Sc. Dr. D.L. Coyier Dr. R. Zwick
17. Medford	Southern Oregon Station	Medford, Oregon
17.1 <i>Tree fruit</i>	Branch station. State institution. Improvement of cultural practices, control of pests, introduction of superior varieties of pears, peaches, apples and sweet corn, pear rootstock research, pear breeding. Tree fruit physiology and nutrition Entomology	Superintend.: Dr. P.B. Lombard Dr. P. Westigard
18. Ontario	Malheur Station	Ontario, Oregon
18.1 <i>General horticulture</i>	Branch station. State institution. Research on livestock feeding, irrigation, soil management, variety testing of forage crops and to a limited extent horticultural crops (potatoes, onions, tree fruits). Onion pink root (<i>Pyrenochaeta terrestris</i>) control in co-operation with USDA and Idaho Branch Experiment Station at Parma Chemical weed control in onions, sugar beets and corn	Superintend.: E.N. Hoffman L. A. Fitch, M. Sc.

K. California



California: 1. Albany, 2. Arcadia, 3. Berkeley, 4. Brawley, 5. Chico, 6. Claremont, 7. Davis, 8. Fresno, 9. Indio, 10. La Canada, 11. La Jolla, 12. Los Angeles, 13. Palos Verdes Peninsula, 14. Pasadena, 15. Riverside, 16. Salinas, 17. San Francisco, 18. San Marino, 19. Santa Barbara, 20. Saratoga, 21. Vista.

General Survey

A diversity of horticultural crops from temperate zone to subtropical species are adaptable to California's varied climate and topography and irrigated agriculture. Many are so well adapted that California ranks at or near the top in the production of them. California's horticulture began in the late 1700's with the Spanish colonization and the agricultural development associated with the Jesuit missions. In the early 1800's, pioneer fruit growers, with American settlers prominent among them, established vineyards and orchards of citrus and deciduous fruits, preparing the way for the significant development in commercial horticulture attendant on the population growth which came with statehood and the gold rush. The opening of the transcontinental railroad and the advent of refrigerated transportation later in the

century were a major stimulus to the expansion of the fruit and vegetable industries. Ornamental or landscape horticulture also has grown in importance with the increasing population and urbanization in the state. The eminent position of California horticulture today is also due in part to contributions from horticultural research. Over the past 50 years especially, the University of California through its College of Agriculture and Agricultural Experiment Station has carried a major responsibility for such research with the efforts divided among several departments appropriate to the diversity and economic importance of the state's horticultural industries. Today, horticultural research in the University is centered primarily on two of its campuses with some additional on a third.



Experimental fields of the Saratoga Horticultural Foundation

RESEARCH INSTITUTIONS AND RESEARCH PROJECTS

USA-K 1.1 - 2.1

Seat/Nature of program	Institution and projects	Address and staff
California		
1. Albany 1.1 General horticulture	Western Regional Research Laboratory, Western Utilization Research and Development Division, United States Department of Agriculture. Agricultural Research Service. The Laboratory at Albany, headquarters for the Division, is one of the four original Regional Research Laboratories in the US authorized by the Federal Government in 1938 for conducting basic and applied research to find new and wider uses for American farm commodities, better products and wider markets. The Division consists of 10 laboratories of which 6 are concerned with horticulture. The fruit and vegetable laboratories conduct basic and applied research on new and improved processed products, methods of processing, relationship of composition to flavour, aroma, colour and texture of foods, chemical reactions related to quality changes and the use and control of micro-organisms in food processing. - Fruit Laboratory Flavour investigations Composition investigations Processing technology Product analysis Branch stations at Honolulu, Hawaii and Puyallup, Washington. - Engineering and Development Laboratory Equipment and process development and their economic evaluation; dehydrating, concentrating, freeze-drying, dehydrofreezing, canning and freezing - Pharmacology Laboratory Pharmacodynamics investigations Toxicology Pathology Physiological active compounds - Plant Enzym Pioneer Research Laboratory - Subtropical Fruit Laboratory at Pasadena (see 14.1) - Vegetable Laboratory Composition investigations Potato investigations Microbiology Processing technology Food appraisal investigations Los Angeles State and County Arboretum Operated by the Department of Arboreta and Botanic Gardens of Los Angeles County. Testing and introduction of ornamental plants from other parts of the world. Armillaria mellea (oak root rot), plant viruses, extension about plant diseases Plant taxonomy Herbarium (30,000 sheets)	800 Buchanan Street, Albany, California 94710 Dir.: Dr. M. J. Copley Chief: Dr. W. L. Stanley Dr. J. W. Corse Dr. F. P. Boyle Dr. R. M. McCready Chief: Dr. A. C. Keyl Dr. A. N. Booth Dr. W. E. Gagne Dr. L. L. Layton Chief: E. F. Jansen Chief: Dr. H. K. Burr Dr. J. F. Carson Dr. J. C. Lewis Dr. J. R. Wagner D. G. Guadagni Arcadia, California Superintend.: G. Spalding Dir.: Dr. W. S. Stewart Ass. dir.: G. Hiatt Dr. P. C. Cleo Dr. L. Enari Curator: A. Griffiths
2. Arcadia 2.1 Botany		

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Arcadia, Calif. (2.1)	Fire retarding plants Flower colour inheritance of camellias, cold resistance and fragrance in show-type camellia flowers; flavonoid pigments of <i>Gossypium</i> in relation to phylogenetic problems Testing on mowing, watering, fertilizing, weed control and other problems of turf grass displays of sufficient size (in co-operation with University of California) Effect of air pollutants on tissue growth of plants; daily monitoring of air to determine the amount of smog Maintenance of research plants and of the general plantings in the Arboretum; initial development and maintenance of 154 acres in the Monrovia foothills (elevation 1200 to 1800 feet) as a botanical garden; station in Palmdale to test the suitability of plants for this winter cold, summer hot, windy locality.	Dr. R. Gonderman/F. Boutin Dr. C. Parks Dr. H. Williams W. Noble G. Spalding/F. Ching
3. Berkeley	Regional Parks Botanic Garden	Tilden Regional Park,
3.1 Botany	Part (20 acres) of the Tilden Regional Park devoted to horticultural plant collections, with special emphasis on California natives.	Berkeley 8, California Dir.: J. Roof
4. Brawley	Southwestern Irrigation Field Station, US Department of Agriculture, Agricultural Research Service	P.O. Box 1339, Brawley, California
4.1 Vegetables	Breeding of improved disease-resistant varieties of lettuce and melons	Dr. K. D. Beatty
5. Chico	Plant Introduction Stations, US Department of Agriculture, Agricultural Research Service, Crops Research Branch	P.O. Box 1040, Chico, California, 95927
5.1 Fruit	Development and evaluation of potential new chemurgic crops; evaluation and research with stone and other fruits, nuts and some ornamentals. Collection on 210 acres of more than 800 clones and cultivars (cherries, apricots, peaches, nectarines, plums, Pistacia, woody ornamental and specialty crops accessions, seedlings of Pistacia vera, English and Persian walnuts, Chinese gooseberry (<i>Actinidia chinensis</i>), Chinese date (<i>Ziziphus jujuba</i>), oriental persimmon, pomegranate, almond and other stone fruit. Evaluation and developmental research with chemurgic crops; selection and evaluation research with progeny of the maple introduction, <i>Acer truncatum</i> Research and evaluation work with <i>Actinidia chinensis</i> (Chinese gooseberry or Kiwi fruit: germination studies, evaluation of presently known cultivars and clones and their seedling progeny to select types best suited to Californian conditions and needs), peach, plum, walnut, ornamentals, pomegranate and Chinese date Research and evaluation studies with apricots, cherries and Pistacia (transplanting problems)	Dr. St. J. Toy R. Smith L. Joley

Seat/Nature of program	Institution and projects	Address and staff
6. Claremont 6.1 Botany	Rancho Santa Ana Botanic Garden Private institution, 80 acres, located in Eastern Los Angeles County at an elevation of 1200 feet. Mediterranean climate. Library, scientific laboratories, herbarium (500,000 specimens), greenhouses, propagating room, walk-in refrigerator, lath house, seed storage room, 3 acres experimental growing grounds. Special emphasis to native groundcover plants and ornamentals developed through hybridization of native California species. Mycology: Mucorales and Laboulbeniales Anatomy and morphology: wood anatomy, biota of long dispersal, insular floras Population genetics, evaluation, Polemoniaceae General horticulture Cytology: plant breeding, Iridaceae and New World Alliaceae (Liliaceae) Taxonomy, Onagraceae Taxonomy, phylogeny, flora of California	1500 North College Avenue, Claremont, California Dir.: Dr. L. W. Lenz Superintend.: P. C. Everett Dr. R. K. Benjamin Dr. S. Carlquist Dr. V. Grant N. Lolonis Dr. L. W. Lenz Dr. Ph. A. Munz Curator herbarium: Dr. R. F. Thorne
7. Davis 7.1 General horticulture	University of California Arboretum California natives, Eucalyptus, other Australian plants; Peter J. Shields grove (oaks) Plant evaluation and plant propagation; provision of teaching materials for plant science departments; seed exchange with institutions in various parts of the world. Taxonomy: Quercus Taxonomy: Euphorbiaceae Taxonomy: Arctostaphylos Taxonomy: Astragalus - Department of Landscape Horticulture Plant physiology, pomology, arboriculture, pruning Genetics evolution, plant breeding, mathematical genetics, domestication of cultivated plants, shrub breeding Plant physiology, plant ecology, commercial floriculture, plant growth, efficiency Plant physiology, taxonomy of horticultural plants, nursery production, arboriculture, mineral nutrition, environment and plant growth, nomenclature of woody ornamentals Plant physiology and ecology, turfgrass biology, ecology of turfgrasses Soils, plant nutrition, nutrient uptake, soil chemistry, soil fertility Plant physiology, ecology, floriculture and nursery crops, reproductive and vegetative development in plants - Department of Pomology Climate in relation to fruit production, apple production problems Cytology, morphology and anatomy, effects of physiologically active substances on fruits and other organs of fruit trees Small fruits; strawberry breeding Morphology and anatomy of fruits and vegetative structures; Register of New Fruit and Nut Varieties	Davis, California 95616 Act. dir.: Dr. J. M. Tucker Prof. dr. J. M. Tucker Assoc. prof. dr. G. Webster R. Gankin W. R. Hildreth Chairman: Prof. R. W. Harris Ass. prof. J. A. Harding Prof. H. C. Kohl Jr. Ass. prof. A. T. Leiser Assoc. prof. J. H. Madison Ass. prof. J. L. Paul Assoc. prof. R. M. Sachs Chairman: Prof. D. S. Brown M. V. Bradley Prof. R. S. Bringhamst Prof. R. M. Brooks

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Davis, California (7.1)	Foliar and soil analysis with emphasis on mineral constituents Soils and orchard soil management Physiology of growth and development, auxin, stock-scion physiology Fruit maturity, fruit handling, cold storage and transportation problems, influence of production variables on processed fruits Hormones in relation to plant growth and fruit production, fig production Planting peaches in old peach soils Pear production problems, pear breeding, pollination Sweet cherry breeding, fruit genetics Stone fruit rootstock problems, methods of propagation, boron nutrition, prune production problems Olive production problems, plant propagation, influence of length of day on growth and reproduction of fruit plants Apricot, freestone and cling peach, nectarine and plum breeding, production problems of apricot and plum Peach production problems, nitrogen and carbohydrate nutrition of fruit plants Almond breeding and genetics, almond production problems, plant propagation Studies on phosphorus, potash and mild salinity in orchard soils, thinning (esp. chemical) of deciduous fruits Physiology of fruit ripening, fruit handling, cold storage and transportation problems, effects of ionizing radiation on fruits Maturity problems of stone fruits, biochemistry of fruit irradiation Cherry production problems, persimmon fruit physiology, physiology of pit-hardening, "black-end" of pears Naturally occurring plant growth substances, microbiological effects of irradiation, culture of fruit tissue, deciduous fruit packing Mineral nutrition of deciduous fruit trees, irrigation problems of deciduous fruit trees Small fruit research - Department of Vegetable Crops Plant nutrition, vegetable fertilization Breeding: onions, potatoes, watermelons, cantaloupe, squash Soil compaction and water relations Breeding tomatoes for processing, asparagus, sweet potatoes Seed production in vegetable crops Biochemistry and physiology of vegetable crops Plant nutrition, fertilizer application Quality and food value studies in relation to vegetables, time and motion studies in relation to vegetable crops. Post-harvest physiology of vegetable crops (shipping, storage etc.) Post-harvest physiology of vegetables, effect of ethylene gas on ripening Physiology of vegetables, growth promoting substances Genetics of tomatoes, breeding brussels sprouts and other crucifers Breeding market tomatoes, spinach and peppers, taxonomy of peppers	J.R. Buchanan R.M. Carlson P.B. Catlin Prof. L.L. Claypool Prof. J.C. Crane A.E. Gilmore Prof. W.H. Griggs P.E. Hansche Prof. C.J. Hansen Prof. H.T. Hartmann Prof. C.O. Hesse A.A. Hewitt Assoc. prof. D.E. Kester O. Lilleland Assoc. prof. E.C. Maxie R.J. Romani K. Ryugo N.F. Sommer K. Uriu V. Voth (at Santa Ana) Chairman: Prof. O.A. Lorenz Prof. G.N. Davis W.J. Flocker G.C. Hanna Prof. J.F. Harrington F. Howard Assoc. prof. J.C. Lingle Prof. J.H. MacGillivray Prof. L.L. Morris Prof. H.K. Pratt L. Rappaport Prof. C.M. Rick Prof. P.G. Smith

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Davis, California (7.1)	Histopathological studies of physiological disorders of vegetable crops Relation of cultural and fertilizer practices to tomato production and quality Breeding lettuce, celery and carrots Physiology and biochemical studies on the development and ripening of vegetable fruits, radio-active tracer studies in mineral nutrition, physiological disorders caused by mineral and environmental conditions Time and motion studies in relation to growing and harvesting vegetable crops Vegetable cultural studies in San Joaquin Valley (Shafter, California) Vegetable cultural studies in Salinas Valley (Salinas, California) - Department of Viticulture and Enology Mineral nutrition of the grape, specialized studies in nitrogen, potassium, zinc and boron deficiencies, fertilization, nutrition-virus interactions Production of virus-free fruit tree and grape material and propagation and distribution of this material, wine grape quality studies, vineyard propagation and nursery practices Methods of wine production in controlled fermentations Studies on theory and practice of colour extraction of red grapes, the browning of wines, wine stabilization olfaction Distillation methods, aging of brandies, identification of materials extracted from wood and their importance to the aging and formation of higher alcohols (fusel oil) Biosynthesis and metabolism of organic acids and sugars, influence of environmental factors on the synthesis and breakdown of sugars and organic acids, biochemical studies of the nitrate tolerance in grape varieties Growth of and fermentation by malo-lactic bacteria and control of yeast metabolism, including higher alcohol formation Development of new rootstocks, nematode and phylloxera resistance, propagation of rootstocks, climatic effects on grape culture Picking, packaging, pre-cooling and transportation of table grapes; chemical factors related to good storage of table grapes, the use of Botrytis cinerea for production of sweet table wines Improvement of all types of grapes (table, raisin and wine), the genetics of Vitis, clonal selections, hybridization, development of new varieties Testing of new additives (DEPC) and equipment pertinent to winery operation, production problems in regard to grape fermentation and to wine quality, evaluation of wine grapes in regard to wine quality Chemistry of wine aging, accelerated maturation of wines, processing - quality relationships, tannings and polyphenolics of grapes and wine Effect of growth regulators on fruit set, size of fruit, maturity, texture, mechanics of growth regulator effects, mechanical harvesting	Assoc. prof. A. R. Spurr H. Timm J. E. Welch M. Yamaguchi M. B. Zahara J. C. Bishop F. W. Zink Chairman: Prof. J. A. Cook C. J. Alley Prof. M. A. Amerine Prof. H. W. Berg Prof. J. G. Guymon W. M. Kliever Ass. prof. R. E. Kunkee Assoc. prof. L. A. Lider Prof. K. E. Nelson Prof. H. P. Olmo C. S. Ough V. L. Singleton Prof. R. J. Weaver

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Davis, Calif. (7.1)	Identification of aroma and flavour constituents, identification of flavour of 'flor' sherries, colour pigments of various grape varieties	Prof. A. D. Webb
8. Fresno 8.1 <i>General horticulture</i>	Western Fruit and Vegetable Investigations Laboratory. Horticultural crops Branch, Agricultural Research Service, US Department of Agriculture - Market Quality Research Division. Research on biological aspects of post-harvest handling, transportation and storage of fruits, vegetables, cut flowers and nursery stock; methods of maintaining quality during marketing and reducing losses caused by decay organisms and physiological deterioration. Plant pathology: grape storage, air transport of strawberries and cut flowers Controlled atmosphere storage of apples, pears and cut flowers, gas chromatography, fumigation and handling of grapes Physiology: storage of plums, controlled atmosphere effects on strawberries, heat pasteurization for strawberries and figs Physiology: post-harvest physiology of asparagus, lettuce, cauliflower, onions and other crops Precooling and transit refrigeration of lettuce, potatoes, artichokes, asparagus and other vegetable crops Plant pathology: effects of controlled atmosphere on decay organisms, heat pasteurization of strawberries and figs Air and rail transportation, general post-harvest physiological and horticultural problems General laboratory research - Crops Research Division (75 acres). Testing of grape varieties and rootstocks, breeding of grapes, peaches, apricots and almonds. Grape and stone fruit research and breeding Grape investigations Almond research and breeding	2021 South Peach Avenue, Fresno, California, 93702 J. M. Harvey, Ph. D. M. Uota, Ph. D. H. M. Couey, Ph. D. W. J. Lipton, Ph. D. J. K. Stewart, M. Sc. M. N. Follstad, Ph. D. C. M. Harris M. Garazsi J. H. Weinberger, Ph. D. H. Loomis R. W. Jones, Ph. D.
9. Indio 9.1 <i>Dates and citrus</i>	United States Date and Citrus Station, US Department of Agriculture Testing date varieties imported from the old world, propagation, fruit thinning, pruning, pest control, irrigation, nitrogen fertilization, effects of leaf surface and crop load on dates, breeding of citrus and dates, investigation of stubborn and rootrot diseases of citrus, testing citrus and dates for tolerance to salinity and cold, heat injury and heat tolerance, chemical thinning of dates. Citrus and date breeding, salt tolerance Plant pathology: citrus and date diseases Physiology of heat injury and tolerance and of cold resistance of citrus and dates Date culture	44-455 Clinton Street, Indio, California, 92201 Superintend.: Dr. J. R. Furr Dr. J. B. Carpenter Dr. D. Ketchie R. W. Nixon

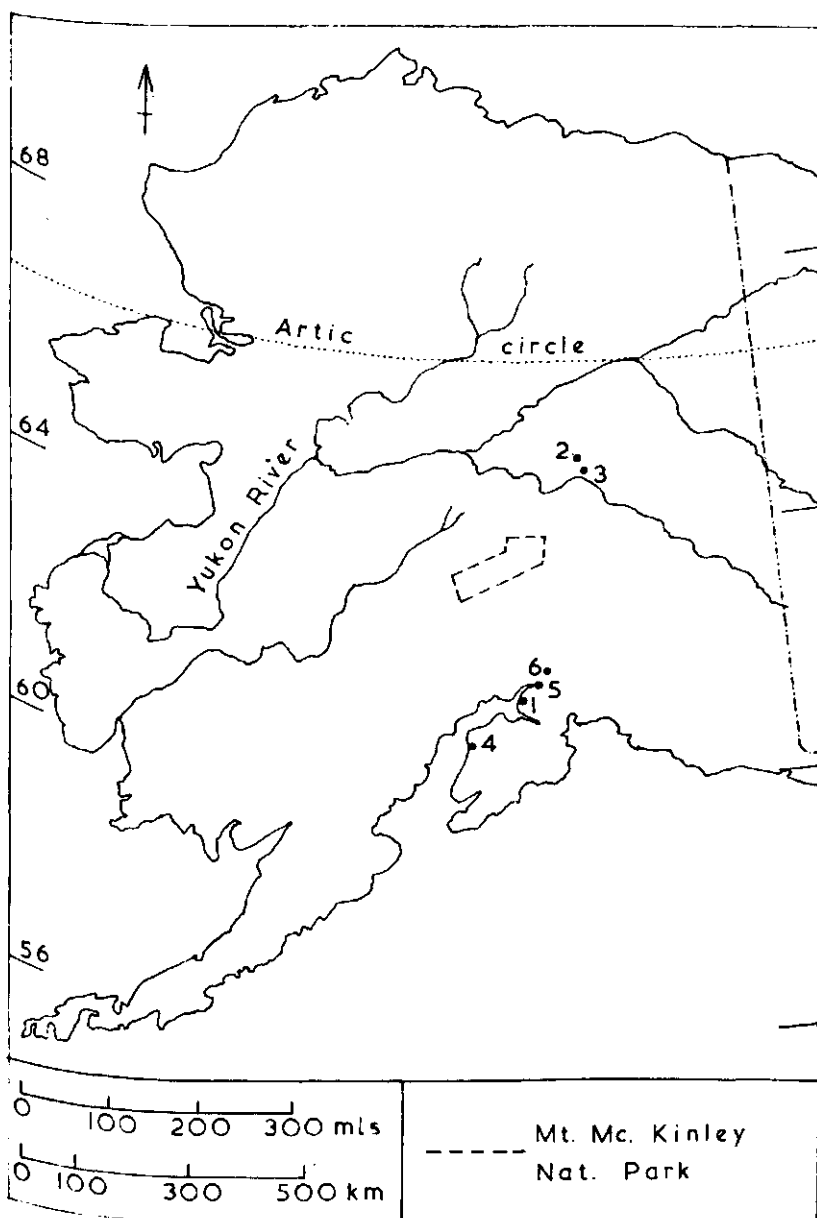
Seat/Nature of program	Institution and projects	Address and staff
10. La Canada 10.1 Botany	Descanso Gardens Operated by the Department of Arboreta and Botanic Gardens of Los Angeles County. Testing of plants that require cooler temperatures than normally occur at the arboretum in Arcadia (see 2.1). Camellias, roses, azaleas, rhododendrons, lilacs, iris, naturalized daffodils, California native plants. Testing of ornamental trees and shrubs for resistance to oak root fungus under natural growing conditions	La Canada, California Superintend.: M. Anthony Dr. P. C. Cheo
11. La Jolla 11.1 Vegetables	US Horticultural Field Station, US Department of Agriculture, Agricultural Research Service Development of disease resistant and better adapted cultivars of lettuce and muskmelons, using methods of plant breeding and genetics. 80% of the head lettuce harvested in US is derived from cultivars released by this station. One of the six muskmelon cultivars, Powdery Mildew Resistant Cantaloupe 45, has been the backbone of the industry for more than 25 years. Leafy vegetables, mostly lettuce Muskmelons	3550 Miramar Road, P.O. Box 150, La Jolla, California, 92038 Dir.: Dr. T. W. Whitaker Dr. T. W. Whitaker Dr. G. W. Bohn
12. Los Angeles 12.1 Botany	University of California - Botanical Garden 8 acres; about 3500 taxa, i.e. cacti, succulents and other desert plants; herbarium (5000 specimens); seed list. Ornamental horticulture Umbelliferae Onagraceae Labiales Loasaceae Dudleya - Department of Agricultural Sciences Ornamental horticulture Floriculture and plant physiology Ornamental horticulture and plant physiology	Los Angeles, California Dir.: Dr. M. E. Matthias Superintend.: W. L. Hansis Ass. dir.: Dr. V. T. Stoutemyer Dr. M. E. Matthias Dr. F. H. Lewis Dr. C. C. Epling Dr. H. J. Thompson D. Verity Chairman: Prof. dr. V. T. Stoutemyer Assoc. prof. A. M. Kofranek Ass. prof. W. P. Hackett
13. Palos Verdes 13.1 Botany	South Coast Botanic Garden Under the administration of the Arboreta and Botanic Gardens of Los Angeles County. Research on problems relating to the diatomaceous earth, methane gas escaping from decomposing material far below the surface, general land settling, fertilizer problems, weed control, development of suitable turf and ground covers and insect infestations.	Palos Verdes Peninsula, California Superintend.: D. P. Woolley
14. Pasadena 14.1 Sub-tropical fruit	Subtropical Fruit Laboratory Branch station of Western Regional Research Laboratory at Albany (see 1.1) Nitrogenous constituents Pigment Flavour	Pasadena, California Chief: Dr. E. A. Beavens Dr. L. B. Rockland Dr. R. M. Horowitz Dr. V. P. Maier

Seat/Nature of program	Institution and projects	Address and staff
15. Riverside 15.1 <i>General horticulture</i>	University of California - Botanic Garden Equipment: lath house, 30 acres under irrigation. Plant physiology Cryptogam ecology Physiological ecology Physiology, ecology Electron microscopy, plant cytology Taxonomy - Department of Horticultural Science Plant physiology and mineral nutrition Avocado genetics and breeding Citrus varieties and rootstocks Mineral nutrition and growth regulators Genetics of citrus and corn Plant growth regulators Plant physiology, weed control Mineral nutrition of subtropicals Physiology of weed control Rootstock-scion relations of subtropicals Plant growth regulators Plant physiology and biochemistry of subtropicals Biochemistry and mode of action of herbicides Tissue culture studies on subtropicals Citrus variety improvement Taxonomy of citrus Economics: motion and time studies in citrus Genetics and nucellar embryony of citrus Rootstock and variety studies of subtropicals Physiological effect of air pollutants on plants - Department of Vegetable Crops Irrigation and soil physics Plant nutrition Vegetable physiology, weed control Breeding: peppers, cantaloupe, watermelons Breeding: broccoli, cauliflower, cabbage Vegetable cultural investigations Vegetable cultural studies in Imperial Valley	Riverside, P.O. Box 672, California, 92502 Prof. W. M. Dugger, Jr. Assoc. prof. V. H. Goodman Assoc. prof. B. R. Strain Ass. prof. I. W. Ting Ass. prof. W. W. Thomson Assoc. prof. F. C. Vasek Chairman: Prof. W. Reuther R. O. Bergh Prof. W. P. Bitters S. B. Boswell Prof. J. W. Cameron C. W. Coggins Prof. B. E. Day T. W. Embleton/C. K. Labanauskas L. S. Jordan J. D. Kirkpatrick H. Z. Hield L. N. Lewis J. D. Mann T. Murashige F. M. Nauer R. Scora Prof. R. J. Smith Prof. R. K. Soost Prof. W. B. Storey O. C. Taylor G. H. Cannell W. Berry J. M. Lyons L. F. Lippert P. D. Legg F. H. Takatori O. D. McCoy
15.2 <i>Soil science</i>	US Salinity Laboratory, US Department of Agriculture, Agricultural Research Service, Soil and Water Conservation Research Division. Cooperating with the Agricultural Experiment Stations of the 17 Western states and Hawaii Equipment: 10 acres land, offices, storage space, laboratories, greenhouses, constant temperature rooms, two sets of large sand-culture tanks, lysimeters and small field plots for salt tolerance and soil and water management studies on the grounds. Objectives: Investigations of the principles underlying the production of crops on saline and sodic soils with special emphasis on the utilization of saline irrigation waters. Chemistry of salt-affected soils, cation exchange, irrigation water quality, agricultural development of arid lands Soil structure and microbiology Salt and specific ion tolerance, osmotic adjustment and plant, soil and water management for salinity control	4500 Glenwood Drive, P.O. Box 672, Riverside California, 92502 Dir.: Dr. C. A. Bower Dr. C. A. Bower Dr. L. E. Allison Dr. L. Bernstein

Seat/Nature of program	Institution and projects	Address and staff
Continuation of Riverside, California (15.2)	Salt and specific ion tolerance Measurement of water potential Plant analyses Salt tolerance and plant management for salinity control Soil-plant-water relations, movement of fluids in porous media, plant biophysics Foreign training Methods of chemical analyses Instrumental analyses Soil structure and mineralogy Physiology and biochemistry of salt injury to plants, influence of salinity on plant metabolism Chemistry and mineralogy of soils Soil microbiology and management for salinity control Salt movement in soils Absorption and translocation of sodium and sodium tolerance of plants Water potential and soil-plant-water relations Cation exchange, soil mineralogy and irrigation water quality Retention and flow of water in soil, diagnosis and improvement of salt-affected soils, measurement of aqueous vapour pressure at high humidity Effect of salinity on plant enzyme systems Publ.: USDA Handbook 60: "Diagnosis and Improvement of Saline and Alkali Soils" and many others.	R. A. Clark F. N. Dalton M. D. Derderian L. E. Francois Dr. W. R. Gardner J. O. Goertzen J. T. Hatcher R. D. Ingvalson Dr. B. L. McNeal Dr. R. H. Nieman W. A. Norvell Dr. G. Ogata Dr. J. D. Oster Dr. G. A. Pearson Dr. S. L. Rawlins J. D. Rhoads Dr. L. A. Richards Dr. R. Weimberg
16. Salinas 16.1 Vegetables	US Agricultural Research Station, US Department of Agriculture, Agricultural Research Service, Crops Research Division, Leafy Vegetable Investigations. Equipment: Greenhouses, isolation cubicles, coldrooms for lettuce seeds storage, laboratories, 150 acres for field projects. Research on resistance to lettuce mosaic and other diseases, mechanical harvesting problems and horticultural quality. The research work is mainly oriented towards the Salinas Valley, the largest lettuce production area in the world. - Vegetable and Ornamentals Research Branch Lettuce breeding and genetics - Department of Vegetable Crops, University of California, Davis Vegetable ecology	P.O. Box 5098, Salinas, California, 93901 Superintend.: Dr. J. S. McFarlane Dr. E. J. Ryder
17. San Francisco 17.1 Botany	Strybing Arboretum and Botanical Garden Owned by the City and the County of San Francisco and operated by the Recreation and Park Department. 64 acres; 3000 species of plants from all over the world. Rhododendrons Plant Accessions Education	F. W. Zink, M. Sc. Golden Gate Park, San Francisco, California Dir.: P. H. Brydon P. H. Brydon Superintend.: A. L. Menzies J. D. Olmsted
18. San Marino 18.1 Botany	Huntington Botanical Garden Private institution, 207 acres, library, herbarium Taxonomy of Cactaceae	115 Oxford Road, San Marino California Curator and superint.: M. Kimmach

Seat/Nature of program	Institution and projects	Address and staff
19. Santa Barbara 19.1 Botany	Santa Barbara Botanic Garden Private institution, 53 acres. Native plants, Ceanothus, chaparral plants, Berberis, Rhamnus, Ribes and Arctostaphylos, Herbarium (25,000 sheets). Ornamental uses of native California species Plants of the California Islands; Pacific Coast Cacti, Camellia cultivar nomenclature Extra-chromosomal structures in meiotic cells Dendrology: Chronology of the southwest Seed dormancy and germination problems of California native species, Lupine and Ceanothus breeding and selection	1212 Mission Canyon Road, Santa Barbara, California Dir.: Mrs. dr. K.K. Muller R.N. Philbrick Mrs. M. S. Walters H. S. Gladwin D. Emery
20. Saratoga 20.1 Ornamental	Saratoga Horticultural Foundation Private institution. Selection and evaluation of superior forms of ornamental plants, development of satisfactory procedures for propagation, production and distribution of these selections to the regular channels of the horticultural trade; shade and ornamental trees, native western shrubs; location and dissemination of superior types of Magnolia grandiflora, Liquidambar styraciflua, Ginkgo biloba, Pistacia chinensis, Ceanothus, Garrya and Arctostaphylos.	P.O. Box 308, Saratoga, California, 95070 Dir.: M. van Rensselaer Superintend.: B. Gage D. Long/K. Raven
21. Vista 21.1 Arboriculture	Carob Demonstration Orchard Private demonstration orchard for introduction and testing of Carob (Ceratonia siliqua) varieties with the objective of fostering a new industry suitable for unirrigated lands in the mild climate areas of California.	Buena Vista Road, Vista (San Diego County), California Dir.: Dr. J.E. Coit

L. Alaska



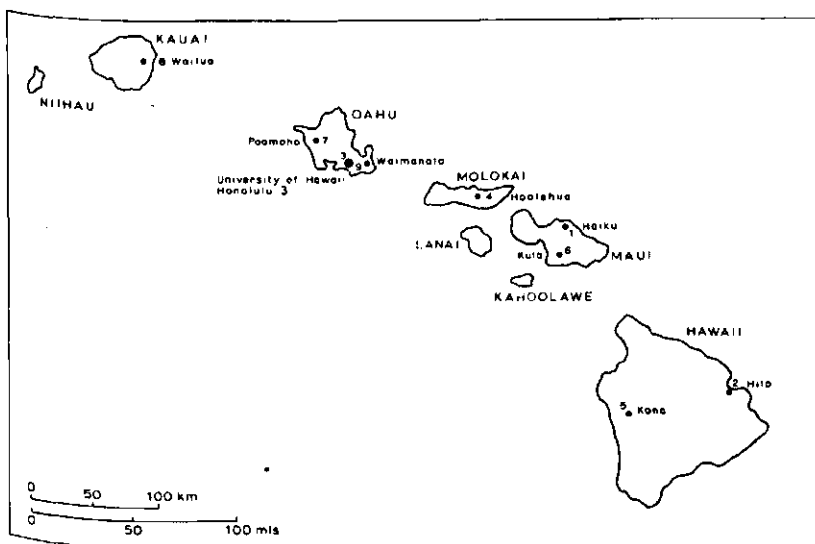
1. Anchorage, 2. College, 3. Fairbanks, 4. Kenai, 5. Matanuska, 6. Palmer.

Research. The Alaska Agricultural Experiment Station is a co-operative venture between the University of Alaska and the United States Department of Agriculture. It is set up to service problems of Alaskan agriculture and includes work in Horticulture, Entomology, Plant Pathology, Soils, and other fields not as closely related to horticulture such as Agronomy, Animal Husbandry, Agricultural Engineering and Agricultural Economics. There is also an experimental

fur farm at Petersburg in South East Alaska. The headquarters are at Palmer with experimental farms at Matanuska, 7 miles from Palmer, and at College near the University campus about 400 miles north from Palmer by road. Most of the staff consists of jointly Federal and University employees and are listed in the university catalog by academic rank. Now that the staff is getting caught up some of the more practical problems they are getting into more basic research problems.

Seat/Nature of program	Institution and projects	Address and staff
Alaska		
1. Anchorage	Baldwin Seeds	Anchorage, Alaska
1.1 <i>General horticulture</i>		
1.2 <i>Botany</i>	Perennial Gardens	Anchorage, Alaska
2. College	Experimental Farm	College, Alaska
2.1 <i>General horticulture</i>	Branch station of Alaska Agricultural Experiment Station at Palmer. Strawberry breeding, adaptation to day length of potato, vegetable varieties, plant physiology Extension, horticulture	Dr. A. Kallio H. Pilsbury
3. Fairbanks	Northern Lights Nursery	Fairbanks, Alaska
3.1 <i>General horticulture</i>		
4. Kenai	Nu State Nursery	Kenai, Alaska
4.1 <i>General horticulture</i>		
5. Matanuska	Experimental Farm	Matanuska, Alaska
5.1 <i>General horticulture</i>	Branch station of Alaska Agricultural Experiment Station at Palmer.	
6. Palmer	Alaska Agricultural Experiment Station	Palmer, Alaska
6.1 <i>General horticulture</i>	Equipment: Glasshouse and cold storage facilities as well as the usual laboratories. Soils Weed control, plant physiology, hollow heart, dormancy of potato Potato breeding, frost resistance in potato, light quality Insect control, pollination, insect ecology, distribution Plant pathology, potato scab, production of virus X free potatoes, storage diseases Soils, soil nutrition Irrigation, soil mapping Soil analysis	Dir.: Dr. A. H. Mick Dr. D. H. Dinkel Dr. C. H. Dearborn Dr. R. H. Washburn Dr. C. E. Logsdon Dr. W. Laughlin N. Michaelson P. Martin
6.2 <i>General horticulture</i>	Washburn Farm and Nursery	Palmer, Alaska

M. Hawaii



1. Haiku, 2. Hilo, 3. Honolulu, 4. Hoolehua, 5. Kona, 6. Kula, 7. Poamoho, 8. Wailua, 9. Waimanalo.

In the last 50 years the University of Hawaii's College of Tropical Agriculture has grown from humble beginnings to an internationally known research center dealing with special problems of tropical and subtropical areas.

Its facilities are found on every major island in the Hawaiian chain. Its staff has been called into consultation on projects in Asia, Australia, Africa, Central and South America. Its staff and advanced students are among the leading agriculturalists in the state and in the Pacific Basin.

Charged with broad responsibility for educating the people of the state as well as conducting research for growers of tropical crops, the College maintains its research and educational contact through branch stations of the Agricultural Experiment Station and is in a large measure responsible for the steady improvement in agricultural methods and products.

Hawaii's first five years of statehood have been years of substantial growth and diversification. This in turn has created a rising interest in Hawaii as a market. Production of cane sugar, the largest agricultural crop, amounted to over 191 million dollars in 1963, an increase of 54.3% in the last 13 years. This production is based on the output of 28 plantations on four islands which normally produce about 1.1 million tons of raw sugar each year. Cane is processed into raw sugar in plantation mills and transported to bulk sugar storage plants on docks where it is mechanically loaded for bulk shipments for California, Texas, and other mainland areas. Pineapple produces approximately 121 million dollars a year which is a 20% increase

in the last 13 years. Most of the pineapples are grown by six companies on five islands (Oahu, Maui, Kauai, Molokai, and Lanai). Canning operations center in the Iwilei district of Honolulu, where the three largest canneries are located.

All other agricultural production totals 44 million dollars, an increase of 68% in the last 13 years. Three-quarters of these products consist of meat, milk and eggs. The aggregate value of vegetables, coffee, fruits, nuts and flowers represents approximately one-quarter of the Hawaiian output.

Although bulk of the growing regions in the state may be considered to have a tropical climate, extreme variations in temperature and rainfall varying with the altitude and extremely different micro-climate over relatively small areas provide an opportunity for growing a great variety of horticultural crops.

The expansion of horticultural industry consisting of macadamia, papaya, coffee, orchids, anthuriums, passion fruit, guava, mango, although somewhat limited by the amount of arable land, is steadily increasing. Since existing growers are interested in diversification, tangerines, mandarins, tangelos, bananas, lychees, longans, acerolas, avocados, and cherimoyas are increasing in importance. Taro, watercress, lettuce, and tomatoes are of high quality and available throughout the year. Sweet corn, sweet potatoes, and watermelons are common. Among the ornamentals, few are as highly prized as orchids, anthuriums, pikake (jasmine), plumerias (frangipani), gingers, heliconias, birds of paradise, shower trees (Cassia), African tulip (Spathodea), carnations, roses and hibiscus.

Seat/Nature of program	Institution and projects	Address and staff
Hawaii		
1. Haiku	Demonstration Farm	Haiku, Maui, Hawaii
1.1 <i>General horticulture</i>	Belongs to the Hawaii Agricultural Experiment Station.	Superintend.: Dr.D.D.F. Williams
2. Hilo	Substation	Hilo, Hawaii, Hawaii
2.1 <i>General horticulture</i>	Branch station of Hawaii Agricultural Experiment Station. Breeding horticultural crops	Superintend.: Dr.T.Izuno
3. Honolulu	Bishop Museum	1355 Kalihi Street, Honolulu, Oahu, Hawaii 96819
3.1 <i>General horticulture</i>	Intensive research in taxonomy of horticultural crops	Dir.: Dr.R.Force
3.2 <i>General horticulture</i>	Hawaii Agricultural Experiment Station, University of Hawaii Main station. State institution. - Department of Horticulture Cucurbit and legume breeding, improvement in leafy vegetable crops, cauliflower and broccoli, tomato improvement and genetics Papaya varieties, introduction and testing of tropical fruits and nuts; varieties, selection and testing of macadamia nuts Cytogenetics of orchids, genetics of floral-cultural crops including anthuriums Papaya culture, nutritional requirements of fruit crops, introduction and testing of citrus varieties, banana culture, nutrition of macadamia nuts Anatomy and morphology of horticultural crops; storage, shelf life, packaging and marketing of flower crops, physiological problems of horticultural crops Improvement and genetics of sweet corn, radiation biology, pollen cell physiology and genetics, plumeria breeding Tissue culture, orchid and other flower crop propagation, developmental morphogenesis in orchids Culture and breeding of mango, guava, papaya, anthurium, acerola and passiflora Cultural problems of lychees, mangos, papayas, macadamia nuts, bananas, guavas and other fruit crops Cultural problems of lettuce, watercress, head and oriental cabbage, tomatoes, sweet corn and other vegetable crops Herbicides, weed control in papaya, coffee, banana, corn and other vegetable crops Nutrition of tropical fruits, evaluation of taro varieties, passion fruit culture Vegetable breeding (tomato, cucurbits, onion, sweet potato, leafy crops) Vegetable breeding for tropical climates, improvement in cantaloupes, watermelon, lima beans, snap beans, lettuce, daikon Co-operative projects originating at the Honolulu Agricultural Experiment Station are conducted at the branch stations in co-operation with the personnel located at these stations.	Honolulu, Oahu, Hawaii 96882 Dir.: Dr.C.Pearis Wilson Assoc.dir.: Dr.G.Stanford Chairman: Dr.J.C.Gilbert Dr.R.Hamilton Dr.H.Kamemoto Dr.R.M.Warner Dr.D.P.Watson Dr.J.L.Brewbaker Dr.Y.Sagawa Dr.H.Y.Nakasone W.Yee Y.Nakagawa Dr.R.R.Romanowski F.A.I.Bowers J.Tanaka Dr.R.W.Hartmann

Seat/Nature of program	Institution and projects	Address and staff
3.3 Botany	Honolulu Botanic Gardens Intensive program in the introduction of ornamental plants is conducted in four locations on Oahu.	Foster Botanical Garden, 180 North Vineyard Boulevard, Honolulu, Oahu, Hawaii 96817 Dir.: P. Weissich
3.4 Pine-apple	Pineapple Research Institute Private institution. Anatomy, physiology, genetics, biochemistry and cultural aspects of pineapple.	2500 Dole Street, Honolulu, Oahu, Hawaii 96822 Dir.: Dr. S. Wortman
4. Hoolehua	Demonstration Farm	Hoolehua, Molokai, Hawaii Dr. R. E. Green (in charge)
4.1 General horticulture	Belongs to the Hawaii Agricultural Experiment Station.	
5. Kona	Demonstration Farm Kae	Kona, Hawaii, Hawaii Superintend.: E. T. Fukunaga
5.1 General horticulture	Belongs to the Hawaii Agricultural Experiment Station.	
5.2 Fruit	Substation Branch station of Hawaii Agricultural Experiment Station. Culture of coffee, macadamia and other tree fruits.	Kona, Hawaii, Hawaii Superintend.: E. T. Fukunaga
6. Kula	Substation	Kula, Maui, Hawaii Superintend.: Dr. D. D. F. Williams
6.1 General horticulture	Branch station of Hawaii Agricultural Experiment Station. Irrigation, cultural problems of fruits, flowers and vegetables; fruit breeding.	
7. Poamoho	Demonstration Farm	Poamoho, Oahu, Hawaii Superintend.: N. Kanda
7.1 General horticulture	Belongs to the Hawaii Agricultural Experiment Station.	
8. Wailua	Substation	Wailua, Kauai, Hawaii Dr. J. A. Crozier
8.1 General horticulture	Branch station of Hawaii Agricultural Experiment Station. Culture of horticultural crops, potato disease control.	
9. Waimanalo	Demonstration Farm	Waimanalo, Oahu, Hawaii Superintend.: H. Waki
9.1 General horticulture	Belongs to the Hawaii Agricultural Experiment Station.	

Alphabetical list

of the research workers mentioned on the pages 9 - 369 with a key to their respective countries and institutions.

The letters behind the names indicate the countries, the figures correspond with the numbering before the various institutions in the chapter "Research institutions and Research projects".

Aalders, L.E.	CDN	6.1	Akimoto, T.	J	11.2	Anabuki, Y.	J	17.2
Aamlid, K.	N	2.1	Akita, H.	J	1.2	Anchel, Marjorie	USA-B	1.1
Abbott, A.J.	GB	28.1	Akita, S.	J	31.1	Andel, Miss O.M.		
Abbott, D.L.	GB	28.1	Akita, T.	J	30.2	van	NL	12.9
Abbott, H.T.	USA-J	6.1	Akiya, R.	J	19.5	Andersen, A.	DK	5.1
Abdullahi, A.	WAN	2.1	Akiyama, T.	J	19.2	Andersen, A.J.	DK	8.1
Abe, I.	J	16.1	Akizuki, K.	J	18.2	Andersen, G.	DK	5.8
Abe, S.	J	19.1	Aksnes, K.	N	10.1	Anderson, E.T.	USA-G	6.1
Abe, Y.	J	39.1	Akuta, S.	J	13.1	Anderson, J.F.	USA-A	5.1
Abe, Z.	J	40.9	Akutsu, T.	J	19.5	Anderson, J.L.	USA-I	9.1
Abel, Jette	DK	5.1	Alán, J.J.	CR	1.1	Anderson, R.H.	CDN	44.1
Abell, L.F.	NL	12.4	Alava, R.	FL	16.1	Andersson, G.	S	9.2
Abernathie, J.W.	USA-E	11.1	Alban, E.K.	USA-F	3.1	Andison, H.	CDN	62.1
Abifarín, D.A.	WAN	2.1	Albrigo, G.	USA-B	16.1	Andō, K.	J	37.1
Abiko, K.	J	19.1	Alcorn, S.M.	USA-H	22.1	Andō, T.	J	1.1
Abodunrin, M.A.	WAN	2.1	Aldenberg, F.	NL	12.9	Andrásfalvi, A.	H	1.1
Abmeyer, E.	USA-G	29.1	Alderz, W.C.	USA-D	30.1	Andreae, W.A.	CDN	30.1
Aburaya, K.	J	27.2	Aldrich, R.A.	USA-B	15.1	Anderucci Cole-		
Aburu, Kana	AUS	41.2	Alentorn Vila, R.	E	3.3	mann, M.T.	BR	11.2
Achman, R.	PL	18.2	Alexander, D.McE.	AUS	20.1	Andrew, W.T.	CDN	52.1
Ackerman, W.	USA-C	3.1	Alexander, J.S.	USA-E	3.1	Andrews, D.J.	WAN	2.1
Ackley, W.B.	USA-J	6.1	Alexander, L.J.	USA-F	7.1	Andrews, F.S.	USA-C	11.1
Acra, M.	PE	6.3	Alfieri, S.	USA-I	5.1	Andrews, J.E.	CDN	39.1
Acuña, L.	E	11.1	Allan, A.W.	AUS	22.1	Andrus, C.F.	USA-D	7.2
Adachi, K.	J	22.1	Allan, P.	ZA	4.1	Anethan, M. d'	B	8.1
Adachi, T.	J	19.2	Alleman, L.	ZA	4.1	Angelino, E.	BR	11.2
Adachi, Y.	J	39.2	Allen, Caroline			Anneck, D.P.	ZA	6.4
Adam, W.B.	GB	9.1	K.	USA-B	1.1	Anstey, T.H.	CDN	55.1
Adamczyk, K.	PL	13.1	Allen, H.	CDN	54.1	Antcliff, A.J.	AUS	20.1
Adams, A.J.	USA-D	59.1	Allen, M.	GB	10.1	Anthon, E.W.	USA-J	11.1
Adams, A.M.	CDN	37.1	Allen, P.G.	GB	18.1	Anthony, M.	USA-K	10.1
Adams, J.A.	USA-B	5.1	Allen, R.M.	USA-H	23.1	Antoszewski, R.	PL	18.1
Adams, J.B.	CDN	9.1	Allen, T.C.	USA-J	14.1	Anttinen, O.	FL	14.1
Adams, K.	D	9.9	Allen, W.R.	CDN	37.2	Aoba, K.	J	19.1
Adams, P.	GB	26.1	Alley, C.J.	USA-K	7.1	Aoba, T.	J	44.2
Adamson, R.M.	CDN	62.1	Allison, L.E.	USA-K	15.2	Aoki, A.	J	38.1
Adler, E.D.	ZA	4.1	Allott, D.J.	GB	29.1	Aoki, M.	J	37.1
Adler, R.	D	20.1	Almendinger,			Aoki, N.	J	3.3
Aerts, R.	B	4.1	D.F.	USA-J	7.1	Aoki, R.	J	38.2
Afanasiev, M.M.	USA-I	22.1	Alston, F.H.	GB	10.1	Aoyagi, M.	J	1.1
Aghion, Mme D.	F	11.1	Alvarez Requejo,			Apeland, J.	N	10.3
Aichele, M.D.	USA-J	4.1	S.	E	12.1	Aplin, T.E.	AUS	35.1
	USA-J	5.1	Alvaro Moreno, A.	E	14.1	Apold, L.	N	6.1
Aihara, S.	J	24.1	Alves de Araujo,			App, Alva	USA-B	10.1
Aitkenhead, P.	GB	16.1	R.	BR	1.1	Apple, J.L.	PE	6.2
Aizawa, T.	J	44.1	Alvin, S.	PL	13.6	Apple, J.W.	USA-F	18.1
Akabane, M.	J	38.1	Amaki, W.	J	29.2	Apple, S.B.	USA-J	14.1
Akabane, N.	J	12.1	Amemiya, T.	J	6.2	Appleby, J.E.	USA-F	12.1
Akamatsu, S.	J	5.2	Amerine, M.A.	USA-K	7.1	Apt, W.J.	USA-J	7.1
Akeley, R.V.	USA-C	3.1	Americky, J.	B	3.2	Ara, K.	J	42.1
Akesawa, S.	J	2.2	Amling, H.A.	USA-D	38.1	Aragón, O.	PE	2.1
Aki, S.	J	17.3	Amma, S.	J	4.1	Arai, K.	J	19.1
Akikawa, H.	J	5.1	Amshoff, G.J.H.	NL	12.9	Araki, K.	J	12.1

Arbolea, García de	E	2.1	Bachthaler, E.	D	12.15	Basak, A.	PL	18.1
Archibald, J.A.	CDN	37.1	Baetge, H.	D	5.11	Basak, W.	PL	18.1
Arellano, M.	PE	5.1	Baeyens, L.	B	3.2	Bash, W.D.	USA-F	3.1
Aresvik, O.	N	10.1	Bagge, H.	DK	2.1	Basham, C.	USA-G	28.1
Arisumi, T.	USA-C	3.1	Bagger, O.	DK	6.1	Baskett, W.J.	AUS	25.1
Arizono, S.	J	18.3	Baggett, J.R.	USA-J	14.1	Basson, A.G.	AUS	39.1
Arizumi, K.	J	45.3	Bagley, W.T.	USA-G	21.1	Basson, D.S.	ZA	7.1
Arkenhout, J.	NL	12.7	Bagnall, R.H.	CDN	9.1	Basson, W.J.	ZA	3.1
Armsby, W.A.	GB	47.1	Bailey, Catherine H.	USA-B	16.1	Bastelaere, H. van	B	13.1
Armstrong, J.F.	USA-J	11.1	Bailey, J.E.	USA-D	13.1	Bates, J.A.R.	GB	16.1
Armstrong, J.K.	USA-D	8.2	Bailey, R.M.	USA-A	1.1	Batjer, L.P.	USA-J	11.1
Armstrong, W.D.	USA-E	11.1	Baines, G.	GB	24.1	Batta, J.	N	10.3
Arnold, C.Y.	USA-F	12.2	Baird, L.	USA-A	15.1	Battle, W.R.	USA-B	16.1
Arnold, W.N.	AUS	28.2	Bakel, J.J.M. van	NL	2.1	Bauckmann, M.	D	9.11
Arnold Bik, R.	NL	1.1	Bakel, J.M.M. van	NL	12.5	Bauer, W.	D	9.17
Arnoian, H.B.	USA-C	11.1	Baker, C.R.B.	GB	16.1	Baugerød, H.	N	10.3
Arrington, E.J.	USA-E	8.1	Baker, G.M.	USA-I	9.1	Baumgardner, R.A.	USA-D	54.1
Arroyo, J.R.	PE	6.2	Baker, J.J.	GB	16.1	Bautista, V.	PE	6.3
Arthey, V.D.	GB	9.1	Baker, R.L.	USA-C	4.1	Baxter, P.	AUS	19.2
Asahira, T.	J	22.3	Bakermans, W.A.P.	NL	12.3	Bayley, H.S.	GB	27.1
Asayama, E.	J	4.2	Bakkendrup Hansen, G.	DK	9.1	Bazan, R.	CR	1.1
Ashcroft, G.L.	USA-I	9.1	Bakker, A.C.	AUS	24.1	Bazant, J.	PL	18.2
Ashikawa, K.	J	40.9	Bakker, H.de	NL	5.1	Beach, G.A.	USA-I	3.2
Ashizawa, M.	J	7.2	Bakker, Miss J.G.	NL	12.9	Beard, J.S.	AUS	35.3
Ashley, T.E.	USA-D	51.1	Bakker, J.W.	NL	12.4	Beattie, D.J.	USA-A	3.1
Ashraff, M.A.	CDN	42.1	Bakowski, G.	PL	18.1	Beattie, J.M.	USA-F	7.1
Ashton, C.	USA-I	11.1	Bakowski, J.	PL	18.2	Beatty, B.M.	AUS	36.2
Ashtworth, R. de B.	GB	16.1	Balász, S.	H	1.2	Beatty, K.D.	USA-K	4.1
Asjes, C.J.	NL	9.1	Baldwin, J.G.	AUS	20.1	Beaulieu, A.A.	CDN	22.1
Asleson, J.A.	USA-I	22.1	Báldy, B.	H	5.1	Beavens, E.A.	USA-K	14.1
Asquith, D.	USA-B	11.1	Balerdi, F.	CR	1.1	Beavers, D.V.	USA-J	14.1
Assche, C. van	B	7.4	Balgooyen, W.P.	USA-B	8.1	Becerra, J.	PE	6.3
Asselbergs, E.A.M.	CDN	32.2	Balla, F.	H	1.3	Beck, K.	DK	5.8
Aston, J.	GB	4.1	Ballinger, E.	USA-D	4.1	Beckenbach, J.R.	USA-D	24.1
Asztalos, G.	H	1.1	Balock, J.W.	USA-H	13.1	Becker, H.	D	9.14
Atkin, R.	GB	46.1	Balogh, A.	H	1.2	Becker, H.F.	USA-B	1.1
Atkins, P.S.	GB	20.1	Balyoll, G.	N	10.3	Beckham, C.M.	USA-D	15.1
Atkinson, F.E.	CDN	63.1	Bandai, S.	J	36.2	Beckmann, E.O.	D	5.4
Atkinson, J.D.	NZ	1.1	Banga, O.	NL	12.8	Beckwith, K.J.W.	GB	14.1
Atkinson, R.G.	CDN	62.1	Bangerth, F.	D	24.1	Beczner, L.	H	1.5
Atmore, S.	USA-B	15.1	Bañkowska, H.	PL	22.3	Bedard, R.	CDN	13.1
Atumi, K.	J	9.2	Bañkowski, H.	PL	22.3	Bédard, R.	CDN	18.1
Auclair, J.L.	USA-H	16.1	Baptist, A.G.	B	3.10	Bedding, A.J.	GB	37.1
Audidier, L.	F	19.2	Barabas, B.	CDN	26.1	Bedford, E.C.G.	ZA	3.1
Aultman, A.	USA-D	47.1	Baranov, A.	USA-A	7.1	Beech, F.W.	GB	28.1
Austin, R.B.	GB	45.1	Baranowski, R.M.	USA-D	26.1	Beecher, A.S.	USA-C	11.1
Avall, H.	S	1.1	Rarańska, Z.	PL	18.3	Reek, A.M.K. van	NL	12.11
Avant, K.L.	AUS	24.1	Barg, T.	D	27.9	Beemster, A.B.R.	NL	12.5
Avery, A.J.	GB	10.1	Barker, A.V.	USA-A	5.1	Beevers, L.	USA-F	12.2
Avery, G.S.	USA-B	7.1	Barker, K.R.	USA-F	18.1	Begtrup, J.W.	DK	6.1
Avril, P.	B	3.2	Barkman, J.J.	NL	12.9	Beijersbergen, J.C.M.	NL	9.1
Axelsson, K.F.	S	4.1	Barksdale, Alma	USA-B	1.1	Beirne, B.P.	CDN	23.1
Aycock, R.	USA-D	4.1	Barlow, H.W.B.	GB	10.1	Bekker, J.F.	USA-B	8.1
Ayers, G.W.	CDN	4.1	Barna, B.	H	1.2	Bekking, Th.J.	NL	5.1
Ayers, L.C.	USA-I	17.1	Barnes, W.C.	USA-D	7.1	Bels, P.J.	NL	8.1
Aylesworth, J.W.	CDN	38.1	Barnicoat, C.F.	NZ	5.1	Bels-Koning, Mrs. H.C.	NL	8.1
Ayre, G.L.	CDN	23.1	Barnwell, R.	GB	40.1	Beltrán, R.	PE	6.4
Ayres, C.	USA-G	6.1	Barr, H.T.	USA-D	54.1	Benis, W.P.	USA-H	22.1
Azuma, S.	J	43.2	Barrera Riber, R.	E	2.1	Benedek, L.	H	7.1
Åkesson, N.E.H.	S	4.1	Barrett, H.C.	USA-F	12.2	Bengston, M.	AUS	12.1
Årsvoll, K.	N	10.5	Barrett, J.E.	USA-D	44.1	Benjamin, R.K.	USA-K	6.1
Baba, H.	J	26.3	Barrios, E.P.	USA-D	54.1	Bennema, J.	NL	5.1
Babilas, W.	PL	13.5	Barrs, H.D.	AUS	6.1	Bennett, A.J.	WAN	2.1
Bach	D	20.1	Parry Jr., J.R.	USA-D	57.1	Bennett, D.H.	GB	43.1
Bach, E.	DK	5.4	Bartel, E.F.	ZA	7.1	Bennett, Miss M.	GB	10.1
Bache, B.W.	WAN	2.1	Barthelet, J.	F	2.2	Bensink, J.	NL	12.9
Bachelier, J.C.	F	5.1	Bartman, E.	PL	22.4	Benson, B.W.	USA-H	20.1
			Barton, D.W.	USA-B	4.1	Benson, N.R.	USA-J	11.1
			Barton, Lela V.	USA-B	10.1	Bentley, O.G.	USA-F	12.2
			Bartosiewicz, A.	PL	22.8	Benton, A.W.	USA-B	16.1
			Barvik, M.	N	10.1			

Bera, B.	PL	18.1	Blanc, D.	F	2.1	Booth, W.E.	USA-I	22.1
Beresford, B.C.	USA-G	1.1	Blanchard, J.M.V.	GB	34.2	Borchers, E.A.	USA-C	13.1
Berg, C. van den	NL	12.4	Blanchet, J.Y.	F	6.1	Borckley, D.G.	USA-C	11.1
Berg, H.W.	USA-K	7.1	Blaney, L.T.	USA-J	13.1	Borden, J.A.	USA-C	11.1
Berg, R.Y.	N	6.2		USA-J	14.1	Borders, H.I.	USA-D	22.1
Bergh, B.O.	USA-K	15.1	Blangstrup Jørgensen, M.	DK	3.1	Borecka, H.	PL	18.1
Bergman, B.H.H.	NL	9.1	Blank, H.G.	D	14.1	Borecki, Z.	PL	18.1
Bergman, E.L.	USA-B	15.1	Blank, L.M.	USA-H	21.1	Borel, G.	NL	12.11
Berkel, N. van	NL	11.1	Blankholm, E.	DK	5.6	Borka, M.	H	1.1
Berkholst, Miss Chr. E.M.	NL	12.2	Blankwaardt, H.F.H.	NL	3.1	Borkowska, B.	PL	18.1
Berkum, J. van	NL	12.9	Blanpied, G.D.	USA-B	6.1	Borna, Z.	PL	13.7
Berlage, A.	USA-J	11.1	Blaricom, L.O.			Bornemisza, E.	CR	1.1
Bernard	B	6.1	van	USA-D	8.2	Bornmann, D.M.	ZA	7.1
Bernard, P.	F	18.1	Błaszczak, W.	PL	13.3	Bornus, L.	PL	18.1
Bernier, R.	CDN	22.1	Blatt, C.R.	CDN	6.1	Boros, R.	H	1.2
Berninger, L.M.	USA-F	18.1	Bleasdale, J.K.A.	GB	45.1	Borthwick, H.A.	USA-C	3.1
Bernstein, L.	USA-K	15.2	Blixt, S.G.	S	4.1	Bos, J.J.	NL	12.9
Berrill, F.W.	AUS	17.1	Blodgett, E.C.	USA-J	4.1	Bos, L.	NL	12.5
Berry, G.	GB	45.1		USA-J	5.1	Bosian, G.	D	18.1
Berry, W.	USA-K	15.1	Blok, I.	NL	5.1	Bosick, J.K.	USA-D	39.1
Beryl Beakbane, A.	GB	10.1	Blom, C.	S	3.1	Bosmans, P.	B	3.7
Bessey, P.M.	USA-H	18.1	Blommaert, K.L.S.	ZA	7.1	Bosse, G.	D	8.1
Bester, A.J.	ZA	7.1	Blomme, R.	B	13.1	Boswell, S.B.	USA-K	15.1
Bester, J.J.A.	ZA	7.1	Blommestein, J.A.			Boswell, T.E.	USA-H	14.1
Betts, A.V.	ZA	7.1	van	ZA	1.1	Boswell, V.R.	USA-C	3.1
Betzema, J.	NL	2.1	Blondon, F.	F	11.1	Botham, J.R.	AUS	25.1
Beukman, E.F.	ZA	7.2	Bloodworth, M.E.	USA-H	7.1	Botting, G.W.	AUS	25.1
Bever, W.M.	USA-F	12.2	Blueford Hancock	USA-H	7.1	Bouhier de l'Ecluse, R.	F	20.1
Beyers, C.P. de L.	ZA	7.3	Blundstone, H.	GB	9.1	Bould, C.	GB	28.1
Beyers, E.	ZA	7.1	Boa, W.	GB	42.1	Boulet, M.	CDN	18.1
BiaJobok, S.	PL	6.1	Bocanegra, S.	PE	6.2	Bourguignon, P.	B	3.2
Ricudo, R.M.T.	BR	11.2	Bochnacka, E.	PL	20.1	Bourque, L.	CDN	18.1
Bidabe, B.	F	1.1	Bock, K.R.	GB	10.1	Bourzeix, M.	F	18.1
Bidault, J.	F	14.1	Bockstaele, L.	B	12.1	Boush, G.M.	USA-F	18.1
Rieleski, R.L.	NZ	1.1	Boczek, J.	PL	22.1	Boutard, C. Roy	USA-A	9.1
Bien, D.R.	USA-J	6.1	Bode, H.R.	D	9.2	Boutin, F.	USA-K	2.1
Bierhuizen, J.F.	NL	12.4	Boehm, E.W.	AUS	25.1	Bovenrade, P.	B	8.1
Biggs, R.H.	USA-D	24.1	Boelema, B.H.	ZA	6.3	Bövve, O.	DK	4.1
Bijhouwer, J.T.P.	NL	12.9	Boer, H.M. den	NL	3.1	Bowden, H.L.	USA-E	5.1
Bijkerk, C.	NL	12.4	Boer, P.J. den	NL	12.9	Bowen, J.F.	CDN	63.1
Billings, C.B.	USA-G	21.1	Boer, R.H. De	USA-B	16.1	Bower, C.A.	USA-K	15.2
Billitt, A.W.	GB	34.1	Boer, Miss S. de	NL	12.1	Bowers, F.A. I.	USA-M	3.2
Bilquez, Mme. N.	F	14.1	Roesman, G.	B	3.8	Bowers, J.L.	USA-E	7.1
Bing, A.	USA-B	2.1	Bognár, S.	H	1.2	Bowman, G.E.	GB	41.1
Bink, J.P.M.	NL	12.9	Bohart, G.E.	USA-I	9.1	Box, C.O.	USA-D	52.1
Binkley, A.M.	USA-I	3.2	Bohmert, D.W.	USA-I	15.1	Boxall, M.I.	GB	40.2
Birchfield, W.	USA-D	54.1	Bohn, G.W.	USA-K	11.1	Boxus, P.	B	2.7
Bird, A.F.	AUS	28.2	Bojanowski, J.	PL	22.3	Boyce, B.R.	USA-A	3.1
Birdsey, M.	USA-D	31.1	Bokx, J.A.	NL	12.5	Boyce, H.R.	CDN	28.1
Birkeland, C.J.	USA-F	12.2	Bollard, E.G.	NZ	1.1	Boyce, W.R.	NZ	3.2
Biró, K.	H	5.1	Bollen, J.G.	NL	12.9	Boye, G.	DK	5.1
Bishop, J.C.	USA-K	7.1	Bolly, M.	B	14.1	Boyette, F.B.	USA-D	2.1
Bishop, R.F.	CDN	6.1	Bolton, A.T.	CDN	32.4	Boyle, Alice M.	USA-H	22.1
Bisson, J.	F	8.1	Bolton, E.F.	CDN	38.1	Boyle, F.P.	USA-K	1.1
Bitancourt, A.A.	BR	11.1	Römeke, H.	D	14.1	Boyle, P.J.	GB	36.1
Bitters, W.P.	USA-K	15.1	Bonsel, J.L.	F	15.1	Boynton, D.	CR	1.1
Bittner, C.S.	USA-B	15.1	Bon, J.	NL	12.4	Braak, J.P.	NL	12.8
Bjergaard, A.	DK	5.8	Bond, T.E.T.	GB	6.1	Bradbury, J.F.	CDN	37.2
Bjerkestrand, E.	N	10.3	Bond, W.T.	USA-H	18.1	Bradley, G.A.	USA-E	7.1
Björling, K.	S	1.1	Bonnefil, L.	CR	1.1	Bradley, M.V.	USA-K	7.1
Björnstad, A.	N	10.5	Bonner, I.A.	AUS	18.1	Bradley, R.H.E.	CDN	9.1
Björman, Miss B.	S	1.1	Bonnet, A.	F	16.1	Bradt, C.A.	CDN	37.1
Black, J.D.F.	AUS	23.2	Bontovits, L.	H	5.1	Brady, N.C.	USA-B	6.1
Black, J.J.C.	GB	11.1	Boodley, J.W.	USA-B	6.1	Braeckman, H.	B	3.6
Black, R.F.	AUS	17.2	Boddt, N. de	B	10.1	Bragt, J. van	NL	12.9
Blackburn, K.J.	AUS	40.2	Boon, B.K.	NL	12.8	Bramlage, W.J.	USA-A	5.1
Blackhurst, H.T.	USA-H	7.1	Roon, J. van der	NL	7.1	Brande, J. van den	B	3.1
Blackwell, C.S.	USA-D	54.1	Boone, D.M.	USA-F	18.1		B	3.3
Blackwell, H.	USA-D	3.1	Booster, D.E.	USA-J	14.1		B	3.5
Blair, E.	PE	6.4	Rooth, A.N.	USA-K	1.1	Brander, P.E.	DK	4.1
Blake, R.C.	USA-F	10.1	Booth, W.F.	NZ	1.1	Brands, W.E.A.	CDN	24.1
						Brantley Jr., B.B.	USA-D	15.1

Brants, Miss D.H.	NL	4.1	Bryan, O.C.	USA-D	29.2	Callbeck, L.C.	CDN	4.1
Brase, K.D.	USA-B	4.1	Brydon, P.H.	USA-K	17.1	Calle, E.E.C.	ZA	7.3
Brasher, E.P.	USA-C	2.1	Brzeski, M.	PL	18.2	Callen, E.O.	CDN	19.1
Braun, A.J.	USA-B	4.1	Buchanan, J.R.	USA-K	7.1	Callewaert, D.	B	12.1
Bravenboer, L.	NL	11.1	Buchanan, M.T.	USA-J	6.1	Calvert, A.	GB	26.1
Braverman, S.W.	USA-B	4.1	Bucher, G.E.	CDN	23.1	Calvert, D.V.	USA-D	23.1
Bravo, M.	PE	6.1	Buchloh, G.	D	24.1	Calzada, J.	PE	6.3
Breaky, E.B.	USA-J	7.1	Buck, G.J.	USA-G	18.1	Camacho, E.	CR	1.1
Bredel, G.S.	ZA	3.1	Buck, R.W.	USA-C	3.1	Camán Cuba, M.	PE	5.1
Bredero, Th.J.	NL	2.1	Buckley, A.R.	CDN	32.3	Cameron, H.R.	USA-J	14.1
	NL	12.4	Buckley, W.R.	GB	40.1	Cameron, J.W.	USA-K	15.1
Breider, H.	D	26.1	Buczak, E.	PL	23.1	Cameron, W.P.L.	GB	11.1
Bremner, P.M.	GB	34.2	BugaJa, W.	PL	6.1	Cammack, R.H.	GB	16.1
Breteler, F.J.	NL	12.9	Bugaret, Y.	F	5.1	Campbell, A.C.	CDN	42.2
Bretthauer, G.	D	9.12	Bui, Mme	F	11.1	Campbell, C.W.	USA-D	26.1
Brewbaker, J.L.	USA-M	3.2	Buijten, J.P. Van	USA-H	7.1	Campbell, F.J.	USA-A	11.1
Brewer Jr., J.E.	USA-B	15.1	Buishand, Tj.	NL	2.1	Campbell, G.M.	USA-E	3.1
Brian, C.	F	1.1	Bukovac, M.J.	USA-F	13.1	Campbell, J.A.	USA-D	47.1
Briand, L.J.	CDN	23.1	Bullock, R.C.	USA-D	23.1	Campbell, J.E.	CDN	4.1
Briggs, J.B.	GB	10.1	Bullock, R.M.	USA-J	12.1	Campbell, R.W.	USA-G	26.1
Brightwell, W.T.	USA-D	19.1	Bünemann, G.	D	5.5	Campbell, W.F.	USA-I	9.1
Bringhurst, R.S.	USA-K	7.1	Bunt, A.C.	GB	26.1	Campbell, W.I.P.	USA-A	8.1
Brink, K.M.	USA-F	9.1	Burchill, R.T.	GB	10.1	Campos, J.	PE	6.1
Brink, V.C.	CDN	64.2	Burck, P. du	NL	5.1	Campos, J.F.B.M.	BR	11.2
Brittain, W.H.	CDN	19.1	Burdajewicz, S.	PL	13.2	Campos Dietrich, S.M.de	BR	11.2
Brittingham, W.H.	USA-C	13.1	Burdine, H.W.	USA-D	20.1	Candar, J.C.	F	11.1
Britton, D.	CDN	63.1	Burger, I.J.	ZA	7.1	Canham, A.E.	GB	40.2
Britton, M.P.	USA-F	12.2	Burger, W.P.	ZA	3.1	Cannell, G.H.	USA-K	15.1
Brizicky, G.K.	USA-A	7.1	Burgess, P.G.	GB	15.1	Cannon, F.M.	CDN	4.1
Broadbent, L.	GB	26.1	Burgis, D.S.	USA-D	21.1	Cannon, O.S.	USA-I	9.1
Brodjanac, S.	D	9.7	Burgos, J.	PE	7.1	Cannon, R.G.	AUS	14.1
Broek, J.M.M. van den	NL	5.1	Burke, D.W.	USA-J	5.1	Cannon, T.F.	USA-D	4.1
Broertjes, C.	NL	12.6	Burke, H.R.	USA-H	7.1	Cansfield, P.E.	GB	34.2
Broicher, K.	D	2.1	Burkhard, R.	D	9.4	Cappelline, R.A.	USA-B	16.1
Broodryk, S.W.	ZA	6.4	Burkhart, L.	USA-H	22.1	Caputa, J.	PL	1.1
Brook, J.A.	WAN	2.1	Burkowitz, A.	PL	18.1	Carew, H.J.	USA-F	13.1
Brook, P.J.	NZ	1.2	Burnett, T.	CDN	23.1	Carfantan, Mme N.	F	15.1
Brooks, A.N.	USA-D	34.1	Burns, E.E.	USA-H	7.1	Carlier, G.	F	15.1
Brooks, H.J.	USA-C	3.1	Burr, H.K.	USA-K	1.1	Carling, K.E.	WAN	2.1
Brooks, L.E.	USA-D	9.1	Burroughs, L.F.	GB	28.1	Carlson, R.F.	USA-F	13.1
Brooks, R.F.	USA-H	9.1	Burt, E.O.	USA-D	22.1	Carlson, R.M.	USA-K	7.1
Brooks, R.M.	USA-D	28.1	Burt, S.W.	USA-J	11.1	Carlsson, M.	S	1.1
Brossier, J.	USA-K	7.1	Burton, J.R.	NZ	2.2	Carlton, C.C.	USA-D	41.1
Brought, C.R.	F	1.1	Burton, M.	AUS	39.1	Carlquist, S.	USA-K	6.1
Brouwer, A.	AUS	23.2	Burton, W.G.	GB	25.1	Carne, R.S.	AUS	37.1
Brouwer, Miss W.M. Th. J. de	NL	12.9	Burts, E.C.	USA-J	11.1	Carolus, R.L.	USA-F	13.1
Browicz, K.	NL	11.1	Busch, L.V.	CDN	26.1	Carpena, O.	E	10.1
Brown, A.	PL	6.1	Busch, W.	PE	6.3	Carpenter, G.A.	GB	41.1
Brown, D.S.	GB	12.1	Buschbeck, G.	USA-D	37.1	Carpenter, J.B.	USA-K	9.1
Brown, K.J.	USA-K	7.1	Bush, C.S.	F	13.1	Carpenter, K.	GB	35.1
Brown, N.J.	WAN	2.1	Busschère, P.de	B	4.1	Carpenter Jr., W. J.	USA-G	26.1
Brown, R.H.	GB	42.1	Busschots, A.	E	2.1	Carr, J.G.	GB	28.1
Brown, R.T.	CDN	33.1	Bustamente, J.	USA-F	12.2	Carruth, L.A.	USA-H	22.1
Brown, W.L.	AUS	59.1	Butler, J.D.	AUS	28.2	Carson, J.F.	USA-K	1.1
Brown, W.N.	USA-D	60.1	Buttrose, M.S.	ZA	7.1	Carstens, W.	ZA	6.3
Brownhall, R.	USA-F	3.1	Buys, M.E.L.	GB	42.1	Carter, A.R.	GB	30.1
Browning, R.	N	10.5	Byass, J.B.	GR	28.1	Carter, G.A.	GB	46.1
Browning, T.O.	AUS	33.1	Bylterud, A.	AUS	39.1	Carter, G.H.	USA-J	5.1
Brózik, S.	H	1.1	Byrde, R.J.W.	USA-B	10.1	Carter, J.C.	USA-F	12.1
Brubaker, R.W.	USA-H	18.1	Byrne, P.N.	PL	20.1	Carter, M.T.	USA-C	15.1
Bruce, C.	USA-D	18.1	Bystricky, V.	PL	20.1	Carter, M.V.	AUS	33.1
Bruce, J.	GB	11.1	Bystydzieńska, K.	PL	13.6	Cartier, J.J.	CDN	22.1
Bruder, J.	H	7.1	Bystydziefski, W.	PL	13.6	Cartwright, J.	GB	29.1
Bruin, P.	NL	7.1	Bzdziuch, S.	F	12.1	Cartwright, P.M.	WAN	2.1
Bruinsma, J.	NL	12.1	Cadel, G.	GB	2.1	Carughi, A.	PE	6.2
Brulfert, J.	F	11.1	Cadman, C.H.	USA-F	7.1	Cary, P.R.	AUS	6.1
Bruneau, M.	B	14.1	Cahoon, G.A.	USA-B	4.1	Casallo, D.A.	E	14.2
Brunt, A.A.	GB	26.1	Cain, J.C.	USA-J	14.1	Casas, I.	CR	1.1
Bruun, M.	N	10.3	Cain, R.F.	USA-A	3.1	Case, M.W.	GB	41.1
Bruyn, J.W. de	NL	12.8	Calahan, C.L.	USA-I	9.1	Case, V.W.	CDN	58.1
			Call, A.B.					

Casimir, D.J.	AUS	10.1	Christensen, S.A.	DK	5.5	Collyer, E.	NZ	5.2
Cass-Smith, W.P.	AUS	35.1	Christiansen, J.	PE	6.2	Combe, I.	PH	6.3
Castillo, L.	PE	5.1	Christie, T.B.C.	NZ	5.1	Combs, O.B.	USA-F	10.1
Caswell, G.H.	WAN	2.1	Christoffersen, A.	DK	3.1	Come, D.	F	5.1
Catley, A.	AUS	41.1	Christou, Th.	CY	1.1	Comeau, J.E.	CDN	1.1
Catlin, P.B.	USA-K	7.1	Chroboczek, E.	PL	18.2	Compton, O.C.	USA-J	14.1
Caudwell, A.	F	5.1		PL	22.9	Cone, W.W.	USA-J	5.1
Caussin, R.	B	2.2	Chróścicki, K.	PL	10.1	Coninck, F.de	B	3.2
Cecil, S.R.	USA-D	15.1	Chazanowska, Z.	PL	8.1	Conover, R.A.	USA-D	26.1
Cegłowska, L.	PL	17.1	Chu, C.Y.	USA-F	12.2	Conradie, J.D.H.	ZA	6.3
Cegłowski, S.M.	PL	17.1	Chubb, W.O.	CDN	40.1	Constantin, R.J.	USA-D	60.1
Cemianowicz, A.	PL	18.1	Chubey, B.B.	CDN	40.1	Contant, R.B.	NL	12.6
Cerny, J.	AUS	36.1	Chudó, S.	J	46.1	Contreras, P.	PE	5.1
Chabot, N.	CDN	13.1	Chujó, T.	J	17.3	Converse, R.	USA-C	3.1
Chace Jr., W.G.	USA-D	33.1	Chylarecki, H.	PL	6.1	Cook, J.A.	USA-K	7.1
Chachin, K.	J	32.2	Cianciara, Z.	PL	18.1	Coolen, W.	B	13.2
Chadwick, K.H.	NL	12.6	Cianciulli, P.L.	BR	11.2	Cooler, F.W.	USA-C	11.1
Chadwick, L.C.	USA-F	3.1	Cichosz, E.	PL	2.1	Coombe, B.G.	AUS	33.1
Challenger, S.	NZ	2.2	Cichosz, T.	PL	18.1	Coon, B.F.	USA-B	15.1
Chamberlain, E.E.	NZ	1.2	Cilliers, Miss C.J.	ZA	6.4	Cooper, A.J.	GB	26.1
Chamberland, E.	CDN	13.1	Cimanowski, J.	PL	18.1	Cooper, C.M.	AUS	25.1
Chambers, D.	USA-D	54.1	Cipar, M.S.	CDN	9.1	Cooper, W.C.	USA-D	33.1
Chambers, E.E.	USA-D	4.1	Cisneros, F.	PE	6.3	Coots, G.D.	USA-A	16.1
Chamel, A.	F	12.2	Cizeron, J.	F	14.1	Copley, M.J.	USA-K	1.1
Champeroux, A.	F	2.1	Clark, B.E.	USA-B	4.1	Coppock, G.E.	USA-D	29.1
Chan, A.P.	CDN	32.3	Clark, Ph.	USA-B	1.1	Coppock, S.	USA-H	16.1
Chan, B.G.	USA-B	4.1	Clark, R.A.	USA-K	15.2	Coral, F.	PE	7.1
Chanasyk, V.	CDN	26.1	Clark, R.L.	USA-J	5.1	Cordeiro, M.	BR	11.2
Chancellor, R.J.	GB	36.1	Clark Jr., W.S.	USA-B	15.1	Cording, J.	USA-B	14.1
Chancey, H.W.R.	CDN	3.1	Clarke, G.	GB	16.1	Cordner, H.B.	USA-H	3.1
Chandler, B.V.	AUS	10.1	Clarke, G.M.	GB	28.1	Córdona, L.A.	PE	7.1
Chang, L.	PE	6.1	Clarke, M.F.	CDN	58.1	Cordukes, W.E.	CDN	32.3
Channon, A.G.	GB	45.1	Clarke, R.T.	GB	34.2	Corgan, J.N.	USA-H	16.1
Chaplin, C.E.	USA-E	11.1	Claybery, C.D.	USA-A	14.1	Corin, C.	B	2.6
Chapman, F.M.	CDN	59.1	Claypool, L.L.	USA-K	7.1	Corke, A.T.K.	GB	28.1
Chapman, P.J.	USA-B	4.1	Clayton, B.C.	GB	5.1	Corley, M.L.	USA-D	15.1
Chapman, R.K.	USA-F	18.1	Clayton, C.N.	USA-D	4.1	Cornejo, J.	F	4.1
Chapman, W.H.	USA-D	35.1	Clayton, J.E.	USA-C	6.1	Cornman, J.F.	USA-B	6.1
Charłampowicz, K.	PL	18.1	Clayton, M.F.	AUS	20.1	Corns, W.G.	CDN	52.1
Charles, A.E.	AUS	41.1	Cleo, P.C.	USA-K	2.1	Cornwall, N.A.	AUS	17.2
Charles, A.W.	AUS	41.1	Clerck, R.de	B	3.1	Corrales, A.	PE	6.1
Charpentier, F.	F	14.1		B	3.5	Correa, R.T.	USA-H	13.1
Charzewski, A.	PL	18.3		B	13.2	Correll, F.E.	USA-D	4.1
Chater, G.P.	GB	38.1		B	4.1	Corse, J.W.	USA-K	1.1
Chávez, A.	PE	6.1	Clijsters, H.	CDN	37.1	Cortvriendt, S.F.	B	3.8
Cheney, P.	USA-J	11.1	Cline, R.A.	USA-J	5.1	Cott, A.E.	USA-G	18.1
Cheo, P.C.	USA-J	11.1	Clore, W.J.	GB	45.1	Cotter, D.J.	USA-F	11.1
	USA-K	10.1	Coaker, T.H.	USA-D	4.1	Cottrell, Miss H.J.	GB	35.1
Cherry, J.H.	USA-F	9.1	Cochran, P.D.	USA-I	9.1	Coudriet, D.	USA-J	13.1
Chevalier	F	19.2	Cochran, G.W.	USA-C	3.1	Coudriet, D.L.	USA-J	9.1
Chevrette, J.E.	CDN	18.1	Cochran, L.C.	AUS	24.1	Couey, H.M.	USA-K	8.1
Chiba, M.	CDN	37.2	Cockroft, B.	ZA	6.3	Couilland, P.	F	7.1
Childers, N.F.	USA-B	16.1	Coertze, A.T.	BR	11.2	Coulombe, L.J.	CDN	22.1
Childs, A.E.	GB	30.1	Coe Teixeira, B.	ZA	6.4	Courtney, A.D.	GB	45.1
Childs, J.F.L.	USA-D	33.1	Coetzee, Mrs. V.	AUS	37.1	Coutu, A.J.	PE	6.2
Childs, W.H.	USA-C	9.1	Coffman, C.R.	USA-K	15.1	Cover, M.S.	USA-C	2.1
Chilton, J.P.	USA-D	54.1	Coggins, C.W.	GB	16.1	Covey, R.P.	USA-J	11.1
Ching, F.	USA-K	2.1	Cohen, M.	USA-D	23.1	Cowan, I.R.	GB	34.2
Chio, O.	J	38.1	Cohen, M.	USA-D	6.1	Cowin, R.F.	GB	41.1
Chipman, E.W.	CDN	6.1	Cohoon, D.F.	USA-K	21.1	Cowley, R.W.I.	AUS	27.1
Chisholm, D.	CDN	6.1	Coit, J.E.	GB	15.1	Cowley, W.R.	USA-H	13.1
Chittenden, E.T.	NZ	5.1	Cokeley, K.C.	AUS	19.1	Cox, J.A.	USA-B	13.1
Chmiel, H.	PL	22.5	Cole, C.E.	GB	9.1	Cox, J.E.K.	GB	7.1
Chōno, H.	J	12.3	Coleman, G.	GB	31.1	Coyier, D.L.	USA-J	16.1
Chopinot, R.	F	14.1	Colhoun, J.	USA-C	9.1	Coyne, D.P.	USA-G	21.1
Chouard, P.	F	11.1	Collier Jr., C.W.	CDN	37.1	Cozens, P.	GB	46.1
Choyce, M.A.	WAN	2.1	Collin, G.H.	GB	21.1	Crabbe	R	5.3
Christ, E.G.	USA-B	16.1	Collingwood, E.F.	USA-G	17.1	Crabtree, G.	USA-J	14.1
Christensen, A.O.	DK	7.2	Collins, P.E.	GB	4.1	Craig, D.L.	CDN	6.1
Christensen, H.	DK	1.1	Collins, W.	CDN	9.1	Craig, R.	USA-B	15.1
	DK	4.1	Collins, W.B.	F	18.1	Craighead, F.C.	USA-D	31.1
	DK	5.6	Collon, Mme Y.			Crall, J.M.	USA-D	30.1
Christensen, M.	DK	6.1						

Cram, W.H.	CDN	43.2	Daidō, K.	J	32.1	Denisen, F.L.	USA-G	18.1
Cram, W.T.	CDN	64.1	Daito, H.	J	5.4	Denman, T.E.	USA-H	12.1
Crandall, P.C.	USA-J	10.1	Dalbro, S.	DK	5.1	Denna, D.	USA-I	3.2
Crane, J.C.	USA-K	7.1	Dallimore, C.E.	USA-I	18.1	Dennis, J.G.	USA-B	4.1
Crauwels, H.	B	10.1	Dally, H.R.	GB	15.1	Dennison, R.A.	USA-D	24.1
Crawford, D.V.	GB	34.2	Dallyn, S.R.	USA-B	9.1	Denolin, M. Jean	B	1.2
Crawford, J.H.	USA-D	8.2	Dalton, F.N.	USA-K	15.2	Dent, K.W.	GB	34.2
Craze, S.P.	GB	12.1	Dam, J.G.C.	NL	5.1	Deobald, H.J.	USA-D	61.1
Crean, D.	GB	9.1	Dana, M.N.	USA-F	18.1	Deonier, M.T.	USA-D	19.1
Creasy, L.L.	USA-B	6.1	Danielson, L.L.	USA-C	3.1	Depree, M.	USA-D	15.1
Creech, J.L.	USA-C	3.1	Dansereau, P.	USA-B	1.1	Derden, A.	B	8.1
Creech, R.G.	USA-B	15.1	Dantz, K.G.	D	6.1	Derderian, M.D.	USA-K	15.2
Creighton, C.S.	USA-D	7.1	Darby, J.F.	USA-D	36.1	Dermen, H.	USA-C	3.1
Creighton, Harriet B.	USA-A	13.1	Darby, L.A.	GB	26.1	Dermine, E.	B	5.1
Cremer, Miss M.C.	NL	9.1	Darling, H.S.	WAN	2.1	Derolez, J.	B	12.1
Crespo, R.	PE	6.1	Daszewski, J.	PL	18.2	Dersch, H.	D	16.1
Crete, R.	CDN	22.1	Daubeny, H.A.	CDN	58.1	Derthing, W.	USA-G	26.1
Cripps, J.	AUS	35.1	Däumel, G.	D	9.7	Desmedt, B.	B	12.2
Crisan, E.	USA-B	10.1	Daunicht, H.J.	D	5.4	Desmet, J.	F	12.1
Crockett, S.P.	USA-D	48.1	Davenport, H.E.	GB	28.1	Dethier, B.E.	USA-B	6.1
Crommelin, R.D.	NL	5.1	David, A.C.	USA-B	4.1	Détienne, G.	F	5.1
Cropley, R.	GB	10.1	David, J.	CDN	19.1	Detroux, L.	B	2.9
Crosbois, M.	E	15.1	Davidson, H.	USA-F	13.1	Dever, D.A.	CDN	24.1
Crosier, W.F.	USA-B	4.1	Davidson, R.L.	ZA	2.1	Devine, E.S.	GB	42.1
Cross, Ch.E.	USA-A	12.1	Davidson, T.P.	USA-J	15.1	Dewey, D.H.	USA-F	13.1
Cross, P.E.	GB	32.1	Davidson, T.R.	CDN	37.2	Dewis, J.W.	WAN	2.1
Crosse, J.E.	GB	10.1	Davies, B.E.	GB	27.1	DeWorth, A.F.	USA-H	7.1
Crossley, J.H.	CDN	62.1	Davies, H.T.	CDN	9.1	Dezső, I.	H	1.2
Crow, W.C.	USA-C	6.1	Davies, J.H.	WAN	2.1	Dhaliwal, A.S.	USA-I	9.1
Crowe, A.C.	CDN	6.1	Davies, J.N.	GB	26.1	Dias, H.	CDN	37.2
Crowe, D.E.	USA-B	3.1	Davis, B.H.	USA-B	16.1	Dias Bicalho, H.	BR	11.2
Crowell, H.H.	USA-J	14.1	Davis, D.W.	USA-I	9.1	Dias Caballero, N.	E	5.1
Crowley, N.C.	AUS	33.1	Davis, E.W.	USA-C	3.1	Díaz, Miss A.L.	PE	6.4
Crowther, R.F.	CDN	37.1	Davis, G.N.	USA-K	7.1	Díaz, F.	CR	1.1
Crozier, J.A.	USA-M	8.1	Davis, H.L.	USA-H	2.1	Díaz-Romeu, R.	CR	1.1
Crüger, G.E.G.	D	7.1	Davis, P.L.	USA-D	33.1	Dicke, R.J.	USA-F	18.1
Crumpton, F.A.	GB	21.1	Davison, J.G.	GB	16.1	Dickens, J.S.W.	GB	16.1
Cruz, Miss M.de la	PE	6.4	Davison, R.M.	NZ	1.1	Dicker, G.H.L.	GB	10.1
Cruz, N.D. da	BR	11.2	Davison, Mrs. S.	NZ	1.2	Dickerson, R.B.	USA-B	15.1
Cselötei, L.	H	4.1	Dawydko, B.	PL	17.1	Dickey, R.D.	USA-D	24.1
Csepregi, P.	H	1.2	Day, Augustine	USA-D	7.1	Dickinson, D.	GB	9.1
Csider, L.	H	4.1	Day, B.E.	USA-K	15.1	Dickinson Jr., D.B.	USA-F	12.2
Csöbőnyei, I.	H	5.1	Day, P.R.	USA-A	14.1	Dickinson, T.R.	GB	4.1
Csorba, Z.	H	1.5	Dayton, D.F.	USA-F	12.2	Dickson, M.H.	USA-B	4.1
Csöti, L.	H	1.2	Deale, F.A.	ZA	5.1	Die, J.van	NL	12.1
Culbert, J.R.	USA-F	12.2	Dean, L.L.	USA-I	21.1	DiEdwardo, A.A.	USA-D	24.1
Cull, B.W.	AUS	18.1	Dean, R.W.	USA-B	5.1	Diepen, D.van	NL	5.1
Cumber, R.A.	NZ	5.2	Dearborn, C.H.	USA-L	6.1	Dijkstra, Miss.J.	NL	12.9
Cumming, W.A.	CDN	40.1	Debuissou, J.	B	2.3	Dilley, D.R.	USA-F	13.1
Cumps	B	12.2	Pecker, G.C.	USA-F	12.1	Dilling Larsen, O.	N	10.4
Cupta, V.C.	CDN	4.1	Decker, P.	USA-D	24.1	Dimock, A.W.	USA-B	6.1
Currence, T.M.	USA-G	6.1	Deckers, J.	B	3.2	Dimond, A.E.	USA-A	14.1
Curtis, D.L.	WAN	2.1	Decourtye, L.	F	1.1	Dingley, J.M.	NZ	1.2
Curtis, L.C.	USA-D	11.1	Deep, I.W.	USA-J	14.1	Dingwall, I.G.P.	GB	29.1
Curtis Jr., O.F.	USA-B	4.1	Defosse, L.	B	2.4	Dinkel, D.H.	USA-L	6.1
Curtiss, W.C.	USA-A	10.1	Degman, E.S.	USA-J	11.1	Dionne, L.A.	CDN	9.1
Curylo	PL	18.1	Deibner, L.	F	18.1	Dłuzewska, W.	PL	22.5
Cutcliffe, J.A.	CDN	4.1	Deist, J.	ZA	7.1	Dmoch, J.	PL	22.1
Cuthbert Jr., E. P.	USA-D	7.1	Dekhuyzen, H.M.	NL	12.9	Dobbelaere, R.de	B	13.1
Czapski, J.	PL	18.1	Dekker, J.	NL	12.9	Dobie, N.D.	USA-J	14.1
Czarnik, W.	PL	13.6	Delap, Mrs.A.V.	GB	10.1	Dobray, Mrs.E.	H	1.2
Czerkaskyi, A.	AUS	24.1	Delgado, E.	PE	6.1	Dodds, K.S.	GB	3.1
Czudzak, J.	PL	23.1	Delgado, M.	PE	6.1	Dodge, F.W.	USA-D	62.1
Czynczyk, A.	PL	18.1	Delhay, R.	B	8.1	Dodson, C.	USA-D	31.1
Czyzewska, S.	PL	13.1	Delmotte, R.	B	8.1	Doedens, E.J.	NL	12.7
			Delver, P.	NL	13.1	Doeksen, J.	NL	12.3
			Demianowicz, Z.	PL	18.1	Dohi, H.	J	12.1
			Demonanville, I.E.	USA-A	12.1	Doi, A.	J	5.2
Nabbs, D.H.	CDN	46.1	Dempsey, A.H.	USA-D	15.1	Doi, K.	J	35.1
Naprowska, B.	PL	22.9	Denby, L.G.	CDN	63.1	Dolan, D.D.	USA-B	4.1
Nahl, M.H.	DK	6.1	Denby Wilkes, G.	F	10.1	Doll, C.C.	USA-G	19.1
Daiber, C.C.	ZA	6.3	Denike, G.N.	CDN	49.1			

Doll, H.	DK	8.1	Dustan, G.G.	CDN	37.2	Emerson, F.H.	USA-F	9.1
Dońska, H.	PL	2.1	Dutkiewicz, L.	PL	18.2	Emery, D.	USA-K	19.1
Domokos, J.	H	1.2	Dutt, J.O.	USA-B	15.1	Emmert, F.H.	USA-A	15.1
Dondale, C.D.	CDN	23.1	Duvekot, W.S.	NL	12.2	Emmond, G.S.	CDN	43.1
Dongo, S.	PE	6.1	Dye, A.P.	USA-C	9.1	Emsweller, S.L.	USA-C	3.1
Donoho Jr., C.W.	USA-F	7.1	Dye, D.W.	NZ	1.2	Emura, I.	J	7.1
Doom, D.	NL	3.1	Dye, M.H.	NZ	1.2	Enari, L.	USA-K	2.1
Doorenbos, J.	NL	12.9	Dykstra, T.P.	USA-D	54.1	Ende, J. van den	NL	11.1
Dorey, I.O.	GB	15.1	Dziecioł, U.	PL	18.1	Endö, K.	J	8.1
Dormal-van den			Dziecioł, W.	PL	18.1	Endo, K.	J	38.1
Bruel, S.	B	5.2				Endö, M.	J	11.1
Dorrell, D.G.	CDN	40.1	Ealy, R.P.	USA-G	26.1	Endo, T.	J	16.1
Dorsman, C.	NL	6.1	Earle, W.H.	USA-H	19.1	Engel	D	6.1
Dorst, H.E.	USA-I	9.1	Easton, C.D.	USA-J	5.1	Engelbrecht, D.S.	ZA	7.1
Doruchowski,			Eaton, G.W.	CDN	64.2	Engle, R.	USA-B	16.1
R.W.	PL	18.2	Eaton, H.J.	GB	7.1	Engsbro, B.	DK	6.1
Dostal, H.C.	USA-F	9.1	Eaton, R.	USA-A	6.1	Ennis Jr., W.B.	USA-C	3.1
Doude van Troost-			Eaves, C.A.	CDN	6.1	Enriquez, G.	CR	1.1
wijk, W.J.	NL	3.1	Ebben, M.H.	GB	26.1	Eperjesi, I.	H	1.2
Dougall, I.C.G.	GB	14.1	Eberz, A.	D	25.1	Epling, C.C.	USA-K	12.1
Doughty, C.C.	USA-J	2.1	Echandi, E.	CR	1.1	Epps, W.W.	USA-D	8.2
Douglas, L.A.	AUS	39.1	Eck, P.	USA-B	16.1	Erasmus, G.M.M.	ZA	7.1
Dovaston, Miss			Ecochard, R.M.	NL	12.6	Erdei, I.	H	7.1
P.I.H.	GB	14.1	Economides, C.V.	CY	1.1	Eriksen, E.	DK	5.8
Dowker, B.D.	GB	45.1	Edamura, T.	J	38.1	Eriksen, E.N.	DK	4.1
Downes, J.A.	CDN	32.1	Edelman-Vlam,			Erikson, H.T.	USA-F	9.1
Downes, J.D.	USA-F	13.1	Mrs. A.W.	NL	5.1	Erlanson, C.O.	USA-C	3.1
Downing, R.S.	CDN	63.1		NL	12.9	Ernst, L.F.	NL	12.4
Dowrick, G.J.	GB	27.1	Edgerton, L.J.	USA-B	6.1	Fsbo, H.	S	9.2
Draines, R.H.	USA-B	16.1	Edington, L.V.	USA-A	14.1	Escher, F.	D	20.1
Dransfield, M.	WAN	2.1	Edland, T.	N	10.5	Escritt, J.R.	GB	5.1
Draper, A.	USA-D	51.1	Edney, K.L.	GB	25.1	Eshett, O.T.	WAN	2.1
	USA-D	55.1	Edwards, C.S.	AUS	40.2	Eskeblad, A.	N	6.1
Draper, R.P.	USA-I	8.1	Edwards, G.J.	USA-D	28.1	Eskeu, R.K.	USA-B	14.1
Dreiling, F.R.	USA-C	11.1	Edwards, G.R.	AUS	33.1	Esquivel, C.	PE	4.1
Drenth, A. van	NL	12.7	Edwards, Miss M.	GB	34.2	Esquivel, O.	CR	1.1
Drew, D.H.	GB	45.1	Edwards, Miss			Estey, S.H.	CDN	19.1
Drew, W.B.	USA-F	13.1	P.M.J.	WAN	2.1	Eto, T.	J	3.1
Driest, J. Ph. van	NL	2.1	Egebaek, H.	DK	5.8	Etzel, W.W.	USA-D	57.1
Drift, J. van der	NL	3.1	Eggert, R.	USA-A	2.1	Evans, E.P.	ZA	6.3
Drijfhout, E.	NL	12.8	Eguchi, H.	J	33.2	Evans, G.E.	USA-I	22.1
Drinkwater, W.O.	USA-B	16.1	Eguchi, T.	J	40.1	Evans, W.D.	CDN	26.1
Driver, C.M.	NZ	2.1	Ehrenhardt, H.	D	18.1	Evenhuis, H.H.	NL	12.5
Dronka, K.	PL	10.1	Ehrle, L.	D	23.1	Everett, C.F.	CDN	9.1
Drouzy, J.	F	14.1	Ehsen, H.	D	20.1	Everett, P.C.	USA-K	6.1
Drózd, W.	PL	18.1	Eide, P.M.	USA-J	3.1	Everett, T.H.	USA-B	1.1
Drude, G.	D	10.1	Einset, J.	USA-B	4.1	Everist, S.	AUS	14.1
Drury Jr., W.	USA-A	6.1	Eiten, G.	BR	11.2	Ewing, E.E.	USA-B	6.1
Dubbs, A.L.	USA-I	26.1	Eijk, J.P. van	NL	12.8	Eygenraam, J.A.	NL	3.1
Duch, J.	PL	15.1	Eksteen, J.J.	ZA	7.1			
DuCharme, E.P.	USA-D	28.1	Eksteen, L.L.	ZA	7.3	Fabiański, A.	PL	4.1
Dudeck, A.E.	USA-G	21.1	Elek, L.	H	1.1	Fabritius-Buch-		
Dudley, Th.R.	USA-A	7.1	Elema, R.K.	NL	13.1	wald, N.	DK	5.2
Dugger Jr., W.M.	USA-K	15.1	Elgersma, D.	NL	4.1	Faegri, K.	N	1.1
Duich, J.M.	USA-B	15.1	Elk, B.C.M. van	NL	6.1	Fajkowska, H.	PL	18.2
Dujardin, J.	F	14.1	Elkersley, J.P.	AUS	35.1	Falanghe, O.	BR	11.1
Dullforce, W.M.	GB	34.2	Ellen, M.	CDN	9.1	Fallon, J.	AUS	35.1
Dullum, N.	DK	7.1	Elliot, J.A.	CDN	32.2	Farrestveit, B.	DK	5.1
Dumon, A.G.	B	7.3	Elliot, J.G.	GB	36.1	Farrel, M.A.	USA-B	15.1
Duncan, D.H.	USA-C	11.1	Elliot, Mrs. R.F.	NZ	1.2	Fatmi, A.S.	WAN	2.1
Dunham, C.W.	USA-C	2.1	Elliot, W.H.	USA-C	6.1	Faucher, P.	F	14.1
Dunkel, K.H.	D	5.4	Ellis, D.E.	USA-D	4.1	Faulkner, L.R.	USA-J	5.1
Dunn, D.B.	GB	8.1	Ellis, P.G.	GB	27.1	Faulkner, R.C.	WAN	2.1
Dunn, G.S.	AUS	39.1	Ellis, P.R.	GB	26.1	Faust, J.	D	18.1
Dunn, J.A.	GB	45.1	Ellison, J.H.	USA-B	16.1	Fawcett, C.H.	GB	46.1
Dunn, J.S.	NZ	3.2	Ells, J.	USA-I	3.2	Fazio, S.	USA-H	22.1
Dunne, T.C.	AUS	35.1	El Shal, M.	D	5.4	Fedderson, H.D.	AUS	25.1
Duran, R.	USA-J	6.1	Elshove, Miss A.	NL	12.9	Feder, W.A.	USA-D	33.1
Durand, Y.	F	6.1	Elton, E.T.G.	NL	3.1	Fejersson, F.	S	4.1
Durham, W.F.	USA-J	11.1	Elzenga, G.	NL	12.8	Fekete, Z.	H	1.2
Durkee, A.R.	CDN	32.2	Embleton, T.W.	USA-K	15.1	Feldman, A.W.	USA-D	28.1
Durkin, D.J.	USA-F	9.1	Emden, H.F. van	GB	40.1	Feldmesser, J.	USA-D	33.1
Durska, K.	PL	18.1	Emden, J.H. van	NL	12.5	Félez, R.P.	F	9.2

Fenner, T.L.	AUS	39.1	Fölscher, W.J.	ZA	6.5	Fuchs, P.	NL	3.1
Ferange, Mlle			Fölster, E.	D	12.6	Fujieda, K.	J	7.2
M.Th.	B	5.3	Fontenot, J.F.	USA-D	54.1	Fujii, F.	J	39.1
Ferdinand, D.	H	6.1	Foott, W.H.	CDN	28.1	Fujii, T.	J	4.2
Ferguson, A.R.	NZ	1.1	Forbes, A.R.	CDN	64.1		J	40.8
Ferguson, J.H.A.	NL	12.8	Forbes, R.B.	USA-D	36.1	Fujimara, T.	J	13.1
Ferguson, K.	USA-A	7.1	Force, R.	USA-M	3.1	Fujimoro, M.	J	26.1
Ferguson, W.E.	CDN	32.2	Ford, Mrs.E.M.	GB	10.1	Fujimoto, H.	J	13.1
Fernandez, J.	PE	6.3	Ford, H.W.	USA-D	28.1	Fujimoto, K.	J	28.1
Fernqvist, I.	S	1.1	Fordham, A.J.	USA-A	7.1	Fujimoto, T.	J	2.2
Ferrari, R.	F	19.1	Fornachon, J.C.			Fujimura, H.	J	22.1
Ferraz, A.M.	BR	11.2	M.	AUS	28.1	Fujimura, J.	J	23.2
Ferrer, F.	CR	1.1	Forsberg, J.L.	USA-F	12.1	Fujino, M.	J	13.1
Ferreira, R.	PE	6.1	Forsee, W.T.	USA-D	20.1	Fujioka, S.	J	13.1
Feucht, J.R.	USA-B	16.1	Forsney, C.G.	USA-B	5.1	Fujisaki, M.	J	25.2
Fich, Chr.	DK	5.8	Forson, J.A.	WAN	2.1	Fujishita, N.	J	32.2
Fidalgo, Maria			Førsund, E.	N	10.5	Fujita, M.	J	29.1
Eneyda P.K.	BR	11.2	Forsyth, F.R.	CDN	6.1	Fujiwara, H.	J	22.5
Fidalgo, O.	BR	11.2	Forsythe Jr.,			Fujiwara, Y.	J	22.1
Fidler, J.C.	GB	25.1	H.Y.	USA-F	7.1	Fukada, Y.	J	23.1
Fiedorow, Z.	PL	13.3	Forsythe, W.	PE	6.4	Fukai, H.	J	31.2
Field, M.L.	USA-E	15.1	Fortanier, E.J.	NL	12.9	Fukuda, A.	J	22.3
Fieldhouse, D.J.	USA-C	2.1	Fortney, W.R.	USA-C	9.1	Fukuda, H.	J	16.1
Figueiredo Jr.,			Foskett, R.L.	USA-I	3.2		J	41.3
E.R.	BR	11.1	Fosler, G.M.	USA-F	12.2	Fukuda, S.	J	35.2
Figueroa, R.	PE	7.1	Foster, J.R.	CDN	43.1	Fukui, K.	J	39.2
Fikes, S.	USA-H	8.1	Foster II, R.E.	USA-H	18.1	Fukumoto, T.	J	13.1
Filipovic, S.D.	AUS	23.2		B	9.1	Fukunaga, E.T.	USA-M	5.1
Filius, I.	H	1.2	Fouarge, G.	ZA	7.1		USA-M	5.2
Fincham, J.R.S.	GB	3.1	Fourie, K.J.	ZA	7.1	Fukunaga, S.	J	28.2
Findlay, W.J.	CDN	28.1	Fourie, M.P.	F	14.1	Fukushima, E.	J	7.3
Finlayson, D.G.	CDN	64.1	Fournier, B.	F	16.1	Fukushima, H.	J	14.4
Finlayson, Miss			Foury, C.	F	16.1	Fukushima, S.	J	3.1
T.	CDN	23.1	Fowler, Miss C.			Fukushima, T.	J	28.2
Fischer, C.C.	USA-B	6.1	A.	AUS	41.1	Fukuyama, K.	J	37.2
Fischer Mattos,			Fox, C.J.S.	CDN	6.1	Fukuzumi, H.	J	32.2
N.	BR	11.2	Fox, R.T.	USA-B	6.1	Fuleki, T.	CDN	6.1
Fish, A.S.	USA-D	4.1	Franciosi, J.R.	PE	6.1	Fulford, R.M.	GB	10.1
Fisher, D.V.	CDN	63.1	Francie, R.I.B.	AUS	33.1	Fullilove, W.T.	USA-D	15.1
Fisher, F.E.	USA-D	28.1	Franco, J.	PE	6.1	Fulmer, J.P.	USA-D	8.2
Fisher, H.H.	USA-C	3.1	Francois, L.E.	USA-K	15.2	Fulton, H.G.	CDN	64.1
Fisher, K.J.	NZ	7.1	Frank, R.	CDN	33.1	Fulton, J.M.	CDN	28.1
Fisher, R.W.	CDN	37.2	Franke, I.	D	9.12	Funaba, M.	J	41.2
Fisher, V.J.	USA-C	2.1	Franken, A.A.	NL	2.1	Funagami, K.	J	5.2
Fitch, L.A.	USA-J	18.1	Franklin, D.F.	USA-I	20.1	Funakoshi, K.	J	37.3
Fitzpatrick, R.			Franklin, E.W.	CDN	26.1	Furr, J.R.	USA-K	9.1
E.	CDN	64.1	Franklin, J.J.	USA-H	7.1	Furstenberg, J.P.	ZA	6.4
Fjeldalen, J.	N	10.5	Frankton, C.	CDN	32.3	Furusato, K.	J	37.4
Flach, A.J.	NL	12.4	Frappell, B.D.	AUS	36.2	Furuta, H.A.	USA-D	38.1
Flanzy, M.	F	18.1	Fraselle, J.	B	2.9	Furuta, K.	J	21.1
Flegg, P.B.	GB	26.1	Frazier, W.A.	USA-J	14.1	Furuya, T.	J	34.1
Flehr, F.	D	9.15	Frederick, E.C.	USA-G	7.1	Futrell, M.C.	WAN	2.1
Fleming, H.	USA-B	13.1	Frédéricq, H.	B	3.4	Fykse, M.	N	10.5
Fleming, P.M.	AUS	6.1	Freeman, G.G.	GB	45.1			
Fleming, R.A.	CDN	37.1	Freeman, J.A.	CDN	58.1			
Flemion, Miss F.	USA-B	10.1	Freeman, T.E.	USA-D	24.1	Gaastra, P.	NL	12.9
Flentje, N.T.	AUS	33.1	French, O.C.	USA-B	6.1	Gabelman, W.H.	USA-F	18.1
Fletcher, H.F.	CDN	58.1	Frerichmann, W.	D	27.7	Gabrielsen, E.	N	10.3
Flocker, R.F.	USA-B	15.1		D	27.10	Gabrielsen, E.K.	DK	5.4
Flónes, M.	USA-K	7.1	Frevort, R.K.	USA-H	22.1	Gabrielson, R.L.	USA-J	7.1
Flood, A.E.	N	7.1	Frey, S.	GB	8.1	Gabryl, J.	PL	18.2
Florez, A.	GB	27.1	Friberg, P.	S	1.1	Gage, B.	USA-K	20.1
Florin, R.	PE	6.3	Frick, E.L.	GB	10.1	Gagnaire, J.	F	12.2
Flowers, S.	S	9.1	Fridlund, P.R.	USA-J	5.1	Gaines, J.C.	USA-H	7.1
Fluiter, H.J. de	USA-I	12.1	Friedberg, L.	F	6.1	Gajewski, E.	PL	11.1
Fockens, F.H.	NL	12.5	Friedberg, R.	F	6.1	Gajaj, M.	PL	18.2
Fodchuk, R.P.	NL	12.2	Frissel, M.J.	NL	12.6	Galletta, G.J.	USA-D	4.1
Fogle, H.W.	CDN	26.1	Fritz, P.D.	D	27.2	Gallander, J.F.	USA-F	7.1
Foley, R.F.	USA-C	3.1	Froker, R.K.	USA-F	18.1	Galle, P.C.	USA-D	18.1
Folkner, J.S.	USA-I	20.1	Frost, A.A.	GB	29.1	Galley, R.A.E.	GB	43.1
Folley, R.R.W.	USA-H	22.1	Fry, B.O.	USA-D	15.1	Gambrell, F.L.	USA-B	4.1
Follstad, M.N.	GB	27.1	Fry, P.R.	NZ	1.2	Gambrell Jr.,		
	USA-K	8.1	Fryer, J.D.	GB	36.1	C.E.	USA-D	9.1
			Fuchs, A.	NL	12.9	Gambrill, R.G.	GB	10.1

Gankin, R.	USA-K	7.1	Gibbins, L.N.	NZ	5.1	Goth, R.W.	USA-C	3.1
Gandy, Miss D.G.	GB	26.1	Gibson, E.J.	USA-D	12.1	Goto, M.	J	25.1
Gane, A.J.	GB	47.1	Giertych, M.	PL	6.1	Gotō, M.	J	25.2
Gapiński, M.	PL	13.7	Giesen, H.J.	NZ	2.1	Goto, T.	J	30.3
Gara, R.	USA-B	10.1	Giessen, A.C. van			Gotō, Y.	J	25.2
Garaudeaux, J.	F	19.2	der	NL	12.8	Gotōda, E.	J	39.1
Garazsi, M.	USA-K	8.1	Gilbert, F.A.	USA-F	20.1	Götz, G.	D	24.1
Garcia, F.	PE	6.1	Gilbert, J.C.	USA-M	3.2	Gould, C.J.	USA-J	7.1
García Cabezón, A.	E	11.1	Gilbert, P.	B	1.1	Gould, E.	USA-C	8.1
Garçon, P.	F	6.1	Gilet, R.	F	12.2	Gould, W.A.	USA-F	3.1
Garderen, J. van	ZA	6.1	Gill, D.L.	USA-D	19.1	Goulpaud, J.	F	14.1
Gardner, F.E.	USA-D	33.1	Gillard, A.	B	3.5	Gourley, C.O.	CDN	6.1
Gardner, M.E.	USA-D	4.1	Gillepsy, T.G.	GB	9.1	Gous, P.J.	ZA	6.3
Gardner, W.R.	USA-K	15.2	Gilles, G.	B	4.1	Gouvêa Labou- riau, L.F.	BR	11.2
Garmendia, M.	PE	6.1		B	6.1	Grabowska, B.	PL	22.11
Garner, R.J.	GB	10.1	Gillingham, G.T.	CDN	62.1	Grabowska, K.	PL	13.4
Garnsey, S.M.	USA-D	33.1	Gilmer, R.M.	USA-B	4.1	Gracia, C.	PE	6.1
Garraway, J.L.	GB	27.1	Gilmore, A.E.	USA-K	7.1	Graham, D.	USA-I	23.1
Garren, R.	USA-J	14.1	Gilmore, J.	USA-F	14.1	Graham, D.C.	GB	11.1
Garretsen, Miss F.	NL	12.8	Gilmore, T.R.	USA-E	3.1	Graham, E.T.	USA-H	7.1
Garrett, Miss C. M.E.	GB	10.1	Gilot, J.	F	12.1	Graham, S.O.	USA-J	6.1
Garrison, O.B.	USA-D	8.1	Ginsburg, L.	ZA	7.1	Graham, T.O.	CDN	26.1
	USA-D	8.2	Gisborne, J.H.	GB	26.1	Gram, K.	DK	5.3
Garthwaite, Miss J.M.	GB	30.1	Given, B.B.	NZ	5.2	Granados, R.	USA-B	10.1
Gartner, J.B.	USA-F	12.2	Gjaerum, H.	N	10.5	Grana Enciso, E.	F	9.2
Gascó Pérez-Caballero, J.L.	E	4.1	Gladstones, J.C.	AUS	35.2	Grandison, G.	NZ	3.1
Gaston, H.P.	USA-F	13.1	Gladwin, H.S.	USA-K	19.1	Grandison, G.S.	NZ	5.2
Gathercole, F.J.	AUS	25.1	Glaser, T.	PL	13.3	Grandjean, P.	B	2.1
Gathey, H.M.	USA-C	3.1	Glass, E.H.	USA-B	4.1	Granger, R.	CDN	22.1
Gaudineau, Mlle M.	F	5.1	Glenn, Miss E.M.	GB	10.1	Graham, I.	S	9.3
Gyá Gilabert, M.	E	13.1	Glits, M.	H	1.2	Grant, V.	USA-K	6.1
Gay-Bellile, F.	F	7.1	Gö, T.	J	9.1	Grasmanis, V.O.	AUS	23.2
Gayford, G.W.	AUS	19.3	Godard, G.	F	6.1	Gratwick, Miss M.	GB	16.1
Geard, C.R.	AUS	36.2	Goenaga, A.	USA-B	10.1	Graves Jr., C.H.	USA-D	52.1
Geelhand de Merxem, F.	B	3.2	Goertzen, J.O.	USA-K	15.2	Gray, W.H.	USA-G	5.1
Geenen, E.	B	7.4	Goff, K.	USA-A	1.1	Greef, J.de	B	3.4
Geisman, J.R.	USA-F	3.1	Gogne, W.E.	USA-K	1.1	Green, D.	GB	18.1
Gelderen, C. van	NL	12.4	Golditz, P.	USA-D	12.1	Green, G.C.	ZA	3.1
Gelin, O.E.V.	S	4.1	Goldsberry, K.	USA-I	3.2	Green, G.M.	NL	12.4
Gemenen, P. van	NL	12.7	Goldschmidt-Reischel, E.	S	1.1	Green, H.C.	GB	42.1
Généreux, H.	CDN	17.1	Goldsworthy, P.R.	WAN	2.1	Green, P.S.	USA-A	7.1
Genest, J.	CDN	12.1	Golik, Z.	PL	20.1	Green, R.E.	USA-M	4.1
Gent, G.P.	GB	47.1	Golińska-Noszczyńska, K.	PL	13.7	Greenham, D.W.P.	GB	10.1
Georgala, M.B.	ZA	3.1	Golisz, A.	PL	22.6	Greenleaf, W.H.	USA-D	38.1
George, A.J.	GB	18.1	Gombkötő, G.	H	1.2	Greenway, H.	AUS	6.1
George, E.J.	USA-G	13.1	Gómez, J.	PF	6.1	Greenwood, D.J.	GB	45.1
George, J.A.	CDN	37.2	Gonderman, R.	USA-K	2.1	Gregers Hansen, B.	DK	8.1
George, K.S.	GB	16.1	González-Sicilia, E.	E	5.1	Gregory, M.	GB	22.1
George, R.A.T.	GB	15.1	Goodchild, N.A.	GB	10.1	Greidanus, P.	NL	12.2
George Jr., W.L.	USA-B	16.1	Goode, J.E.	GB	10.1	Greig Jr., J.K.	USA-G	26.1
Gesell, S.G.	USA-B	15.1	Gooding, H.J.	GB	13.1	Grenard, R.S.	USA-F	9.1
Geraldson, C.M.	USA-D	21.1	Goodman, R.N.	USA-E	15.1	Gries, G.A.	USA-H	22.1
Gérard, R.	F	6.1	Goodman, V.H.	USA-K	15.1	Griffin, G.D.	USA-I	9.1
Gerber, J.F.	USA-D	24.1	Goodway, N.D.	GB	7.1	Griffiths, A.	USA-K	2.1
Gerhardt, P.D.	USA-H	18.1	Goodwin-Wilson, R.	CDN	26.1	Griffiths, A.E.	USA-A	16.1
Gerlach, A.	D	20.1	Goosen, R.J.	ZA	8.1	Griggs, W.H.	USA-K	7.1
Germing, G.H.	NL	12.7	Goossens, A.	B	10.1	Grimm, G.R.	USA-D	33.1
Gerrits, J.P.G.	NL	8.1	Gordon, W.C.	USA-D	52.1	Grimso, N.H.	USA-G	4.1
Gershon, H.	USA-B	10.1	Gordy, J. Frank	USA-C	1.1	Grisse, A.de	B	3.5
Gersons, L.	NL	12.2	Görgényi, Mrs.L.	H	1.2	Grissendanner, S.E.	USA-D	42.1
Gertych, Z.	PL	18.2	Gorter, Miss C.J.	NL	12.9	Grcarevic, M.	AUS	20.1
Gerwig, J.L.	USA-B	16.1	Gorter, G.J.	ZA	6.3	Grobler, J.H.	ZA	3.1
Getzin, L.W.	USA-J	7.1	Gorter, G.J.M.A.	ZA	6.1	Grobman, A.	PE	6.2
Geus, C.de	NL	10.1	Gortzig, C.	USA-B	6.1	Grochowska, M.	PL	18.1
Geyer, J.W.G.	ZA	6.1	Goryū, K.	J	26.1	Grochowski, J.	PL	18.1
Geypens, M.	B	7.4	Gossot, P.	F	4.1	Gromisz, M.	PL	18.1
			Gostick, K.G.	GB	16.1	Gromisz, Z.	PL	18.1
			Gostyńska-Jakuszewska, M.	PL	6.1	Gröné, L.	S	1.1
						Gronek, M.	PL	3.1
						Groot, C. de	CDN	31.1
						Grosclaude, C.	F	5.1

Groskopp, M.D.	USA-F	17.1	Hall, J.G. van	NL	5.1	Hardie, J.L.	GB	11.1
Gross, S.	USA-B	10.1	Hall, L.P.	GB	9.1	Hardin, N.C.	USA-C	9.1
Groszmann, H.M.	AUS	14.1	Hall, O.G.	GB	40.2	Harding, J.A.	USA-K	7.1
Groven, I.	DK	4.1	Hall, R.J.	CDN	25.1	Harding, P.L.	USA-D	33.1
Gruhler, M.	D	9.7	Hall, T.D.	GB	11.1	Hardisty, S.	AUS	35.1
Grunnet, H.Ø.	DK	7.1	Hallard, J.	F	14.1	Hardy, F.	CR	1.1
Gruppe, W.	D	10.1	Hallewell, R.S.	USA-H	7.1	Hardy, F.S.	GB	14.1
Gruys, P.	NL	3.1	Hallig, V.Aa.	DK	11.1	Hare, W.W.	USA-D	52.1
Grzyb, Z.	PL	18.1	Halse, N.J.	AUS	35.1	Hargrave, P.D.	CDN	51.1
Grzymia, A.	PL	14.1	Halsey, L.H.	USA-D	24.1	Harkness, C.	WAN	2.1
Guadagni, D.G.	USA-K	1.1	Haltvick, E.T.	USA-F	18.1	Harkness, R.W.	USA-D	26.1
Gubbels, G.	CDN	65.1	Hamachi, F.	J	7.1	Harmon, S.A.	USA-D	19.1
Guerra, R.	PE	3.1	Hamada, K.	J	13.1	Harney, Miss P.M.	CDN	26.1
Guillén, L.	PE	1.1	Hamaguchi, K.	J	27.2	Harper, F.R.	CDN	55.1
Guimaraes de Aze-			Hamajima, N.	J	26.3	Harper, J.E.	USA-B	15.1
vedo, L.	BR	11.2	Hamaoka, S.	J	40.5	Harper, R.S.	AUS	19.1
Gull, D.D.	USA-D	24.1	Hamdorf, G.	D	14.1	Harrewijn, P.	NL	12.5
Gunn, E.	GB	12.1	Hamilton, H.A.	CDN	22.1	Harries, F.H.	USA-J	11.1
Gunst, J.H. de	NL	3.1	Hamilton, J.M.	USA-B	4.1	Harries, H.C.	GB	26.1
Guppy, J.C.	CDN	32.1	Hamilton, M.G.	USA-D	6.1	Harrington, J.D.	USA-B	15.1
Gurney, Miss B.	GB	26.1	Hamilton, R.	USA-M	3.2	Harrington, J.F.	USA-K	7.1
Gursansky, J.A.	AUS	25.1	Hamilton, R.I.	USA-I	22.1	Harris, C.M.	USA-K	8.1
Gutard, A.A.	CDN	50.1	Hammarlund, A.	DK	9.1	Harris, Jr., E.D.	USA-D	20.1
Guttay, A.J.R.	USA-A	15.1	Hammarlund, L.	DK	6.1	Harris, G.P.	GB	40.1
Guy, R.	AUS	31.1	Hammett, H.L.	USA-D	52.1	Harris, H.	USA-D	38.1
Guyer, G.E.	USA-F	13.1	Hammer, C.L.	USA-F	13.1	Harris, P.	CDN	23.1
Guymer, D.A.	WAN	2.1	Hampton, R.O.	USA-J	5.1	Harris, R.E.	CDN	50.1
Guymon, J.G.	USA-K	7.1	Hamson, A.R.	USA-I	9.1	Harris, R.W.	USA-K	7.1
Guzewska, I.	PL	18.1	Hanan, J.J.	USA-I	3.2	Harris, W.B.	AUS	25.1
Guznam, V.L.	USA-D	20.1	Hanaoka, T.	J	12.2	Harrison, A.L.	USA-H	14.1
Gwozdecki, J.	PL	18.1	Hance, R.J.	GB	36.1	Harrison, K.A.	CDN	6.1
Györffy, B.	H	1.4	Hanchey, R.H.	USA-D	54.1	Harrison, M.R.	USA-B	16.1
Gyuró, F.	H	1.2	Hancock, D.H.	WAN	2.1	Harrison, R.A.	NZ	2.2
			Hancock, Miss			Harrow, K.M.	NZ	1.2
			F.D.	ZA	2.1	Harst, J. van der	NL	12.8
Haag, I. de	NL	12.1	Hand, D.B.	USA-B	4.1	Hart, G.	AUS	41.1
Haahr, V.	DK	8.1	Handro, O.	BR	11.2	Hartley, R.D.	GB	46.3
Haan, F.A.M. de	NL	12.4	Handro, W.	BR	11.2	Hartman, F.O.	USA-F	3.1
Haans, J.C.F.M.	NL	5.1	Hankó, M.	H	1.2	Hartman, G.P.	USA-I	28.1
Haaren, A.J. van	AUS	42.1	Hanna, G.C.	USA-K	7.1	Hartman, J.D.	USA-B	6.1
Haas, P.G. de	D	21.1	Hannay, C.L.	CDN	30.1	Hartmann, C.	F	15.1
Haasis, F.A.	USA-D	4.1	Hänningen, P.	FL	5.1	Hartmann, E.	DK	5.1
Haber, Z.	PL	13.4	Hannon, C.I.	USA-D	28.1	Hartmann, H.D.	D	9.9
Habran, R.	B	6.1	Hansche, P.E.	USA-K	7.1	Hartmann, H.T.	USA-K	7.1
Hackett, W.P.	USA-K	12.1	Hansell, Dorothy			Hartmann, R.	B	10.1
Haddock, D.J.	USA-H	13.1	E.	USA-B	1.1	Hartmann, R.W.	USA-M	3.2
Haddon, A.V.	GB	4.1	Hansen, C.J.	USA-K	7.1	Haruta, T.	J	22.5
Hadle, B.	USA-G	26.1	Hansen, E.	USA-J	14.1	Harvey, J.M.	USA-K	8.1
Haefen, J.L. van	NL	3.1	Hansen, H.	D	15.1	Hase, Y.	J	19.1
Haegeman, F.	B	13.1	Hansen, H.P.	DK	5.2	Hashimoto, S.	J	40.9
Haegeman, J.	B	10.1	Hansen, K.	DK	5.3	Hashimoto, T.	J	23.1
Haeseler, C.W.	USA-B	15.1	Hansen, L.	DK	5.8	Hashino, M.	J	7.1
Hafen, L.	USA-F	9.1	Hansen, L.R.	N	10.5	Hassbroek, F.J.	ZA	7.1
Hagaguchi, K.	J	27.1	Hansen, M.	DK	5.8	Hasselbach, R.	D	19.1
Hagedorn, D.J.	USA-F	18.1	Hansen, P.	DK	7.1	Hasselkus, E.R.	USA-F	18.1
Haggar, R.J.	WAN	2.1	Hansen, R.	D	27.15	Hata, S.	J	22.1
Haginoru, Y.	J	17.2	Hansen, T.	DK	6.1	Hatanaka, C.	J	18.3
Hagiwara, H.	J	6.2	Hansen, W.W.	USA-H	3.1	Hatanaka, H.	J	7.1
Hagiya, K.	J	29.2	Hansis, W.L.	USA-K	12.1	Hatano, H.	J	25.1
Haglund, W.A.	USA-J	3.1	Hanyūda, T.	J	16.1		J	25.2
Haigh, J.C.	GB	45.1	Hara, S.	J	32.1	Hatcher, J.T.	USA-K	15.2
Haine, K.E.	GB	7.1		J	37.2	Hatta, S.	J	43.2
Haine, Miss N.M.	GB	41.1		J	39.1	Hattori, I.	J	35.1
Haisman, D.R.	GB	9.1		J	6.2	Haub, G.	D	9.13
Hakkaart, F.A.	NL	1.1	Harada, A.	F	11.1	Haugen, Ø.	N	10.2
	NL	17.5	Harada, H.	F	11.1	Haut, I.C.	USA-C	4.1
	J	40.7	Harada, S.	J	25.1	Haves, S.F.	GB	11.1
Hakoda, N.	GB	5.1	Harada, T.	J	18.1	Havis, J.R.	USA-A	5.1
Halcrow, J.G.	AUS	28.1	Haraldson, A.	S	1.1	Havord, G.	CR	1.1
Hales, C.R.	USA-D	24.1	Haramaki, C.	USA-B	15.1	Havstad, J.	N	2.1
Hall, C.B.	USA-G	28.1	Harcourt, D.G.	CDN	32.1	Hawkins, J.C.	GB	42.1
Hall, C.V.	AUS	10.1	Hard, C.G.	USA-G	6.1	Hawkins, L.E.	USA-H	3.1
Hall, E.A.	AUS	6.1	Hardenburg, R.	USA-C	3.1	Haworth, F.	GB	45.1
Hall, I.V.	CDN	6.1	Hårdh, J.E.	FL	12.1			
Hall, J.	USA-B	16.1						

Hawthorn, B.T.	NZ	1.2	Hernandez, T.P.	USA-D	54.1	Hirano, S.	J	4.1
Hawthorne, P.L.	USA-D	54.1		USA-D	57.1	Hirao, K.	J	3.2
Hayase, H.	J	12.2	Herne, D.H.C.	CDN	37.2		J	4.2
Hayashi, H.	J	23.1	Herregods, H.	B	13.1	Hiraoka, T.	J	10.2
Hayashi, H.	J	45.1	Herrera Munoz, A	E	9.2	Hiraragi, T.	J	16.2
Hayashi, I.	J	19.2	Herrero, J.	E	14.3	Hirata, K.	J	26.1
Hayashi, K.	J	4.1	Herreweghe, H. van	B	13.1	Hirata, N.	J	32.2
	J	44.1	Herriot, R.I.	AUS	31.1	Hirsch, G.	B	1.1
Hayashi, S.	J	1.1	Herrmann, Chr.	D	27.4	Hirohata, K.	J	43.1
	J	41.4	Hesling, J.J.	GB	26.1	Hirose, K.	J	26.3
Hayashi, Y.	J	31.1	Heslop, A.J.	AUS	19.2		J	37.1
Hayden, R.A.	USA-D	15.1	Heslot, D.	F	19.1	Hirose, T.	J	22.2
Hayes, W.A.	GB	26.1	Hess, C.E.	USA-F	9.1	Hirota, R.	J	41.3
Haynes, D.W.M.	WAN	2.1	Hesse, C.O.	USA-K	7.1	Hiroyasu, T.	J	46.1
Haynes, F.L.	USA-D	4.1	Heursel, J.	B	10.1	Hiruma, H.	J	34.1
Haynes, J.L.	USA-D	52.1	Heuvel, J. van den	NL	4.1	Hisasue, T.	J	21.2
Hayslip, N.C.	USA-D	23.1	Heuveln, B. van	NL	5.1	Hitaka, Y.	J	30.3
Hayward, F.W.	USA-D	28.1	Hewetson, F.Y.N.	USA-B	11.1	Hitchborn, J.H.	GB	8.1
Hazu, G.	J	37.3	Hewitt, A.A.	USA-K	7.1	Hitokuwada, W.	J	4.1
Head, G.C.	GB	10.1	Hewitt, E.J.	GB	28.1	Hitz, C.W.	USA-B	15.1
Hearn, C.J.	USA-D	33.1	Heybroek, H.M.	NL	4.1	Hjeltne, A.	N	5.1
Heath, O.V.S.	GB	40.1	Heydecker, W.	GB	34.2		N	10.3
Heathcote, R.G.	WAN	2.1	Heyns, A.J.	ZA	7.1	Hoag, D.G.	USA-G	11.1
Heatherbell, D.			Heyns, J.	ZA	6.4	Hoare, E.R.	AUS	6.1
A.	NZ	1.1	Hiatt, G.	USA-K	2.1	Hobbs, E.W.	GB	28.1
Heavens, A.V.	USA-B	16.1	Hibbard, A.D.	USA-E	15.1	Hobbs, E.L.	USA-D	21.1
Hebblethwaite, P.	GB	42.1	Hibben, C.R.	USA-B	8.1	Hobbs, J.A.	WAN	2.1
Heek, L.A.G. van	AUS	24.1	Hibukawa, S.	J	34.1	Hobein	D	20.1
Heeney, H.B.	CDN	35.1	Hickman, C.E.	USA-C	9.1	Hobolth, L.	DK	6.1
Heerema, J.P.	NL	5.1	Hicks, F.W.	AUS	36.2	Hobson, G.E.	GB	26.1
Heft, L.	D	21.1	Hicks, P.G.	AUS	39.1	Hockey, K.C.	NZ	7.1
Hege, H.	D	27.16	Hida, K.	J	37.4	Hodges, T.K.	USA-F	12.2
Hegwood, D.A.	USA-D	54.1	Hield, H.D.	USA-K	15.1	Hodgson, W.A.	CDN	9.1
Hehn, E.R.	USA-I	22.1	Hiemeleers, K.J.	B	7.2	Hodossi, A.	H	5.1
Heide, O.M.	N	10.3	Hidding, A.P.	NL	12.4	Hodosy, A.	H	5.1
Heijna, B.J.	NL	12.7	Hiele, T. van	NL	12.2	Hoecker, R.W.	USA-C	6.1
Heimann, M.	D	9.13	Higashi, T.	J	37.1	Hoek, D.	NL	10.1
Heinze, K.G.	D	5.8	Higgins, G.M.	WAN	2.1	Hoestra, H.	NL	12.9
Hejndorf, F.	DK	6.1	Higgins, K.B.	AUS	19.3	Hoff, J.E.	USA-F	9.1
Hejnowicz, A.	PL	6.1	Higgins, L.J.	USA-A	2.1	Hoffman, E.N.	USA-J	18.1
Hekman, H.	NL	12.6	Hignett, R.C.	GB	10.1	Hoffman, J.C.	USA-D	7.2
Helf, K.A.W.	ZA	3.1	Higo, R.	J	35.1	Hoffman, M.B.	USA-B	6.1
Hellings, A.J.	NL	12.4	Higuchi, H.	J	1.3	Hofman, J.E.	AUS	39.1
Hellmers, E.	DK	5.2	Higuchi, T.	J	33.1	Hofmann, E.L.	D	9.16
Hellwig, A.	PL	23.1	Hirsalmi, H.	FL	16.1	Hogarth, W.B.	AUS	17.2
Helms Jørgensen, J.	DK	8.1	Hijkata, S.	J	40.9	Hogdon, P.B.	USA-A	4.1
Helson, V.A.	CDN	32.3	Hikichi, A.	CDN	37.2	Hogenboom, N.	NL	12.8
Helton, A.W.	USA-I	19.1	Hildebrand, E.M.	USA-C	3.1	Hohmann, G.	D	6.1
Hemphill, D.D.	USA-E	15.1	Hildebrand, F.H.	WAN	2.1	Holcomb, J.W.	USA-J	11.1
Hende, R. Van den	CDN	18.1	Hildebrandt, A.C.	USA-F	18.1	Holder, J. van	B	3.7
Henderson, F.C.	AUS	41.1		USA-F	18.1		B	3.11
Henderson, W.R.	USA-D	4.1	Hilder, R.F.	AUS	29.1	Holfelder, Mrs. E.	D	27.14
Henmi, S.	J	16.1	Hildreth, W.R.	USA-K	7.1	Holland, D.A.	GB	10.1
Hennig, K.	D	9.1	Hilgeman, R.H.	USA-H	21.1	Holland, G.P.	CDN	32.1
	D	9.4	Hilkenbäumer, F.	D	6.1	Holland, N.S.	USA-G	11.1
Henrard, G.	B	3.2	Hill Jr., R.G.	USA-F	7.1	Holland, R.C.	USA-J	1.1
Henriet, J.	B	2.9	Hill, T.A.	GB	27.1	Holle, M.	PE	6.3
Hensel, D.R.	USA-D	25.1	Hill-Cottingham, D.G.	GB	28.1	Holley, W.D.	USA-I	3.2
Hensen, K.J.W.	NL	12.9				Hollings, M.	GB	26.1
Henson, Mrs. A.B.	WAN	2.1	Hille Ris Lambers, D.	NL	12.5	Hollingsworth, M.H.	USA-D	43.1
Henson, J.	WAN	2.1	Hills, C.H.	USA-B	14.1	Hollis, W.L.	USA-C	4.1
Hentig, W.U. von	D	5.7	Hills, G.J.	GB	8.1	Holloway, R.I.C.	GB	10.1
Henze, A.	D	27.6	Hilston, N.W.	USA-I	17.1	Holly, K.	GB	36.1
Henze, J.	D	6.1	Hilton, R.J.	CDN	26.1	Holm, L.G.	USA-F	18.1
Hepler, P.R.	USA-A	1.1	Hilton, S.A.	CDN	9.1	Holmenlund, N.P.	DK	5.8
Hepplewhite, R.D.	ZA	6.3	Hindle, R.J.	USA-A	16.1	Holmøy, R.	N	10.2
Herbert, Miss H.J.	CDN	6.1	Hinneri, S.	FL	16.1	Holmqvist, N.	S	5.1
Herbert, T.T.	USA-D	4.1	Hinrichs, H.A.	USA-H	3.1	Holroyd, J.	GB	36.1
Herde, J.d'	B	13.2	Hirai, J.	J	32.2	Holst, A.F. van	NL	5.1
Herholdt, J.A.	ZA	3.1	Hiraishi, M.	J	19.2	Holt, J.B.	GB	42.1
Herklotz, A.	D	12.15	Hirakata, Y.	J	21.2	Holtshausen, L.C.	ZA	3.1
			Hiraki, Y.	J	4.1	Hołubowicz, T.	PL	13.5

Homma, K.	J 16.1	Hunter, H.A.	USA-C 4.1	Inoue, H.	J 17.3
Honda, F.	J 7.2	Hunter, J.G.	GB 20.1	Inoue, J.	J 31.1
Honda, N.	J 31.3	Hunter, J.H.	USA-D 10.2	Inoue, K.	J 7.2
Honda, S.	J 21.1	Hunter, L.D.	GB 10.1		J 37.2
Hongo, I.	J 40.2	Hunter, R.A.	USA-H 5.1	Inoue, Y.	J 40.8
Honiball, F.	ZA 3.1	Huokuna, F.	FL 7.1	Inuzuka, T.	J 12.1
Honkavaara, T.	FL 17.1	Hurd, R.G.	GB 26.1	Inyang, O.A.	WAN 2.1
Honma, S.	USA-F 13.1	Hurt, B.C.	USA-D 50.1	Ipinmidun, W.B.	WAN 2.1
Hoof, H.A. van	NL 12.5	Hurtado, C.	PE 7.1	Ique, K.	CR 1.1
Hooghiemstra, D.	NL 10.1	Hurter, N.	ZA 7.1	Ireland, J.P.	ZA 7.1
Hope, G.W.	CDN 6.1	Husabø, P.	N 10.3	Iriko, Z.	J 34.1
Hope, T.	AUS 14.2	Hussey, N.W.	GB 26.1	Iritani, W.M.	USA-I 18.1
Hope, W.A.	WAN 2.1	Hutchins, A.E.	USA-G 6.1	Isenberg, F.M.	USA-B 6.1
Hopen, H.J.	USA-F 11.1	Hutchins, L.M.	CR 1.1	Ishibashi, K.	J 4.1
	USA-F 12.2	Hutchinson, A.	CDN 37.1	Ishida, M.	J 22.2
	USA-G 2.1	Huttleston, D.		Ishida, T.	J 37.2
	USA-A 3.1	G.	USA-B 12.1	Ishida, Y.	J 5.2
Hopp, R.J.	AUS 37.1	Hutton, C.E.	USA-D 27.1	Ishigami, K.	J 1.1
Horck, K.H. van	J 19.1	Huyskes, J.A.	NL 12.8	Ishiguro, K.	J 1.1
Hori, Y.	J 39.2	Hyland, H.L.	USA-C 3.1	Ishihara, M.	J 19.1
Horigane, M.	J 9.1	Hyuga, T.	J 3.1		J 20.1
Horiguchi, T.	USA-D 24.1			Ishii, K.	J 46.1
Horn, G.S.	USA-D 54.1	Ianabe, S.	J 40.7	Ishii, T.	J 1.2
Horn, N.L.	D 12.2	Iba, Y.	J 37.1		J 11.2
Horn, W.	CDN 64.2	Ibáñez, M.	CR 1.1	Ishikawa, S.	J 37.2
Hornby, C.A.	USA-K 14.1	Ichii, T.	J 13.3	Ishimoto, S.	J 40.4
Horowitz, R.M.	USA-C 11.1	Ichikawa, M.	J 19.3	Ishino, T.	J 7.1
Horsfall Jr., F.	USA-A 14.1	Ichinose, I.	J 27.1	Ishiwata, H.	J 4.1
Horsfall, J.G.	J 16.1	Ichinose, T.	J 26.3	Ishizawa, S.	J 29.2
Hoshino, Y.	J 12.1	Icochea, T.A. de	PE 6.1	Ishizuka, Y.	J 14.1
Hosogai, S.	J 22.3	Icochea, Mrs. T.		Isigai, T.	J 43.2
Hosoi, T.	D 27.12	Ames de	PE 6.3	Isotalo, A.	FL 13.1
Hösslin, R. von	CDN 36.1	Ida, S.	J 40.9	Itagi, T.	J 19.2
Hostetter, G.W.B.	USA-F 18.1	Ido, Y.	J 1.1	Itakura, A.	J 14.2
Hougas, R.W.	USA-B 16.1	Iduma, L.E.	WAN 2.1	Itakura, T.	J 19.1
Hough, L.F.	USA-C 3.1	Ie, T.S.	NL 12.9	Itami, K.	J 34.1
Houghland, G.V.C.	NL 12.5	Igboin, A.E.	WAN 2.1	Itō, A.	J 16.2
Houten, J.G. ten	N 10.3	Iguchi, Y.	J 46.2	Itō, H.	J 24.2
Hovde, F.	GB 10.1	Iida, H.	J 40.4		J 30.3
Howard, B.H.	USA-K 7.1	Iijima, T.	J 26.4		J 45.2
Howard, F.	USA-A 7.1	Iiya, Y.	J 11.2	Itō, I.	J 22.2
Howard, R.A.	USA-H 3.1	Iizuka, M.	J 19.1	Itō, J.	J 13.1
Howell, D.E.	GB 11.1	Ikedo, I.	J 37.1	Itō, K.	J 1.1
Howell, P.J.	USA-F 13.1	Ikedo, T.	J 5.2	Ito, K.	J 7.2
Howitt, A.J.	AUS 25.1	Ikedo, Y.	J 29.1		J 16.1
Howles, R.	USA-F 7.1	Ikegami, H.	J 13.1	Itō, S.	J 14.4
Howlett, F.S.	USA-F 9.1	Ikegami, Y.	J 20.1		J 16.2
	USA-F 7.1	Ikenoya, R.	J 34.1		J 19.2
Hoxsie, C.E.	USA-F 9.1	Ikeuchi, S.	J 12.2		J 22.5
Hoy, J.M.	NZ 5.2	Ikeuchi, Y.	J 13.1		J 24.1
Hoyman, W.G.	USA-J 5.1	Ikutake, M.	J 21.1		J 37.1
Hoyt, S.C.	USA-J 11.1	Imaizumi, H.	J 23.1		J 44.1
Hryshoko, T.	CDN 15.1	Imamura, T.	J 27.1	Itō, T.	J 4.2
Hubbard, C.E.	GB 22.1	Imanaga, T.	J 30.1		J 22.1
Hubbeling, N.	NL 12.5	Imazu, T.	J 32.2	Ito, T.	J 36.2
Hudson, M.	CDN 22.1	Inaba, K.	J 15.1	Itō, Y.	J 26.3
Hudson, J.P.	GB 34.2		J 21.2	Ivens, G.W.	GB 36.1
Hudson, L.W.	USA-J 6.1	Inaba, S.	J 24.1	Ivey, H.W.	USA-D 39.1
Huelin, F.E.	AUS 10.1	Inaba, Y.	J 45.2	Ivins, J.D.	GB 34.2
Huet, J.	F 1.1	Inagaki, K.	J 13.1	Iwadate, S.	J 16.2
Hugard, J.	F 17.1	Inagaki, S.	J 23.1	Iwagaki, H.	J 8.1
Hughes, H.M.	GB 12.1	Inako, Y.	J 4.1		J 40.6
Hughes, M.B.	USA-D 6.1	Incze, F.	H 1.2		J 40.7
Huglin, P.	F 8.1	Inden, T.	J 23.2	Iwama, S.	J 46.2
Hugo, J.F. du T.	ZA 7.1	Ing, E.G.	GB 7.1	Iwamasa, M.	J 37.1
Hujita, T.	J 36.2	Ingalsbe, D.W.	USA-J 5.1	Iwami, N.	J 40.9
Hull, J.	USA-F 13.1	Ingewersen, I.	DK 5.1	Iwamoto, K.	J 21.2
Hull, J.W.	USA-F 10.1	Ingle, M.	USA-C 9.1	Iwasa, R.	J 4.2
Hull, R.	GB 8.1	Ingram, J.	GB 27.1	Iwasaki, K.	J 22.3
Hulle, J. van	B 13.1		GB 30.1	Iwasaki, T.	J 19.1
Hulme, A.C.	GB 25.1	Ingvalson, R.D.	USA-K 15.2		J 37.1
Humphries, D.J.	GB 26.1	Inokuchi, T.	J 31.3	Iwase, S.	J 7.3
Hunter, A.W.S.	CDN 32.4	Inose, T.	J 34.1		J 14.1

Iwata, H.	J	32.1	Jensen, J.O.	DK	7.1	Judkins, W.P.	USA-C	11.1
Iwata, M.	J	4.1	Jensen, M.	DK	5.8	Juhl, M.	DK	6.1
	J	22.3	Jensen, R.	DK	5.4	Julien, J.B.	CDN	32.4
	J	40.3	Jensen, S.	DK	5.8	Julien, J.P.	CDN	18.1
Iwata, S.	J	31.2	Jezeq, R.F.	USA-D	51.1	Julliard, B.	F	8.1
Iwata, T.	J	31.2		USA-D	55.1	Jüri, T.	J	32.1
	J	32.2	Jiménez, E.	CR	1.1	Jutras, P.J.	USA-D	28.1
Izaki, M.	J	14.2	Jin, S.	J	16.2	Jyōjima, T.	J	39.1
Izawa, F.	J	1.1	João Salvador					
Izumi, S.	J	24.1	Furtado	BR	11.2	Kaai, C.	NL	2.1
Izuno, T.	USA-M	2.1	Jodō, S.	J	5.3		NL	12.5
Jaarsveld, F. van	ZA	7.1	Johansen, R.H.	USA-G	11.1	Kabumoto, T.	J	13.1
Jaarsveld, J.H.	ZA	6.3	Johansson, J.	S	1.1	Kádár, G.	H	1.2
van	PL	4.1	Johnson, A.A.	USA-B	6.1	Kadota, M.	J	43.2
Jabłonski, B.	PL	1.1	Johnson, A.G.	GB	45.1	Kadota, S.	J	36.2
Jabłonski, M.	USA-B	10.1	Johnson, B.	AUS	33.1	Kadota, T.	J	20.2
Jack, C.	PL	18.1	Johnson, C.A.	USA-J	6.1	Kadoya, K.	J	5.4
Jackiewicz, A.	GB	27.1	Johnson, C.N.	USA-C	4.1	Kaether, K. E.	D	21.1
Jackson, A.A.	USA-D	19.1	Johnson, F.	USA-J	7.1	Kagan, F.	PL	13.1
Jackson, C.R.	AUS	33.1	Johnson, G.V.	USA-B	2.1	Kagawa, A.	J	9.2
Jackson, D.	NZ	1.1	Johnson, M.W.	GB	8.1	Kagawa, M.	J	39.2
Jackson, D.I.	GB	16.1	Johnson, R.A.H.	GB	42.1	Kagaya, N.	J	2.1
Jacob, F.H.	NL	12.9	Johnson, R.B.	USA-D	28.1	Kageyama, M.	J	37.1
Jacob, J.J.s'	ZA	3.1	Johnson, W.A.	USA-D	38.1	Kajiura, M.	J	19.1
Jacobs, C.S.	NL	11.1	Johnson, W.B.	USA-B	16.1	Kakizaki, M.	J	44.1
Jacobs, J.M.	DK	1.1	Johnston, F.B.	CDN	32.2	Kalin, E.W.	USA-J	6.1
Jacobsen, P.	USA-B	10.1	Johnston, G.R.	CDN	26.1	Kalinke, H.	D	9.3
Jacobson, J.	S	10.1	Johnston, R.E.	GB	21.1	Kall, J.	DK	6.1
Jacobsson, A.	CDN	6.1	Johnston, S.	USA-F	15.1	Kallio, A.	USA-L	2.1
Jacques, R.P.	B	2.4	Johnstone, F.E.	USA-D	11.1	Kallio, P.	FL	16.1
Jadot	PL	18.2	Joiner, J.N.	USA-D	24.1	Kallio, T.K.	FL	11.1
Jagoda, J.	USA-D	33.1	Joley, L.	USA-K	5.1	Kaloostain, J.H.	USA-D	17.1
Jahn, P.L.	D	18.1	Jones, A.	USA-D	19.1	Kamanoi, M.	J	40.4
Jakob, L.	N	10.5	Jones, A.G.	GR	41.1	Kambara, Y.	J	11.1
Jakobsons, P.	PL	13.1	Jones, A.H.	USA-J	11.1	Kamemoto, H.	USA-M	3.2
Jakusz, A.	GB	16.1	Jones, A.R.C.	CDN	19.1	Kamerbeek, G.A.	NL	9.1
James, W.C.	AUS	39.1	Jones, C.M.	USA-F	9.1	Kamiham, T.	J	34.1
Jamieson, G.I.	GB	16.1	Jones, G.B.	WAN	2.1	Kamimura, M.	J	21.2
Jamieson, W.	AUS	35.1	Jones, G.L.	GB	18.1	Kamimura, N.	J	21.2
Jamison, F.S.	USA-D	24.1	Jones, H.D.	USA-H	17.1	Kamimura, S.	J	16.1
Janes, B.E.	USA-A	15.1	Jones, H.L.	USA-D	37.1	Kamińska, T.	PL	13.1
Janes, R.L.	USA-F	13.1	Jones, J.D.	GR	25.1	Kamiya, S.	J	37.3
Janick, J.	USA-F	9.1	Jones, J.P.	USA-D	21.1	Kammen, A. van	NL	12.9
Janiszewska-			Jones, K.	GB	22.1	Kamoen, O.	B	3.11
Cichocka, E.	PL	22.1	Jones, L.G.	USA-D	54.1	Kampen, J. van	NL	2.1
Jankiewicz, L.	PL	18.1	Jones, L.H.	GB	4.1		NL	10.1
Jansen, E.F.	USA-K	1.1	Jones, L.T.	AUS	35.1	Kaname, T.	J	19.2
Janssen, H.	D	24.2	Jones, M.A.	GB	27.1	Kanato, K.	J	19.1
Jantzen, J.J.	NL	5.1	Jones, O.P.	GB	10.1	Kanazawa, K.	J	19.1
Jarma, A.A.	WAN	2.1	Jones, R.W.	USA-K	8.1	Kanbe, K.	J	2.1
Jarvis, R.H.	GB	23.1	Jones, S.C.	USA-J	14.1	Kanda, N.	USA-M	7.1
Jaszczołt, E.	PL	15.1	Jones, S.T.	USA-D	38.1	Kanda, S.	J	13.1
Jaumien, F.	PL	22.6	Jong, D.J.	NL	13.1	Kaneko, K.	J	19.5
Javier, G.	PE	4.1	Jong, D.J.de	NL	12.5	Kaneko, M.	J	1.1
Jayco, E.R.	USA-F	12.2	Jonge Poerink, H.	NL	2.1	Kanie, S.	J	21.1
Jaynes, R.A.	USA-A	14.1	Jongerius, A.	NL	5.1	Kanki, H.	J	27.1
Jeff, A.E.	GB	7.1	Jonkers, H.	NL	12.9	Kanno, H.	J	16.2
Jenkins, J.M.	USA-D	1.1	Jooste, J.v.d.W.	ZA	7.3	Kanno, K.	J	16.2
Jenkins, W.A.	CDN	7.1	Jordan, L.S.	USA-K	15.1	Kano, K.	J	17.3
Jenkins, W.R.	USA-B	16.1	Jorgensen, C.	USA-I	3.2	Kano, S.	J	31.1
Jennings, J.	USA-A	13.1	Jorgenson, E.C.	USA-I	9.1	Kanō, T.	J	18.2
Jennings, J.P.	AUS	25.1	Jorgenson, K.R.	AUS	16.1	Kantack, E.J.	USA-D	54.1
Jensen, A.	DK	6.1	Jorgenson, L.G.	CDN	51.1	Kapás, S.	H	1.6
Jensen, C.J.	DK	8.1	Jørgensen, H.	DK	5.9	Karasińska, J.	PL	18.2
Jensen, E.	DK	5.8	Jørgensen, H.A.	DK	6.1	Karay, J.	H	1.2
Jensen, E.R.	USA-H	16.1	Jørgensen, J.A.	DK	6.1	Karczewska, M.	PL	13.2
Jensen, G.L.	USA-G	17.1	Jørgensen, S.J.	DK	7.2	Kardos, E.	H	1.3
Jensen, H.J.	USA-J	13.1	Joubert, A.J.	ZA	3.1	Kärenlampi, L.	FL	16.1
	USA-J	14.1	Joubert, T.G.	ZA	6.3	Karnatz, Annemarie	D	5.5
			Jouret, C.	F	18.1	Karnatz, H.	D	14.1
Jensen, H.P.	DK	8.1	Jozukuri, A.	J	39.2	Kárpáti, Z.	H	1.2
Jensen, J.	DK	3.1	Juárez, L.A.	PE	1.1	Kasai, N.	J	17.2
	DK	8.1	Jubb, S.	GB	41.1	Kashima, R.	J	30.1

Kataoka, H.	J 29.1	Keppeler, H.W.	USA-F 13.1	Kishimoto, O.	J 19.1
Karunen, M.	FL 16.1	Keppie, J.L.	GB 11.1	Kishimoto, Y.	J 25.1
Karunen, Mrs. P.	FL 16.1	Kerekes, J.	H 1.2		J 25.2
Kasahara, J.	J 16.3	Kerling, Miss		Kishino, I.	J 27.1
Kaszoniyi, S.	H 1.2	L.C.P.	NL 4.1	Kiss, A.	H 5.1
Katai, M.	J 17.1	Kern, R.	USA-J 1.1	Kissel, Mrs. J.	H 1.3
Kato, A.	J 38.1		USA-J 4.1	Kitagaki, M.	J 13.1
Kato, H.	J 19.1	Kerr, E.A.	CDN 37.1	Kitagawa, H.	J 22.3
Kato, K.	J 1.1	Kerr, S.H.	USA-D 24.1	Kitajima, H.	J 19.1
Kato, T.	J 20.2	Kerr, W.L.	CDN 48.1	Kitamura, T.	J 26.3
Kato, Y.	J 23.1	Kerssen, Miss M.		Kitano, T.	J 13.1
Katsumata, H.	J 7.2	C.	NL 12.5	Kitao, J.	J 19.1
Katsumine, M.	J 1.1	Kessler, G.M.	USA-F 13.1	Kitchin, J.T.	USA-A 16.1
Kattan, D.A.	USA-E 7.1	Kester, D.E.	USA-K 7.1	Kitson, J.A.	CDN 63.1
Katulska, C.	PL 13.5	Kester, J.A.	NL 12.4	Kizaki, N.	J 19.3
Katyar, K.	CR 1.1	Ketchis, D.	USA-K 9.1	Kiakan, G.	USA-I 2.1
Kaukovirta, E.	FL 12.1	Kettner, H.	D 27.13	Kiarup, J.	DK 7.2
Kawabuchi, A.	J 1.1	Keyl, A.C.	USA-K 1.1	Klein, R.M.	USA-B 1.1
Kawada, K.	J 22.1	Keys, C.H.	CDN 47.1	Klement, Z.	H 1.5
Kawaguchi, T.	J 37.3	Keyworth, W.G.	GB 45.1	Klenk, E.	D 28.1
Kawahara, I.	J 25.1	Kho, Y.O.	NL 12.8	Kleparski, J.	PL 18.1
Kawakami, H.	J 34.1	Kida, K.	J 42.1	Klessner, P.J.	ZA 6.3
	J 40.9	Kidman, G.J.	AUS 24.1	Kleyn, J.de	NL 12.9
Kawakami, T.	J 40.5	Kidson, Miss E.B.	NZ 5.1	Kliwer, W.M.	USA-K 7.1
Kawakatsu, T.	J 22.1	Kiefer, W.	D 9.16	Kliffen, C.	NL 12.5
Kawakita, K.	J 17.1	Kiem, S.C.	USA-D 31.1	Klinkenberg, Miss	
Kawamura, E.	J 16.1	Kiès, B.	NL 12.8	C.H.	NL 12.5
Kawamura, K.	J 24.1	Kieser, M.E.	GB 28.1	Klinkenberg, K.	WAN 2.1
Kawamura, S.	J 20.1	Kieturakis, B.	PL 11.1	Kloke, A.	D 5.9
Kawamura, T.	J 4.2	Kihara, H.	J 19.4	Klos, E.J.	USA-F 13.1
Kawanishi, Y.	J 17.2	Kihara, T.	J 37.1	Kyossowski, W.	PL 18.1
Kawara, I.	J 25.2	Kikuchi, J.	J 32.1	Klostermeyere,	
Kawara, K.	J 14.3	Kikuchi, T.	J 3.3	E.C.	USA-J 5.1
Kawasaki, S.	J 33.1	Kilb, G.	H 1.3	Klougart, A.	DK 5.1
Kawasato, H.	J 38.1	Kilby, W.W.	USA-D 51.1		DK 5.7
Kawase, K.	J 7.2	Kilduff, T.	CDN 51.1	Kluczynska, J.	PL 5.1
Kawase, M.	CDN 40.1	Kilpatrick, D.T.	AUS 25.1	Knapp, F.W.	USA-D 24.1
Kawata, J.	J 19.1	Kimbrough, W.D.	USA-D 54.1	Knave, D.E.	USA-E 11.1
Kawata, K.	J 27.2	Kimnach, M.	USA-K 18.1	Kneebone, L.R.	USA-R 15.1
Kawecki, Z.	PL 12.1	Kimura, H.	J 8.1	Knibbe, J.M.	NL 5.1
Kayami, I.	J 1.1	Kimura, J.	J 3.1	Knight, B.	GB 46.1
Kays, W.R.	USA-H 3.1	Kimura, K.	J 9.1	Knight, R.J.	USA-D 31.2
Kearns, H.G.H.	GB 28.1		J 17.2	Knight, R.L.	GB 10.1
Keatley, J.C.R.	AUS 24.1	Kimura, M.	J 22.2	Knoblauch, F.	DK 4.1
Keay, Miss M.A.	WAN 2.1	Kimura, Y.	J 14.1	Knoke, J.	CR 1.1
Keen, R.A.	USA-G 26.1	Kinbacher, E.J.	USA-G 21.1	Knorr, L.C.	USA-D 28.1
Keener, P.D.	USA-H 22.1	Kinder, W.J.	USA-A 1.1	Knowles, R.H.	CDN 52.1
Keep, Miss E.	GB 10.1	King, D.R.	USA-H 7.1	Knowlton, G.	USA-I 9.1
Kefford, J.F.	AUS 10.1	King, E.P.	USA-D 19.1	Kobabe, G.	D 12.2
Kehr, A.E.	USA-C 3.1	King, G.H.	USA-D 11.1	Kobachi, J.	J 7.2
Keijzer, R.de	B 13.1	King, J.M.	GB 47.1	Kobayashi, A.	J 22.3
Keil, H.L.	USA-C 3.1	Kingsley, C.C.	ZA 3.1	Kobayashi, G.	J 45.1
Keipert, K.	D 21.1	Kinnings, Miss		Kobayashi, H.	J 11.1
Kelbert, D.G.A.	USA-D 21.1	J.C.	GB 37.1		J 13.1
Keleny, G.P.	AUS 41.1	Kinohira, N.	J 22.1		J 46.4
Keller, H.	D 20.1	Kinoshita, K.	J 31.3	Kobayashi, K.	J 33.2
Kellerman, J.H.P.	ZA 9.1	Kinoshita, Y.	J 43.2	Kobayashi, M.	J 16.2
Kelley, J.D.	USA-E 11.1	Kinsella, M.N.	AUS 19.4		J 29.1
Kelly, W.E.	USA-B 6.1	Kinsman, G.B.	CDN 7.1	Kobayashi, T.	J 26.1
Kelsheimer, E.G.	USA-D 21.1	Kiplinger, D.C.	USA-F 3.1	Kobayashi, U.	J 38.1
Kemp, G.A.	CDN 55.1	Kips, R.	B 3.5	Koch, B.	H 8.1
Kemp, W.G.	CDN 37.2	Kirby, A.H.M.	GB 10.1	Koch, B.A.	WAN 2.1
Kempeneers, L.	B 7.3	Kirchgatter, G.	D 27.11	Koch, L.W.	CDN 28.1
Kempski, F.	PL 22.6	Kirk, J.H.	GB 27.1	Kochen, W.	USA-I 20.1
Kempton, R.J.	GB 26.1	Kirk, O.C.	USA-I 10.1	Kochman, J.	PL 22.2
Kemula, F.	PL 14.1	Kirkham, D.S.	GB 10.1	Koen, H.	ZA 6.4
Kenez, J.	AUS 19.3	Kirknel, E.	DK 6.1	Koert, J.L.	NL 10.1
KenKnight, G.E.	USA-D 62.1	Kirkpatrick, J.		Kofler, L.	F 12.1
Kennedy, W.K.	USA-B 6.1	D.	USA-K 15.1	Kofranek, A.M.	USA-K 12.1
Kennel, W.	D 24.2	Kirkpatrick, K.C.	USA-J 11.1	Koga, K.	J 45.3
Kent, G.C.	USA-B 6.1	Kishi, K.	J 19.1	Kohashi, Y.	J 22.1
Kenworthy, A.L.	USA-F 13.1	Kishi, T.	J 46.3	Kohl, Jr. H.C.	USA-K 7.1
Kepka, A.	PL 18.2	Kishimoto, H.	J 32.1	Kohl, W.	D 6.1

Koike, Y.	J	33.2	Krczal, H.	D	13.1	Kuykendall, J.R.	USA-H	22.1
Koizumi, M.	J	37.1	Kretchman, D.W.	USA-F	7.1	Kuykendall, R.R.	USA-D	49.1
Kojima, M.	J	18.3	Krezdorn, A.H.	USA-D	24.1	Kuyper, B.	NL	9.1
Kok, I.B.	ZA	3.1	Kriel, A.	ZA	7.2	Kvaale, E.	N	3.1
Koleda, I.	H	1.2	Krigel, I.	AUS	19.2	Kwiatkowska-Leska, L.	PL	18.2
Kołodziejczyk, A.	PL	13.7	Krijgsman, H.K.	NL	12.7			
Kōma, S.	J	36.1	Kriner, R.R.	USA-B	16.1	Laar, H.J. van de	NL	6.1
Komatsu, E.	J	14.1	Kristensen, R.	DK	5.1	ladanauskas, C.K.	USA-K	15.1
Komatsuzaki, R.	J	34.1	Kristoffersen, T.	N	10.3	Labbe, A.	F	12.1
Komjáti, I.	H	1.6	Krokowski, A.	PL	18.2	LaBelle, R.L.	USA-B	4.1
Komoti, S.	J	12.2	Krone, P.R.	USA-F	13.1	Labouriau, M.L.S.	BR	11.2
Kon, K.	J	2.1	Kronenberg, G.H.			Labrum, E.J.	GB	16.1
Konakabara, M.	J	37.2	M.	NL	12.9	Labruyère, R.E.	NL	12.5
Konayashi, M.	J	18.1	Kronenberg, Miss H.G.	NL	12.8	Lacey, H.J.	GB	10.1
Kōndo, N.	J	40.4				Lachance, R.O.	CDN	18.1
Kondo, T.	J	29.1				Lachman, J.	PL	18.1
Kondō, T.	J	37.1	Kropczyńska, D.	NL	12.9	Lachman, W.H.	USA-A	5.1
		J 40.2	Kropisz, A.	PL	22.1	Lacouture, J.	F	7.1
Konno, S.	J	19.1	Kropp, K.	PL	7.1	LaCroix, L.J.	CDN	42.2
Kōno, H.	J	8.1	Kropp, M.	PL	7.1	Laere, O. van	B	3.3
Kōno, K.	J	21.1	Krotoszyner, J.	B	2.6		B	13.2
Kōno, M.	J	18.3	Kryńska, W.	PL	12.1	Laferriere, L.	USA-I	21.1
Konsler, T.R.	USA-D	3.1	Krzyzewski, Z.	PL	13.1	Lafin, T.	GB	30.1
Koo, R.C.J.	USA-D	28.1	Kubo, M.	J	35.1	Lafon, J.	F	7.1
Kooistra, E.	NL	12.8		J	35.2	Lafon, R.	F	5.1
Kooistra, G.	NL	9.1	Kubo, S.	J	5.2	Lafrance, J.	CDN	22.1
Koomen, J.P.	NL	2.1	Kubo, T.	J	32.2	Lagerstedt, H.B.	USA-J	14.1
Koopmans, W.	NL	12.8	Kubota, K.	J	9.1	Laine, U.	FL	8.1
Koot, Y. van	NL	11.1	Kubota, T.	J	16.1	Laine, U.	FL	16.1
Kooy, J.G. van	NL	12.6	Kuc, Ruth	USA-F	9.1	Lake, J.V.	GB	42.1
Kopcsó, I.	H	1.2	Kuckuck, H.	D	12.2	Laking, L.	CDN	27.1
Koppe, R.	NL	12.7	Kudamatsu, H.	J	27.2	Lam, S.L.	USA-F	9.1
Korbobo, E.P.	USA-R	16.1	Kuder, G.	D	9.7	Lamb, R.C.	USA-B	4.1
Korematsu, H.	J	11.3	Kudo, S.	J	3.1	Lambert, C.	F	14.1
Korenaga, R.	J	37.1		J	41.1	Lambert, E.B.	USA-C	3.1
Koródi, L.	H	1.2	Kudō, T.	J	40.9	Lambert, J.L.M.	GB	27.1
Körös, L.	H	5.1	Kühn, E.	BR	11.2	Lamberts	B	7.1
Korsak, A.	PL	16.1	Kuhn, G.D.	USA-D	24.1	Lambeth, V.L.	USA-E	15.1
Koshio, H.	J	13.1	Kuhne, F.A.	ZA	3.1	Lamborn, E.W.	USA-I	9.1
Košlínka, M.	PL	18.1	Kuiper, F.	NL	12.9	Lamm, R.	S	1.1
Kossowski, M.	PL	9.1	Kuiper, P.J.C.	NL	12.9	Lammel, K.	H	1.2
Kostecka, B.	PL	18.2	Kuiper, P.J.C.	USA-A	14.1	Lana, E.P.	USA-G	11.1
Kosteljk, S.	NL	12.7	Kuitert, L.C.	USA-D	24.1	Landfald, R.	N	10.3
Kosuge, M.	J	6.1	Kukkonen, I.	FL	16.1	Landgren, B.	S	5.1
Kosugi, K.	J	4.2	Kulwiec, Z.J.	GB	26.1	Landingham, A.H.		
Kotani, A.	J	37.1	Kumagai, T.	J	24.1	van	USA-C	9.1
Koter, D.	PL	12.1	Kumashiro, K.	J	26.4	Lang, A.R.G.	AUS	6.1
Kotō, M.	J	19.2	Kumazawa, S.	J	27.2	Lange, A.de	NL	4.1
Kototani, M.	J	32.1	Kunimasa, K.	J	14.4	Lange, E.	PL	18.1
Kottman, F.M.	USA-F	7.1	Kunishige, M.	J	7.2	Lange, J.	DK	5.1
Kouwe, J.J.	NL	12.4	Kunitomi, S.	J	6.1		DK	5.3
Kovachich, W.G.	GB	4.1	Kunke, R.E.	USA-K	7.1	Langenegger, W.	ZA	3.1
Kovács, Mrs. G.	H	1.2		D	13.1	Langer, C.A.	USA-A	2.1
Kovács, J.	H	6.1	Kunze, L.	J	37.2	Langford, W.R.	USA-D	15.1
Kovács, S.	H	1.2	Kurano, H.	J	17.3	Langhams, R.W.	USA-B	6.1
Kowal, J.M.	WAN	2.1	Kurata, H.	J	19.1	Langley, B.C.	USA-H	12.1
Koyama, I.	J	34.1	Kurihara, A.	J	10.1	Langvad, B.J.	S	4.1
Kōyama, T.	J	19.1	Kurihara, K.	J	34.1	Lanphear, F.O.	USA-F	9.1
Koyasu, S.	J	9.1	Kurihara, M.	J	40.9	Lantin, R.	F	1.1
Kozaczenko, H.	PL	22.9	Kurihara, S.	J	37.3	Lapins, K.O.	CDN	63.1
Kozaki, I.	J	19.1	Kurita, H.	J	7.1	Laremans, R.	B	7.3
Kozłowska, M.	PL	7.1	Kuriyama, T.	J	37.1	Large, J.R.	USA-D	32.1
Kozma, P.	H	1.2		J	11.1	Larmie, W.F.	USA-A	16.1
Kozono, T.	J	7.2	Kurki, Miss L.M.	FL	11.1	Larmond, Mrs. M.E.	CDN	32.2
Kozyra, J.	PL	10.1	Kuroda, K.	J	22.3	Larsen, C. Syrach	DK	5.1
Kraanen, Ch. J.M.	NL	5.1	Kurogami, K.	J	39.2	Larsen, E.	DK	7.2
Kraayenhagen, A.	NL	12.9	Kuroi, I.	J	29.2	Larsen, E.C.	DK	4.1
Krall, J.L.	USA-I	26.1	Kurokawa, Y.	J	11.1	Larsen, F.	DK	5.1
Kramer, A.	USA-C	4.1	Kuroki, F.	J	25.1	Larsen, F.E.	USA-J	6.1
Kraus, J.E.	USA-I	19.1	Kurosawa, A.	J	6.1	Larsen, R.P.	USA-F	13.1
Krauss, R.E.	USA-R	4.1	Kusaka, F.	J	39.1	Larson, R.A.	USA-D	4.1
Krauze, J.	PL	13.4	Kusaka, Y.	J	19.4			
	PL	24.1	Kushman, L.J.	USA-D	4.1			
			Kuwahara, T.	J	9.1			

Larsson, Mrs. G.	S	7.1	Leuty, S.J.	USA-F	18.1	Logsdon, C.E.	USA-L	6.1
Laruelle, R.	B	1.2	Leveck, H.H.	USA-D	52.1	Löhden, A.	D	14.1
Last, F.T.	GB	26.1	Leven, J.A. van 't	NL	12.4	Lolonis, N.	USA-K	6.1
Latawiec, K.	PL	19.1	Leverington, R.E.	AUS	14.2	Lombaard, C.	ZA	9.1
Laterrot, H.	F	16.1	Levi, E.	NL	12.6	Lombard, P.B.	USA-J	17.1
Lauer, F.I.	USA-G	6.1	Levieil, F.	F	6.1	Long, C.	USA-G	26.1
Laughlin, J.C.	AUS	36.2	Levy, C.R.	AUS	39.1	Long, D.L.	USA-K	20.1
Laughlin, W.	USA-L	6.1	Lewandowska, A.	PL	22.9	Long, J.D.	USA-C	7.1
Laurent, C.	B	6.1	Lewis, A.V.	GB	19.1	Long, M.I.E.	GB	26.1
Laurie, A.	USA-D	18.1	Lewis, B.G.	GB	34.2	Long, W.G.	USA-D	28.1
Laurin, R.E.	CDN	45.1	Lewis, C.E.	USA-F	13.1	Longley, R.P.	CDN	6.1
Lavalleye, M.	B	14.1	Lewis, D.	GB	34.2	Loof, P.A.A.	NL	12.9
Law, J.M.	USA-D	54.1	Lewis, F.H.	USA-B	11.1	Loomis, H.	USA-K	8.1
Lawin, L.	PL	22.4		USA-K	12.1	Loon, H.L. van	NL	6.1
Lawrence, C.H.	CDN	9.1	Lewis, G.D.	USA-B	16.1	Lopatecki, L.E.	CDN	63.1
Lawrence, F.J.	USA-C	4.1	Lewis, J.C.	USA-K	1.1	Lopez, A.	USA-C	11.1
Lawrie, R.A.	GB	34.2	Lewis, L.N.	USA-K	15.1	Lopez, P.	PE	4.1
Lay, A.	D	9.4	Lewis, T.L.	AUS	36.1	Lord, F.T.	CDN	6.1
Layne, R.E.C.	CDN	28.1	Leyendecker, P.J.	USA-H	16.1	Lord, W.J.	USA-A	5.1
Layton, L.L.	USA-K	1.1				Lorenz, O.A.	USA-K	7.1
Layton, W.A.	AUS	41.1	Leys, R.	B	3.2	Lorz, A.P.	USA-D	24.1
Łażniewska, I.	PL	18.1	Liard, O.	B	5.3	Lott, R.V.	USA-F	12.2
Leach, Miss M.	GB	28.1	Liceras, L.	PE	7.1	Lott, T.B.	CDN	63.1
Leblond, C.	F	15.1	Lider, L.A.	USA-K	7.1	Lötter, J.de V.	ZA	7.1
Lecomte, M.	B	8.1	Lidgate, H.J.	GB	5.1	Lotz, E v/d S.	ZA	7.1
Lecrenier, A.	B	2.3	Lieberman, A.S.	USA-B	6.1	Louget, Ph.	F	15.1
	B	5.2	Liebster, G.	D	27.3	Lougheed, E.C.	CDN	26.1
	B	5.3	Liegel, W.	D	24.1	Loughlin, J.B.O.	AUS	36.2
	B	5.4	Lienk, S.E.	USA-B	4.1	Loughton, A.	GB	41.1
	B	5.5	Lighty, R.W.	USA-B	12.1	Louis, A.	B	3.2
	B	6.1	Lilleland, O.	USA-K	7.1	Louw, L.M.	ZA	7.1
Lee, D.F.	GB	16.1	Limpel, L.	USA-B	10.1	Love, J.E.	USA-E	3.1
Lee, R.E.	USA-B	6.1	Linacre, E.T.	AUS	6.1	Lövkvist, B.	S	1.1
Leeffe, J.S.	CDN	6.1	Linde, J. van der	NL	5.1	Lovvorn, R.N.	USA-D	4.1
Leemans, J.A.	NL	12.8	Linde, R.J. van der	NL	3.1	Zucka, M.	PL	7.1
Leeper, P.W.	USA-H	13.1	Lindeman, D.W.	NL	12.9	Luckan, J.	D	20.1
Lees, J.R.	GB	30.1	Lindeman, W.	NL	12.9	Luckman, W.H.	USA-F	12.1
Leeuw, G.T.N.de	NL	4.1	Lindemann, A.	D	11.1	Luckwill, L.C.	GB	28.1
Leeuw, P.N.de	WAN	2.1	Linden, R.	B	5.1	Ludrow, E.S.	USA-D	15.1
Leeuwenberg, A.J.				B	5.2	Ludwig, R.A.	CDN	32.3
M.	NL	12.9		B	6.1	Lugo, J.	PE	6.1
Leffring, L.	NL	1.1	Lindhardt, K.	DK	6.1	Lukasik, S.	PL	9.1
Legg, J.T.	GB	10.1	Lindner, R.C.	USA-J	11.1	Lukens, R.J.	USA-A	14.1
Legg, P.D.	USA-K	15.1	Lindstrom, R.S.	USA-F	13.1	Luna de la Fuente, R.	PE	6.1
Leggett, G.E.	USA-J	5.1	Lingle, J.C.	USA-K	7.1	Lund-Høie, K.	N	10.5
Legro, R.A.H.	NL	12.9	Link, C.B.	USA-C	4.1	Lundin, P.N.	S	4.1
Leh, H.O.	D	5.9	Link, D.	D	12.5	Lundmark, Mrs. J.C.	AUS	23.2
Lehr, R.	D	20.1	Link, H.	D	24.2	Lundstad, A.	N	10.3
Leidenfrost, E.	D	9.5	Linn, M.B.	USA-F	12.2	Lun-Shin Wei	USA-F	12.2
Leiser, A.T.	USA-K	7.1	Lint, P.J.A.L.de	NL	11.1	Lush, G.B.	GB	34.1
Lelliott, R.A.	GB	16.1		NL	12.9	Lutrick, M.C.	USA-D	27.1
Lemaître, R.	B	6.1	Linton, P.N.	GB	11.1	Lutz, J.M.	USA-C	6.1
Lemon, E.R.	USA-B	6.1	Lipecki, J.	PL	9.1	Lyall, L.H.	CDN	32.4
Lenander, S.E.	S	1.1	Lippert, L.F.	USA-K	15.1	Kyko, Z.	PL	17.1
Lenartowics, W.	PL	18.1	Lipton, W.J.	USA-K	8.1	Lynden, K.R. Baron van	NL	5.1
Lenger, A.	B	1.1	Lis, E.	PL	18.1	Lyon, D.J.de B.	WAN	2.1
Lenkiewicz, W.	PL	18.2	Little, Jr. L.D.	USA-B	16.1	Lyons, J.M.	USA-K	15.1
Lent, J.M.	USA-A	15.1	Ljones, B.	N	10.3			
Lentz, R.	USA-B	16.1	Llewellyn, F.W.M.	GB	10.1	Maarleveld, G.C.	NL	5.1
Lenz, F.	D	5.5	Lloyd, F.G.	GB	18.1	Maas, E.F.	CDN	62.1
Lenz, F.	AUS	6.1	Lloyd, G.A.	GB	16.1	Maas Geesteranus, H.P.	NL	12.5
Lenz, L.	CDN	42.2	Lloyd-Jones, C.P.	GB	28.1	Maat, D.Z.	NL	12.5
Lenz, L.W.	USA-K	6.1	Lloyd Ryall, A.	USA-C	6.1	Maatsch, R.	D	12.15
Léon, J.	PE	6.4	Loan, C.C.	CDN	23.1	Mabbott, T.W.	GB	11.1
Leonard, C.D.	USA-D	28.1	Locasio, S.J.	USA-D	24.1	MacCarthy, H.R.	CDN	64.1
Leopold, A.C.	USA-F	9.1	Locht, L.J.	NL	12.4	MacDonald, D.	WAN	2.1
Leroux, E.J.	CDN	19.1	Locke, S.B.	USA-J	6.1	MacDonald, D.M.	GB	11.1
Keska, W.	PL	18.1	Lockhart, C.L.	CDN	6.1	MacDowell, L.G.	USA-D	29.1
Leski, B.	PL	22.2	Lodam, B.D.	WAN	2.1	MacEachern, C.R.	CDN	6.1
Leski, R.	PL	18.1	Lode, O.	N	10.5	Macewicz, L.	PL	18.2
Lester, H.C.	USA-D	42.1	Loenen, F.C. van	NL	5.1			
Leteinturier, J.	F	15.1	Loest, F.C.	ZA	3.1			
Letham, D.S.	NZ	1.1	Loewel, E.L.	D	14.1			

MacGillivray, J. H.	USA-K	7.1	Mannel, R.G.	USA-A	15.1	Matsuda, K.	J	19.1
MacGillivray, R. H.E.	CDN	9.1	Manring, J.D.	USA-H	7.1	Matsuda, M.	J	37.4
MacGregor, D.R.	CDN	63.1	Manson, D.C.M.	NZ	3.1	Matsuda, S.	J	11.3
Machado, E.	E	11.1	Mante, W.	D	5.5	Matsuda, T.	J	11.3
Macheix, J.J.	F	15.1	Mantel, W.P.	NL	12.5	Matsui, S.	J	37.1
Machida, A.	J	36.2	Mapother, H.R.	GB	28.1	Matsui, T.	J	7.3
Machida, H.	J	39.1	Mappes, D.	D	27.2		J	40.2
Machida, T.	J	26.1	Mappes, F.	D	27.7	Matsumaru, K.	J	34.1
Machida, Y.	J	19.1	Maquin, J.M.	CR	1.1	Matsumo, H.	J	22.1
Machnik, B.	PL	18.1	Marais, P.G.	ZA	7.1	Matsumoto, H.	J	5.2
Machnik, J.	PL	18.1	Maramorosch, K.	USA-B	10.1	Matsumoto, K.	J	5.4
Macho-Quevedo Bará, J.	E	5.1	Marcelle, R.	B	4.1	Matsumoto, M.	J	40.6
Macias, W.	PL	18.2	Marcellin, P.	F	15.1		J	40.7
Maciejewska, Z.	PL	18.2	March, R.S.	USA-C	9.1		J	40.9
Maciejowska, Z.	PL	13.1	Maréchal, R.	B	3.2	Matsumoto, R.	J	16.2
Mack, H.J.	USA-J	14.1	Marel, H.W. van der	NL	5.1	Matsuo, N.	J	33.2
Mackauer, J.M.	CDN	23.1	Márk, Mrs.I.	H	1.5	Matsuo, S.	J	7.2
Mackay, D.C.	CDN	4.1	Markarian, D.	USA-F	13.1	Matsuo, T.	J	7.2
Mackiewicz, M.	PL	18.1	Markham, R.	GB	8.1	Matsuo, Y.	J	7.2
MacKinnon, J.P.	CDN	9.1	Markiewicz, L.	PL	7.1	Matsuoka, K.	J	40.4
Mackowiak, M.	PL	13.5	Markwardt, E.D.	USA-B	6.1	Matsushima, J.	J	23.2
Mackowiak, S.	PL	17.1	Marlatt, R.B.	NZ	3.1	Matsushita, T.	J	22.5
Macksam, W.G.	USA-G	17.1	Marlowe, Jr., G. A.	USA-F	7.1	Matsuura, M.	J	20.2
MacLean, A.A.	CDN	9.1	Marousky, F.J.	USA-C	11.1	Matsuyama, M.	J	6.1
MacLean, N.A.	CDN	64.2	Marsh, H.V.	USA-A	5.1	Matsuyama, Y.	J	43.2
MacLellan, C.R.	CDN	6.1	Marsh, R.W.	GB	28.1	Matthee, F.N.	ZA	7.1
MacLinn, W.A.	USA-B	16.1	Marshall, J.E.	USA-H	1.1	Matthewman, W.G.	CDN	32.1
MacNaughton, W. N.	CDN	44.1	Marston, M.E.	GB	34.2	Matthews, J.S.	CDN	63.1
MacPhee, A.W.	CDN	6.1	Martens, N.	B	3.3	Matthews, W.A.	USA-C	7.1
MacWithey Jr., H.S.	USA-I	22.1	Martens, P.H.	B	3.5	Matthias, M.E.	USA-K	12.1
Maczák, J.	H	1.1	Marth, P.	F	2.2	Mattos, J.R. de	RR	11.2
Madison, J.H.	USA-K	7.1	Martin, A.	USA-C	3.1	Mattos Bicudo, C.E.	RR	11.2
Madsen, H.F.	DK	3.1	Martin, C.C.	PE	6.1			
Madsen, L.L.	CDN	63.1	Martin, D.	AUS	41.1	Mattus, G.E.	USA-C	11.1
Maeda, H.	USA-J	6.1	Martin Jr., D.C.	AUS	36.1	Matura, M.	J	43.2
Maeda, H.	J	40.9	Martin, G.	USA-F	11.1	Matzer, F.	D	27.3
Maeda, M.	J	24.1	Martin, J.A.	USA-J	11.1	Matzunaga, Y.	J	37.2
Maeda, S.	J	39.2	Martin, J.T.	USA-D	8.2	Mauch, A.	D	24.2
Maekawa, S.	J	13.2	Martin, L.F.	GB	28.1	Maude, R.R.	GB	45.1
Maelzer, D.	AUS	38.1	Martin, L.P.	B	1.1	Maurer, A.R.	CDN	58.1
Maeyama, I.	J	13.1	Martin, M.W.	USA-C	15.1	Maurer, K.J.	D	9.11
Magalhães, F.M.	BR	11.2	Martin, P.	USA-I	9.1	Maurer, M.	D	20.1
Rios	BR	11.2	Martin, P.	F	14.1	Maxie, E.C.	USA-K	7.1
Maggs, D.H.	AUS	20.1	Martin Jr., W.C.	USA-L	6.1	Maxwell, C.W.B.	CDN	9.1
Magie, R.O.	USA-D	21.1	Martin, W.J.	USA-D	38.1	Maxwell, N.P.	USA-H	13.1
Maginnes, E.A.	CDN	46.1	Martínez Zaporta, F.	USA-D	54.1	May, C.	USA-C	3.1
Maguire, B.	USA-B	1.1		F	7.1	May, L.H.	AUS	33.1
Mahlstedt, J.P.	USA-G	18.1	Martins Felipe, G.			May, P.	AUS	28.2
Mai, W.F.	USA-B	6.1		BR	11.2	Maynard, D.N.	USA-A	5.1
Maier, V.P.	USA-K	14.1	Maruki, T.	J	5.2	Mayton, E.L.	USA-D	40.1
Mainar, A.	E	14.1	Marushige, T.	USA-K	15.1	Mazliak, P.	F	15.1
Majewska, W.	PL	22.7	Marusugi, K.	J	46.2	Mazoyer, R.	F	2.1
Mäkinen, Y.	FL	16.1	Maruyama, K.	J	26.2	Mazurkiewicz, Z.	PL	22.10
Makino, H.	J	1.1	Marx, G.A.	J	26.2	McAllen, J.W.	CDN	9.1
Makino, Y.	J	19.1	Marzec, T.	USA-B	4.1	McAnelly, C.W.	USA-I	17.1
Makita, H.	J	26.3	Masabayashi, K.	PL	5.1	McArdle, F.J.	USA-B	15.1
Makosz, E.	PL	1.1	Masaki, T.	J	19.5	McBee, G.G.	USA-H	7.1
Malachowski, A.	PL	13.7	Mason, J.L.	J	37.1	McBee, R.C.	USA-I	22.1
Malan, A.H.	ZA	7.1	Massaux, F.	CDN	63.1	McClean, A.P.D.	ZA	6.4
Malan, Miss C.E.	ZA	6.3	Massey, D.M.	B	2.6	McClellan, W.D.	USA-C	3.1
Maliga, P.	H	1.1	Mastalerz, J.W.	GB	26.1	McCollum	PE	6.2
Malo, S.E.	USA-D	26.1	Masucci, P.E.	USA-B	15.1	McCollum, G.	USA-I	20.1
Manabe, M.	J	17.3	Masuda, T.	USA-B	16.1	McCollum, J.P.	USA-F	12.2
Manabe, T.	J	39.2	Masui, M.	J	31.3	McCombs, C.L.	USA-D	4.1
Mandl, R.	USA-B	10.1	Matsui, M.	J	37.5	McConnell, B.	CDN	42.2
Manis, W.E.	USA-D	31.2	Mathews, I.	ZA	3.1	McConnell, M.C.	GB	2.1
Mann, G.	GB	25.1	Maton, A.	B	11.1	McCormick, J.	USA-I	13.1
Mann, J.D.	USA-K	15.1	Maton, J.	B	3.4	McCornack, A.A.	USA-D	29.1
			Matsubara, N.	J	27.2	McCoy, O.D.	USA-K	15.1
			Matsubara, S.	J	40.5	McCready, R.M.	USA-K	1.1
				J	45.1	McCubbin, E.N.	USA-D	25.1
			Matsubara, T.	J	33.2	McCune, D.	USA-B	10.1

McDaniel, J.C.	USA-F 12.2	Merritt, R.H.	USA-B 16.1	Minegishi, T.	J 12.1
McDaniel, J.C.	USA-F 12.2	Merwe, G.G. van		Minges, P.A.	USA-B 6.1
McDougall, W.A.	AUS 14.1	der	ZA 6.4	Mink, G.I.	USA-J 5.1
McElwee, F.W.	USA-D 24.1	Messing, J.H.L.	GB 26.1	Minshall, W.H.	CDN 30.1
McEvoy, E.T.	CDN 32.3	Mestre, J.P.	F 6.1	Mioduszewski, B.	PL 18.2
McEwen, F.L.	USA-B 4.1	Mészáros, F.	H 1.2	Mira, E.	F 9.2
McFadden, L.A.	USA-A 2.1	Mészöly, G.	H 5.1	Miranda, H.	CR 1.1
McFadden, S.E.	USA-D 24.1	Metcalf, Miss E.		Miravittles, L.	E 3.1
McFarlane, J.J.	AUS 10.1	D.	WAN 1.1	Mirobe, M.	J 19.2
McFarlane, J.S.	USA-K 16.1	Metcalf, H.N.	USA-I 22.1	Mishima, K.	J 12.1
McFarlane, V.H.	USA-D 61.1	Metcalf, C.F.	GB 22.1		J 21.2
McFerran, J.	USA-E 7.1	Mettivier Meyer,		Mitchell, A.E.	USA-F 13.1
McGlasson, W.B.	AUS 10.1	J.C.	NL 12.2	Mitchell, A.P.	GB 15.1
McGrew, J.	USA-C 3.1	Meulen, A. van der	ZA 3.1	Mitchell, A.R.	AUS 13.1
McGuire, J.J.	USA-A 16.1	Meurman, H.	FL 1.1	Mitchell, H.S.	AUS 10.1
Mc Ilvain Jr.,		Meyer, B.S.	USA-F 3.1	Mitchell, J.W.	USA-C 3.1
E.H.	USA-H 5.1	Meyer, Miss M.P.		Mitchell, P.D.	AUS 23.2
McIntosh, K.K.	CDN 63.1	K.	ZA 6.4	Mitsushima, Y.	J 22.5
McKay, J.W.	USA-C 3.1	Meyer, R.H.	USA-F 12.1	Mitsuzawa, K.	J 7.1
McKeen, C.D.	CDN 28.1	Meyneke, C.A.R.	NL 12.10	Mitterling, L.A.	USA-A 15.1
McKenzie, D.W.	NZ 1.1	Meynhardt, J.T.	ZA 7.1	Miura, J.	J 3.1
McKevan, D.K.E.	CDN 19.1	Mezey, F.	H 1.2	Miura, K.	J 26.2
McKissock, A.	NZ 8.1	Michaelson, N.	USA-L 6.1	Miura, T.	J 44.1
McLaren, D.I.	GB 42.1	Michalik, H.	PL 18.2	Miura, Y.	J 19.2
McLaughlin, H.A.L.	CDN 7.1	Michalski, W.	PL 10.1	Miwa, S.	J 37.3
McLean, J.	GB 41.1	Michel-Wolwertz,		Miyagawa, A.	J 36.2
McLean, D.	USA-B 10.1	M.R.	B 4.1	Miyagawa, K.	J 26.3
McLean, D.M.	USA-H 13.1	Mick, A.H.	USA-L 6.1	Miyahara, M.	J 7.1
McMechan, A.D.	CDN 63.1	Middlelem, C.H.		Miyaishi, K.	J 19.5
McNabb, R.F.R.	NZ 1.2	Van	USA-D 24.1	Miyaji, R.	J 18.1
McNeal, B.L.	USA-K 15.2	Middlehurst, J.	AUS 10.1	Miyakawa, T.	J 39.2
McNew, G.L.	USA-B 10.1	Middleton, J.E.	USA-J 5.1	Miyakusu, T.	J 19.1
McNulty, I.B.	USA-I 12.1	Milke, T.	J 21.2	Miyamoto, T.	J 21.1
McOnie, K.	ZA 3.1	Mijas, M.	PL 15.1	Miyashita, K.	J 12.2
McWhorter, F.P.	USA-J 13.1	Mika, A.	PL 18.1	Miyawaki, K.	J 17.1
Mead, R.	USA-J 14.1	Mikami, Y.	J 3.2	Miyazaki, I.	J 18.3
Meader, E.M.	GB 45.1	Miki, H.	J 17.2	Miyazaki, M.	J 30.1
Meahl, R.P.	USA-A 2.1	Miki, O.	J 43.2	Miyazaki, N.	J 19.5
Mecklenburg, R.	USA-B 15.1	Miki, S.	J 17.2	Miyazaki, S.	J 33.3
A.	USA-F 13.1		J 40.2		J 41.1
Medina, A.	PE 1.1	Mikkelsen, V.	DK 5.3	Miyazawa, Y.	J 26.3
Medina, C.	PE 6.3	Milanez, Adanto		Miyoshi, M.	J 5.2
Meer, F.A. van der	NL 12.5	I.	BR 11.2	Miyoshi, T.	J 26.1
Meer, Q.P. van der	NL 12.8	Milbrath, J.A.	USA-J 14.1	Mizu, O.	J 22.1
Meffert, H.F. Th.	NL 12.2	Miles, H.W.	GB 27.1	Mizumura, H.	J 34.1
Mega, K.	J 32.1	Milholland, R.D.	USA-D 2.1	Mizuno, T.	J 40.4
Meidner, H.	GB 40.1	Milkan, D.F.	USA-E 15.1	Moberg, A.	S 10.1
Meijer, E.R.	NL 12.9	Miller, A.C.	USA-D 56.1	Möcsényi, Mrs. M.	H 1.2
Meijer, J.	NL 10.1	Miller, C.H.	USA-D 4.1	Möcsényi, M.	H 1.2
Meijerman, G.C.	NL 12.4	Miller, E.J.	GB 16.1	Modlibowska, I.	GB 10.1
Melard, V.	B 9.1	Miller, E.L.	USA-B 12.1	Moh, C.C.	CR 1.1
Melham, Th.S.	BR 11.2	Miller, G.W.	USA-I 9.1	Mohler, J.L.	USA-G 21.1
Melhuis, F.M.	AUS 6.1	Miller, H.N.	USA-D 24.1	Mohr, H.C.	USA-E 11.1
Mellenthin, W.M.	USA-J 16.1	Miller, J.C.	USA-D 54.1	Mohr, W.P.	CDN 35.1
Mellor, F.C.	CDN 64.1		USA-D 58.1	Möhring, H.K.	D 8.1
Mellor, J.D.	AUS 10.1	Miller, L.	USA-B 10.1	Möhrs, K.H.	D 9.8
Melquist, G.A.L.	USA-A 15.1	Miller, P.M.	USA-A 14.1	Mohsenin, N.N.	USA-B 15.1
Melville, F.	AUS 35.1	Miller, P.W.	USA-J 14.1	Molestina, C.	PE 6.1
Melville, J.	AUS 33.1	Miller, R.O.	USA-F 3.1	Moller, W.J.	AUS 25.1
Menary, R.C.	AUS 18.1	Miller, S.R.	CDN 35.1	Molls Rasmussen,	
Mendez, D.	PE 6.1	Miller, T.C.	AUS 25.1	P.	DK 7.1
Mendizábal, M.	F 1.1	Mills, H.B.	USA-F 12.1	Molnár, Mrs. A.	H 1.5
Menges, R.M.	USA-H 13.1	Milner, R.T.	USA-F 12.2	Molnár, B.	H 1.1
Menzies, A.L.	USA-K 17.1	Milne-Redhead,		Molnár, L.	H 5.1
Menzies, J.A.	CDN 42.2	E.W.B.H.	GB 22.1	Molnar, S.A.	CDN 51.1
Menzies, M.H.	GB 10.1	Milthorpe, F.L.	GB 34.2	Molot, P.M.	F 5.1
Menzies, S.A.	NZ 1.2	Mimata, T.	J 30.2	Moltzer, F.	NL 12.7
Mercier, R.G.	CDN 37.1	Mimura, I.	BR 11.2	Monin, A.	B 5.1
Merkley, D.R.	USA-I 23.1	Minamibori, K.	J 28.1		B 5.5
Merrill, L.G.	USA-B 16.1	Minamikawa, K.	J 33.1	Montalvo, R.	PE 6.1
Merrill Jr., S.	USA-D 51.1	Minard, H.R.G.	NZ 3.2	Montes, A.	PE 6.3
	USA-D 55.1	Minderman, G.	NL 3.1	Montgomery, H.B.	
		Minegishi, M.	J 34.1	S.	GB 10.1

Montgomery, Miss I.G.	GB	2.1	Mukai T.	J	22.1	Nagy, P.	H	1.1
Montgomery, R.S.	AUS	41.2	Mulder, D.	NL	13.1	Naito, K.	J	28.1
Mool, J.C.	NL	12.5	Müller, F.	F	20.1	Naitō, M.	J	43.1
Moorat, A.E.	GB	15.1	Muller, J.	P	2.1	Naitō, N.	J	7.1
Moore, C.S.	GB	10.1	Müller, K.H.	D	20.1	Naitō, P.	J	36.1
Moore, E.L.	USA-D	52.1	Muller, Mrs. K.K.	USA-K	19.1	Nakada, H.	J	6.2
Moore, F.J.	GB	16.1	Müller, K.W.	P	27.9	Nakada, T.	J	38.1
Moore, H.E.	USA-B	6.1	Müller, L.	CR	1.1	Nakagawa, M.	J	39.2
Moore, J.D.	USA-F	18.1	Mullett, R.A.	AUS	19.2	Nakagawa, F.	J	15.1
Moore, J.N.	USA-E	7.1	Mulligan, B.O.	USA-J	8.1	Nakagawa, S.	J	32.2
Moore, M.H.	GB	10.1	Mullin, R.	USA-G	6.1	Nakagawa, Y.	J	19.1
Moore, R.F.	CDN	24.1	Mullins, M.G.	AUS	28.2		J	36.2
Moore III, F.	USA-I	2.1	Muma, M.H.	USA-D	28.1	Nakagawa, Y.	USA-M	3.2
Moorter, Van	B	2.4	Münch, J.	D	27.17	Nakahara, M.	J	41.2
Mooney Jr., P.H.	USA-C	11.1	Mund, R.M.	USA-B	8.1	Nakai, S.	J	4.1
Moreau, M.	F	6.1	Munehiro, S.	J	15.1	Nakajima, G.	J	19.3
Morgan, C.V.G.	CDN	63.1	Munger, H.M.	USA-B	6.1	Nakajima, K.	J	14.3
Morgan, G.T.	CDN	9.1	Mungomery, W.V.	AUS	16.1	Nakajima, T.	J	26.3
Morgan, N.G.	GB	28.1	Munk, W.J.de	NL	9.1	Nakajima, Y.	J	7.1
Morgans, A.	AUS	19.4	Munro, D.C.	CDN	4.1		J	20.2
Mori, H.	J	16.1	Munro, J.	CDN	9.1	Nakama, K.	J	37.2
Mori, S.	J	5.2	Munson, Shirley T.	USA-G	6.1	Nakamura	J	21.1
Mori, T.	J	13.1	Munthe, T.	N	10.5	Nakamura, F.	J	35.2
Morikawa, K.	J	22.1	Munz, Ph.A.	USA-K	6.1	Nakamura, H.	J	37.4
Morimoto, J.	J	43.2	Murai, C.	J	34.1	Nakamura, M.	J	9.2
Morimoto, M.	J	28.2	Murakami, M.	J	40.7		J	26.4
	J	31.1	Murakami, Y.	J	19.1	Nakamura, N.	J	13.2
Morin, C.	PE	6.3	Murakishi, H.H.	USA-F	13.1	Nakamura, R.	J	26.4
Morioka, S.	J	4.1	Muramatsu, H.	J	19.5	Nakamura, S.	J	18.4
Morita, A.	J	7.1		J	27.1		J	30.2
Morita, K.	J	40.4	Muramatsu, Y.	J	37.3	Nakamura, T.	J	16.3
Morita, S.	J	4.1	Muranishi, S.	J	7.3		J	34.1
	J	34.1	Murata, H.	J	37.4	Nakano, Y.	J	11.1
Morris, L.G.	GB	42.1	Murata, N.	J	37.1	Nakaoka, T.	J	13.1
Morris, L.L.	USA-K	7.1	Murata, R.	J	35.1	Nakashizuka, A.	J	29.1
Morris, R.F.	CDN	3.1	Murata, T.	J	32.2	Nakasone, H.Y.	USA-M	3.2
Morrison, C.A.	USA-F	1.1	Murayama, T.	J	13.1	Nakasuiji, T.	J	43.1
Morrison, E.M.	USA-I	9.1	Muro, J. del C.	PE	7.1	Nakatani, M.	J	43.2
Morrison, F.O.	CDN	19.1	Murphy, E.F.	USA-A	1.1	Nakatomi, Y.	J	29.1
Morrison, H.E.	USA-J	14.1	Murphy, H.J.	USA-A	1.1	Nakausa, T.	J	40.9
Morrison, Miss H.E.	CDN	37.1	Murphy, P.W.	GB	34.2	Nakaya, E.	J	19.1
Morrison, J.W.	CDN	40.1	Murray, C.C.	USA-D	10.2	Nakayama, H.	J	45.2
Morrison, L.G.	NZ	3.1	Murray, H.R.	CDN	19.1	Nakayama, R.M.	USA-H	16.1
Morrison, L.S.	USA-H	3.1	Murray, K.E.	AUS	10.1	Nakazawa, D.	J	20.1
Morrison, T.M.	NZ	2.2	Murray, R.A.	CDN	7.1	Nakazawa, S.	J	28.1
Mortensen, J.A.	USA-D	30.1	Murthy, D.W.P.	AUS	41.1	Nakazawa, T.	J	15.1
Morton, D.J.	USA-D	19.1	Muszyńska, E.	PL	18.1	Namikawa, J.	J	22.1
Morton, R.S.	CDN	7.1	Muszyński, S.	PL	22.3	Namikawa, O.	J	19.3
Morwood, R.B.	AUS	12.1	Mutor, R.	PL	23.1	Nanjyō, N.	J	41.3
Mosegaard, J.	DK	7.3	Myburgh, A.C.	ZA	7.1	Nanjyō, Y.	J	32.2
Moss, C.J.	GB	42.1	Myburgh, J.	ZA	6.3	Nankivell, W.I.	AUS	19.1
Moss, D.F.	AUS	25.1	Myers, V.I.	USA-H	13.1	Nannenga-Bremekamp, Mrs. N.E.	NL	12.9
Motohashi, S.	J	40.9	Mygind, H.	DK	6.1	Narita, H.	J	2.1
Moulinier, H.	F	2.1	Myhre, A.S.	USA-J	7.1	Narkiewicz-Jodlo, J.	PL	18.2
Moulton, A.E.	USA-F	13.1	Myklebust, E.	N	10.3	Natti, J.J.	USA-B	4.1
Moulton, J.E.	USA-F	15.1	Mynett, K.	PL	22.11	Nauer, E.M.	USA-K	15.1
Mountain, W.B.	CDN	37.2	Myodo, H.	J	12.3	Naumann, W.D.	D	21.1
Moura, C.A.F.de	BR	11.2	Myszka, T.	PL	3.1	Nawrocka, B.	PL	18.2
Mower, R.C.	USA-B	6.1				Neal Jr., O.M.	USA-C	9.1
Mowry, J.B.	USA-F	10.2	Nádasy, M.	H	1.2	Neethling, L.P.	ZA	6.3
Moyls, A.W.	CDN	63.1	Nairádi, I.	H	6.1	Neff, A.E.	CDN	36.1
Moyne Hogan, Le	USA-H	22.1	Nagahama, M.	J	18.3	Neff, M.S.	USA-D	14.1
Mozsár, K.	H	1.2	Nagai, K.	J	3.1	Negura, Y.	J	41.2
Mrozowska, T.	PL	11.1	Nagai, M.	J	12.2	Neild, B.E.	USA-G	21.1
Mrozowski, M.	PL	11.1	Nagai, Y.	J	27.1	Neill, J.W.	CDN	64.2
Muijzenberg, F.			Nagasawa, K.	J	4.2	Neilson, W.T.A.	CDN	9.1
W.B. van den	NL	12.7	Nagasawa, M.	J	40.9	Nel, J.C.	ZA	3.1
Muir, P.C.	GB	10.1	Nagato, Y.	J	4.1	Nel, R.I.	ZA	7.1
Muirhead, W.A.	AUS	6.1	Nagel, C.W.	USA-J	6.1	Nelder, J.A.	GB	45.1
Mukai, B.	J	34.1	Nagel-de Boois, Mrs. H.M.	NL	3.1	Nelson, A.I.	USA-F	12.2
Mukai, T.	J	5.2	Nagy, R.	H	1.2	Nelson, D.C.	USA-G	11.1

Nelson, G.A.	CDN	3.1	Nishino, M.	J	37.2	Odake, T.	J	42.1
Nelson, K.E.	USA-K	7.1	Nishino, T.	J	27.1	Odawara, C.	J	30.3
Nelson, M.R.	USA-H	22.1	Nishitani, N.	J	13.1	Odland, M.L.	USA-B	15.1
Nelson, P.E.	USA-F	9.1	Nishiura, M.	J	37.1	O'Donoghue, J.B.	AUS	39.1
Nelson, S.H.	CDN	46.1	Nishiyama, I.	J	22.4	Oebker, N.F.	USA-H	22.1
Németh, M.V.	H	1.1		J	35.1	Ōgaki, C.	J	19.2
Nerum, K. van	B	7.1	Nitsch, C.	F	11.1	Ōgami, A.	J	7.1
Nesbitt, W.	USA-R	16.1	Nitsch, J.P.	F	11.1	Ogano, R.	J	12.1
Nettancourt, D.			Nittler, L.M.	USA-B	4.1	Ogasawara, S.	J	11.1
de	NL	12.6	Nivens, D.	USA-H	8.1		J	45.2
Nettles, V.F.	USA-D	24.1	Niwicki, S.	PL	18.1	Ogata, G.	USA-K	15.2
Neubeller, J.	D	24.1	Nixon, R.W.	USA-K	9.1	Ogata, K.	J	32.2
Neuray, G.	B	2.3	Noble, M.J.M.	GB	11.1	Ogata, R.	J	40.3
Neve, R.A.	GB	46.3	Noble, W.	USA-K	2.1	Ogata, T.	J	30.1
Nevins, R.B.	USA-D	52.1	Nobrega, P.	BR	11.1	Ogawa, M.	J	15.1
Nevling, Jr., L.I.	USA-A	7.1	Noda, S.	J	27.2	Ogawa, T.	J	27.2
Newhall, A.G.	CR	1.1	Noda, T.	J	4.1	Ogden, W.B.	USA-F	18.1
Newhook, F.E.	NZ	1.2	Nøddegaard, E.	DK	6.1	Ogg, C.L.	USA-B	14.1
Newsom, D.W.	USA-D	54.1	Nohara, K.	J	45.1	Ogiwara, S.	J	4.1
Newsom, L.D.	USA-D	54.1	Nøhr Rasmussen, A.	DK	6.1	Ogny, F. d'	F	3.1
Newton, P.	GB	31.1	Nolan, C.N.	USA-D	29.2	Ogura, H.	J	18.4
Nguyen Vinh Xuan	F	15.1	Noll, C.J.	USA-B	15.1	Ogura, T.	J	42.1
Nickle, W.R.	CDN	23.1	Nollen, H.M.	NL	12.9	Ōgushi, R.	J	27.1
Nicklow, C.W.	USA-F	13.1	Nolte	D	20.1	Ōhashi, K.	J	13.1
Nicolai, P.	B	6.1	Nomoto, T.	J	29.1	Ōhata, T.	J	37.1
Nicolaisen, W.	D	12.6	Nomura, A.	J	32.1	Ohiaeri, J.U.	WAN	2.1
Nichols, H.E.	USA-G	18.1	Nomura, K.	J	4.2	Ōishi, R.	J	35.1
Nichols, R.	GB	26.1	Nomura, M.	J	45.1	Ōizumi, Y.	J	24.1
Nicholson, J.A.H.	GB	27.1	Nonami, W.	J	20.1	Oka, C.	J	37.2
Nicholson, M.E.	AUS	17.1	Noordam, D.	NL	12.9	Oka, H.	J	22.5
Niekerk, P.E. le R.	ZA	7.1	Noordink, J.W.P.	NL	12.5	Okada, A.	J	4.1
Nielsen, G.	DK	8.1	Noort, D. van	ZA	3.1	Okada, M.	J	40.8
Nielsen, G.G.	DK	8.1	Noort, G. van	ZA	3.1	Okada, S.	J	5.1
Nielsen, L.W.	USA-D	4.1	Nordby, A.	N	10.2	Okada, Y.	J	31.1
Nielsen, P.C.	DK	5.1	Norman, G.G.	USA-D	37.1	Okamoto, S.	J	37.5
Nielsen, V.	DK	5.1	Norman, P.N.	USA-D	33.1	Okano, T.	J	27.2
Nieman, R.H.	USA-K	15.2	Norrish, M.E.	GB	26.1	Okasako, Y.	J	25.1
Niemann, J.	D	20.1	Nortje, B.K.	ZA	7.1		J	25.2
Niemczyk, E.	PL	1.1	Norton, J.D.	USA-D	38.1	Ōkawa, Y.	J	19.2
	PL	18.1	Norton, G.	GB	34.2	Okazaki, K.	J	44.1
Niemirski, W.	PL	22.4	Norton, R.A.	USA-J	3.1	Okazaki, M.	J	31.3
Niesel, A.	D	20.1	Norvell, W.A.	USA-K	15.2	Okazoe, A.	J	5.2
Nieuwhof, M.	NL	12.8	Nott, Miss R.M.	GB	38.1	O'Keefe, R.B.	USA-G	21.1
Nievas Abascal, C.P.	E	5.1	Nourisseau, J.	F	5.1	Okimoto, A.	J	11.3
Niewiadomska, K.	PL	12.1	Nowacka, W.	PL	13.2	Okitsu, S.	J	7.2
Nii, K.	J	39.1	Nowakowski, Z.	PL	18.1	Ōkōchi, H.	J	37.3
Niitsu, A.	J	46.2	Nowosielska, B.	PL	18.2	Okuchi, S.	J	5.2
Nijzuma, T.	J	2.1	Nowosielski, O.	PL	18.2	Okuda, Y.	J	32.1
Nijveldt, W.C.	NL	12.5	Nuland, D.S.	USA-G	21.1	Okudai, N.	J	7.2
Nilsson, F.V.	S	1.1	Nunes, A.C.	CDN	32.2	Okudai, S.	J	37.1
Niltzelius, T.	S	3.1	Nurse, M.	CDN	15.1	Okudono, H.	J	13.1
Ninomiya, K.	J	37.3	Nuttall, V.W.	CDN	32.4	Okumura, K.	J	45.1
Ninomiya, S.	J	40.5	Nybom, S.	S	2.1	Okumura, M.	J	12.3
Nisen, A.	B	2.3	Nye, W.P.	USA-I	9.1	Okumura, S.	J	22.5
Nishi, M.	J	21.2	Nyenhuis, E.M.	ZA	4.1	Okuse, I.	J	3.3
Nishi, S.	J	19.1	Nyhlén, A.	S	8.1	Oland, K.	N	4.1
Nishiba, S.	J	23.1	Nyhlén, R.	S	6.1	Olcese, O.	PE	6.3
Nishibe, T.	J	5.1	Nylund, R.E.	USA-G	6.1	Oldenhove de Guer-		
Nishide, A.	J	10.1	Nys, L.	B	9.1	techin, F.B.	B	3.2
Nishida, K.	J	21.2	Nyujtő, F.	H	5.1	Olivares, C.	PE	6.1
Nishida, N.	J	13.1				Oliver, C.S.	USA-B	15.1
Nishida, T.	J	14.3				Oliveira Fialho, N. de	BR	11.2
Nishigaya, S.	J	37.2	Obarski, J.	PL	13.1	Olivier, M.C.	ZA	1.1
Nishii, K.	J	42.1	Ōbayashi, N.	J	28.1	Olmo, H.P.	USA-K	7.1
Nishikawa, H.	J	42.1	Oberbacher, M.F.	USA-D	29.1	Olmsted, J.D.	USA-K	17.1
Nishimura, K.	J	30.3	Oberholzer, P.C.			Olson, O.A.	CDN	3.1
Nishimura, M.	J	41.2	J.	ZA	6.5	Olsen, K.L.	USA-J	11.1
Nishimura, S.	J	45.1	Oberle, G.D.	USA-C	11.1	Olsen, O. Bagge	DK	5.8
Nishimura, T.	J	22.1	Oberly, G.H.	USA-B	6.1	Olson, E.O.	USA-H	13.1
	J	22.5	Obo, N.	J	19.1	Olson, G.C.	USA-I	3.2
Nishino	J	22.1	Ochoa, C.	PE	6.3	Olson, L.E.	USA-I	9.1
Nishino, K.	J	15.1	Oda, Y.	J	32.2	Olson, R.V.	WAN	2.1

Olsson, K.	AUS 24.1	Ouden, H. den	NL 12.5	Patterson, A.C.	CDN 43.2
Olthof, T.H.A.	CDN 37.2	Ough, C.S.	USA-K 7.1	Patterson, M.E.	USA-J 6.1
Omori, H.	J 5.2	Ounsworth, L.F.	CDN 28.1	Patterson, N.A.	CDN 6.1
Omori, S.	J 40.5	Ourecky, D.K.	USA-B 4.1	Patterson, R.E.	USA-H 7.1
Omori, Y.	J 13.1	Ournac, Mlle A.	F 18.1	Patton, T.A.	USA-B 15.1
Omura, S.	J 36.2	Overcash, J.P.	USA-D 52.1	Patyna, Z.	PL 22.11
Onazy, O.C.	WAN 2.1	Overman, A.J.	USA-D 21.1	Paul, L.I.	USA-G 6.1
O'Neill, W.J.	USA-J 11.1	owada, A.	J 5.2	Paul, L.J.	USA-K 7.1
Onishi, M.	J 5.2		J 37.1	Paulet, P.	F 11.1
Onizuka, Y.	J 21.2	Owada, T.	J 38.1	Paulin, A.	F 15.1
Ono, K.	J 16.2	Owens, F.W.	USA-H 11.1	Pauw, M.de	B 13.1
Ono, M.	J 4.2	Owens, R.W.	USA-B 10.1	Payne, R.N.	USA-H 3.1
Ono, S.	J 10.1	Oxenham, B.	AUS 14.1	Peabody, D.V.	USA-J 3.1
Ono, T.	J 46.3	Øydvig, J.	N 10.3	Peairs Wilson, C.	USA-M 3.2
Ono, Y.	J 18.1	Oyer, E.R.	USA-F 9.1	Pearce, S.C.	GB 10.1
Onohara, I.	J 13.1	Ozaki, H.Y.	USA-D 22.1	Pearse, H.L.	ZA 6.1
Onsem, J. van	B 10.1	Ozaki, M.	J 43.2	Pearson, G.A.	USA-K 15.2
Onyejekwe, F.U.	WAN 2.1	Ozarowska, K.	PL 18.2	Peat, W.	GB 27.1
Oorschot, J.L.P. van	NL 12.3	Ozawa, H.	J 19.2	Pécaut, P.	F 16.1
Oort, A.J.P.	NL 12.9	Ozawa, K.	J 26.3	Peck, N.H.	USA-B 4.1
Oost, N. van	B 13.1	Ozawa, M.	J 26.3	Pegg, G.F.	GB 27.1
Oosten, M.F. van	NL 5.1	Ozawa, T.	J 40.5	Pegg, K.	AUS 17.1
Oostenbrink, M.	NL 12.9	Ozbun, J.L.	USA-B 6.1	Peggie, I.D.	AUS 23.1
Oosterheert, W.F.	NL 12.6	Ozenda, P.	F 12.1	Peikert, F.W.	USA-B 15.1
Oosthuizen, C.M.	ZA 1.1		F 12.2	Pelers, C.	B 3.5
Oostrom, C.G.J.	NL 12.4	Ozerol, N.H.	USA-F 12.2	Pelham, J.	GB 26.1
Oostrum, A. van	ZA 3.1			Pelletier, R.L.	CDN 19.1
Orchard, W.R.	CDN 62.1	Packer, W.J.	AUS 19.2	Pellet, H.M.	USA-G 21.1
Orenski, S.	USA-B 10.1	Padfield, C.A.S.	NZ 1.1	Peloquin, S.J.	USA-F 18.1
Orffer, C.J.	ZA 7.2	Pag, H.H.W.	D 5.10	Pentzer, W.T.	USA-C 6.1
Ormerod, P.J.	GB 10.1	Page, E.R.	GB 45.1	Pepin, H.S.	CDN 64.1
Ormos, I.	H 1.2	Page, O.T.	CDN 9.1	Pepper, B.B.	USA-B 16.1
Ormsod, D.P.	CDN 64.2	Pape, P.E.	AUS 17.2	Perrault, C.	CDN 17.1
Orsenigo, J.R.	USA-D 20.1	Pahaut, P.	B 3.2	Perron, J.R.	CDN 22.1
Orth, P.H.G.	D 7.1	Paillard, Mlle N.	F 15.1	Perry Jr., F.B.	USA-D 38.1
Orth, R.G.	USA-D 26.1	Painter, J.H.	USA-J 14.1	Perry, Lily M.	USA-A 7.1
Orton, Jr., E.R.	USA-B 16.1	Pais, I.	H 1.2	Persson, A.R.	N 10.3
O'Rourke, E.N.	USA-D 54.1	Paizs, Mrs. M.	H 1.5	Perttula, O.	FL 4.1
Osada, I.	J 6.2	Palao, P.	PE 6.1	Peschken, D.	CDN 23.1
Osada, K.	J 21.2	Palasthy, A.	GB 7.1	Pesserl, G.	D 27.3
Osara, K.	FL 12.1	Palm, C.E.	USA-B 6.1	Peters, C.	USA-I 1.1
Osawa, T.	J 32.2	Palmer, J.L.	WAN 2.1	Peters, D.	NL 12.9
Osborn, M.R.	USA-D 10.1	Palmer, R.D.	USA-D 52.1	Petersen, H.I.	DK 6.1
Øshika, Y.	J 10.1	Palmer, T.P.	NZ 2.1	Peterson, B.	S 3.1
Øsinska, M.	PL 23.1	Palmiter, D.H.	USA-B 5.1	Peterson, C.E.	USA-F 13.1
Osos, A.	PE 6.1	Paludan, N.	DK 6.1	Peterson, L.A.	USA-F 18.1
Ostendorf, H.D.	D 12.5	Panton, J.S.	GB 1.2	Peterson, L.E.	USA-G 20.1
Oster, J.D.	USA-K 15.2	Papavizas, G.C.	USA-C 3.1	Peterson, L.O.T.	CDN 43.2
Ostrowski, W.	PL 21.1	Pape, J.C.	NL 5.1	Peterson, R.M.	USA-G 17.1
Oszkinis, W.	PL 13.4	Pâques, Cl.	B 8.1	Pethö, F.	H 9.1
	PL 22.11	Paquin, R.	CDN 17.1	Petty, B.K.	ZA 6.4
Øta, H.	J 10.1	Par, W.J.	GB 26.1	Petty, D.R.	AUS 37.1
Øta, K.	J 17.1	Paradis, R.O.	CDN 22.1	Petzer, C.F.	ZA 7.3
Øta, T.	J 7.1	Pardo Pascual, M.	E 14.1	Peucker, H.	D 20.1
	J 18.1	Paredes, J.	PE 7.1	Pew, W.D.	USA-H 18.1
	J 27.1	Parent, B.	CDN 22.1	Pfahl, P.B.	USA-B 15.1
Øtani, H.	J 26.2	Parent, R.C.	CDN 4.1	Pfeiffer, C.	USA-F 9.1
Øtani, M.	J 43.1	Paris, J.	F 12.2	Pfenningsfeld, F.	D 27.8
Øtani, S.	J 40.6	Paris, Mlle Y.	B 5.4	Pflugfelder, E.	D 22.1
Øtoi, N.	J 39.2	Park, J.H.	USA-H 23.1	Phan-Chon-Ton	F 15.1
Øtomo, J.	J 11.3	Parker, J.	GB 5.1	Philbrick, R.N.	USA-K 19.1
Øtomo, T.	J 34.1	Parker, M.M.	USA-C 13.1	Philippon, J.	F 15.1
Øtono, H.	J 35.2	Parks, C.	USA-K 2.1	Phillips, A.M.	USA-D 32.1
Øtsu, R.	J 21.2	Parlevliet, J.E.	NL 12.9	Phillips, E.L.	USA-C 12.1
Øtsu, T.	J 22.1	Parmentier, G.	B 2.8	Phillips, J.H.H.	CDN 37.2
Øtsuka, C.	J 34.1	Parry, M.S.	GB 10.1	Phillips, W.R.	CDN 32.2
Øtsuka, F.	J 26.3	Parynow, S.	PL 2.1	Philouze, J.	F 16.1
Ott, E.C.J.	NL 12.9	Pascual Jimenez, M.	E 10.2	Philp, J.	GB 45.1
Ottén, K.	B 10.1	Passe, H.A.	CDN 15.1	Philpott, B.P.	NZ 2.2
Otto, C.A.	USA-B 16.1	Paszkowska, I.	PL 22.10	Phyllips, R.H.	USA-G 6.1
Otto, W.A.	USA-G 13.1	Patchen G.O.	USA-J 11.1	Piatkowski, M.	PL 14.1
Ottosson, L.	S 1.1	Paterson, D.R.	USA-H 7.1	Pickett, A.D.	CDN 6.1

Pickett, B.S.	USA-E 3.1	Porter, W.L.	USA-B 14.1	Radnóczy, F.	H 2.1
Pickett, H.W.	USA-G 18.1	Posnette, A.F.	GB 10.1	Radoliński, A.	PL 18.2
Picoud, M.	USA-B 1.1	Possingham, J.V.	AUS 28.2	Radzikowska, A.	PL 15.1
Piedemonte de	F 17.1	Post, Miss A.H.	USA-B 8.1	Raeburn, J.R.	GB 1.1
Lima, C.	BR 11.2	Post, C.J. van der	NL 11.1	Raese, E.G.	USA-D 51.1
Pienaar, R. de V.	ZA 7.3		NL 12.4	Raese, J.T.	USA-D 55.1
Pienaar, W.J.	ZA 7.1	Postema, E.	USA-F 2.1	Ragetli, H.W.	CDN 64.1
Pienaaars, P.S.	ZA 7.1	Postigo, R.	PE 6.3	Rahn, E.M.	USA-C 2.1
Pieniazek, J.	PL 18.1	Postlethwaite,		Rahner, M.	D 12.5
Pieniazek, S.A.	PL 22.6	J.D.	GB 42.1	Raine, J.	CDN 64.1
Piens, G.	B 13.1	Poszwińska, J.	PL 6.1	Rakcsányi, L.	H 1.2
Pierce, L.C.	USA-A 2.1	Potaczek, H.	PL 18.2	Rake, Miss B.A.	GB 28.1
Pierce, W.C.	USA-D 62.1	Potter, J.M.C.	GB 13.1	Raleigh, G.J.	USA-B 6.1
Pierik, R.L.M.	NL 12.9	Potter, R.F.	GB 33.1	Ramirez, L.	PE 6.1
Pieringer, A.P.	USA-D 28.1	Pottier-Alapetite,		Ramos, A.	PE 6.1
Pierson, C.F.	USA-J 11.1	G.	F 12.1	Ramsay, D.M.	WAN 2.1
Pieters, G.A.	NL 12.9	Pound, G.S.	USA-F 18.1	Randall, T.E.	USA-J 6.1
Pieters, J.H.	NL 2.1	Poux, Ch.	F 18.1	Randle, Miss P.E.	GB 26.1
Pifer, E.C.	USA-B 15.1	Powell, B.H.	GB 30.1	Randles, J.W.	AUS 25.1
Pijls, F.W.G.	NL 5.1	Powell, D.	USA-F 12.2	Randolph, V.A.	USA-H 10.1
Pike, R.B.	USA-A 2.1	Powell, H.R.	AUS 35.1	Raphael, T.D.	AUS 36.2
Pilgaard, A.P.	DK 10.1	Powell, L.E.	USA-B 6.1	Rappaport, L.	USA-K 7.1
Pilsbury, H.	USA-L 2.1	Powell, R.H.	NZ 3.1	Rasberg, D.W.	USA-H 7.1
Pimentel, D.	USA-B 6.1	Powers, M.J.	USA-J 6.1	Rasmussen, A.O.	USA-B 15.1
Pinchinat, O.	CR 1.1	Pragłowski, J.	PL 18.2	Rasmussen, E.	DK 2.1
Pinchinat-Miernik,		Pratt, B.H.	AUS 33.1	Rasmussen, G.K.	USA-D 33.1
B.	PL 18.2	Pratt, Charlotte		Rast, A.Th.B.	NL 11.1
Pindel, Z.	PL 22.5	S.	USA-B 4.1		NL 12.5
Pinho, R.A.	BR 11.2	Pratt, H.K.	USA-K 7.1	Rathmell Jr., J.	
Piper, H.	D 1.1	Pratt, M.J.	CDN 64.1	K.	USA-B 15.1
Piringer, A.A.	USA-C 3.1	Preczner, G.	H 2.1	Rauch, F.D.	USA-G 18.1
Pirone, P.P.	USA-B 1.1	Predki, S.	PL 18.1	Raudaskoski, Mrs.	
Pitcher, R.S.	GB 10.1	Prentice, I.W.	GB 16.1	M.	FL 16.1
Pitman, G.	USA-B 10.1	Preston, A.P.	GB 10.1	Rauth, W.	D 9.8
Plaisted, R.	USA-B 6.1	Price, F.E.	USA-J 14.1	Raven, K.	USA-K 20.1
Plank, J.F. van		Pridham, A.M.S.	USA-B 6.1	Rawlins, S.L.	USA-K 15.2
der	ZA 6.4	Priestly, C.A.	GB 10.1	Rayment, A.F.	CDN 3.1
Plessis, S.F. du	ZA 3.1	Pringle, J.S.	CDN 27.1	Raymer, W.	USA-C 3.1
Plessis, S.J. du	ZA 6.1	Pringle, T.W.	GB 33.1	Rea, J.	PE 6.4
Pliszka, J.	PL 22.6	Prins, P.J.J.	ZA 7.1	Read, D.C.	CDN 4.1
Plycharski, W.	PL 18.1	Prins, T.	ZA 5.1	Read, P.E.	USA-C 2.1
Plumier, W.	B 5.1	Pritchard, F.	USA-H 23.1	Read, R.W.	USA-D 31.1
	B 5.4	Probocskai, E.	H 1.2	Read, W.H.	GB 26.1
Poapst, P.A.	CDN 32.2	Procasker, R.J.	USA-D 7.1	Rebandel, Z.	PL 13.5
Pochard, E.	F 16.1	Proebsting, E.L.	USA-J 5.1		NL 12.6
Poelman, J.N.B.	NL 5.1	Provencher, G.	CDN 20.1	Rechenmann, R.V.	
Poelstra, P.	NL 12.6	Proverbs, M.D.	CDN 63.1	Redai, I.	H 1.2
Pohjanheimo, O.	FL 6.1	Pryor, R.L.	USA-C 3.1	Redit, W.	USA-C 3.1
Pohl, Z.	PL 6.1	Przedpeńska, M.	PL 18.2	Redlich, G.C.	F 9.1
Poillion, W.A.	USA-D 60.1	Przybylski, T.	PL 6.1	Redman, J.	CDN 27.1
Pokorny, F.A.	USA-D 11.1	Przygodzka, I.	PL 5.1	Reece, P.C.	USA-D 33.1
Pol, P.H. van de	NL 12.10	Pudelski, T.	PL 13.7	Reed, D.K.	USA-D 33.1
Pollack, B.L.	USA-B 16.1	Puente, F. de la	PE 6.1	Reed, J.R.	USA-B 16.1
Pollack, B.M.	USA-C 3.1	Puite, K.	NL 12.6	Rees, A.R.	GB 26.1
Pollard, A.	GB 28.1	Purtak, M.	PL 5.1	Rees, D.H.	GB 10.1
Pollard, L.H.	USA-I 9.1	Putman, W.L.	CDN 37.2	Rees, M.W.	GB 8.1
Pollet	B 12.2	Pyne, C.T.	WAN 2.1	Rehm, S.A.E.	ZA 6.3
Ponchet, J.	F 2.2			Reich, H.	D 14.1
Pond, D.D.	CDN 9.1	Quak, Miss F.	NL 12.5	Reichart, G.	H 1.5
Poniedzialek, M.	PL 7.1	quamme, H.A.	CDN 40.1	Reid, R.D.	GB 2.1
Poniedzialek, W.	PL 7.1	Queiroz, A.S.	F 11.1	Reid, W.J.	USA-D 7.1
Ponsen, M.B.	NL 12.9	Quemener	F 19.2	Reimers, N.	USA-H 23.1
Pont, W.	AUS 15.1	Quevedo, A.	PE 6.1	Reimschuessel, E.	USA-I 11.1
Pool, W.D.	USA-D 54.1	Quevedo, F.	PE 6.1	Reisaeter, O.	N 10.3
Pope, D.T.	USA-D 4.1	Quillon, P.J.	F 10.1	Reisch, K.W.	USA-F 3.1
Popenoe, J.	USA-D 31.1	Quinlan, J.D.	GB 10.1	Reissmann, H.J.	CDN 37.1
Populer, C.	B 2.8	Quinlan, T.J.E.	AUS 37.1	Reitz, J.H.	USA-D 28.1
Porrey, W.	B 4.1	Quinones, Q.	PE 5.1	Reitzel, J.	DK 6.1
Porritt, S.W.	CDN 63.1			Rejman, A.	PL 22.6
Porter, L.A.	NZ 3.2	Raay, A. van	NL 12.5	Rem, Mrs. L.T.	USA-B 8.1
Porter, W.K.	USA-D 53.1	Racer, H.M.	USA-F 5.1	Remy, J.	B 3.2
		Rademacher, H.	D 3.1	Renard, W.	D 12.14
		Radler, F.	AUS 20.1	Renborg, U.B.	S 1.1

Rensburg, N.J.J.	ZA	7.1	Robin, F.	F	20.1	Rowlands, D.G.	GB	4.1
van Rensselaer, M.			Robinson, D.R.	CDN	46.1	Roy, P.O.	CDN	22.1
van Renwick, A.	USA-K	20.1	Robinson, G.D.	USA-I	14.1	Royce, R.D.	AUS	35.1
Reuderink, R.	USA-B	10.1	Robinson, J.B.	AUS	25.1	Royle, D.J.	GB	46.3
Reunhardt, P.K.	NL	7.1	Robinson, R.W.	USA-B	4.1	Röyrvik, J.	DK	9.1
Reuther, W.	ZA	1.1	Robles, J.	PE	7.1	Rozegna, S.	PL	22.10
Revilla, V.	USA-K	15.1	Roborgh, R.H.J.	NZ	4.1	Rozier, C.	F	12.1
Revois, R.V.	PE	6.1	Rocha, G.de la	PE	6.1	Rozsnyay, J.	H	1.1
Reynolds, C.W.	F	12.1	Rochette, P.	F	12.1	Ruck, J.A.	CDN	63.1
Reynolds, H.W.	USA-D	33.1	Rockland, L.B.	USA-K	14.1	Rudny, R.	PL	13.1
Reynolds, J.G.	USA-C	4.1	Rodenbourg, J.	B	2.6	Rudzinska, M.	PL	22.10
Rhee, J.A.van	USA-H	21.1	Rodgers, J.B.	USA-J	14.1	Ruf Jr., R.H.	USA-I	15.1
Rheenen, H.A.van	GB	43.1	Rodríguez, M.	PE	6.3	Ruffier-Lanche, R.	F	12.1
Rhoades, H.S.	NL	3.1	Røed, H.	N	10.5	Rumpel, J.	PL	18.2
Rhoads, J.D.	WAN	2.1	Roeder, K.	D	4.1	Pünger, W.	D	5.7
Rhoda Baruch, E.	USA-K	36.1	Røeggen, C.	N	10.3	Rushby, R.	CDN	13.1
Rhodes, A.M.	NL	12.9	Roehmer, K.	D	14.1	Russell, E.W.	GB	40.2
Rhodes, M.J.C.	USA-F	12.2	Roeofsen, B.	NL	13.1	Russell, M.R.	USA-F	12.2
Rhodes, W.H.	USA-E	3.1	Roever, W.E.	USA-E	3.1	Russell, W.A.	CDN	56.1
Riber, C.	GB	25.1	Rogers, B.L.	USA-C	5.1	Rutherford, P.P.	GB	27.1
Riber Rasmussen, C.	USA-D	9.1	Rogers, D.J.	USA-B	1.1	Rutland, R.B.	USA-D	11.1
Rich, A.E.	DK	5.1	Rogers, E.	USA-I	1.1	Ryan, G.F.	USA-D	28.1
Rich, S.	USA-A	2.1	Rogers, I.S.	AUS	25.1	Ryberg, M.	S	9.1
Richard, J.J.	USA-A	14.1	Rogers, O.M.	USA-A	2.1	Ryder, E.J.	USA-K	16.1
Richards, F.J.	CDN	12.1	Rogers, R.N.	USA-E	15.1	Ryugo, K.	USA-K	7.1
Richards, L.A.	GB	46.2	Rogers, W.S.	GB	10.1			
Richards, M.	USA-K	15.2	Rohde, J.	D	5.7	Saaltink, G.J.	NL	9.1
Richards, R.P.	NZ	7.1	Roland, G.	B	2.7	Sachs, R.M.	USA-K	7.1
Richardson, A.L.	B	2.8	Roll-Hansen, J.	N	7.1	Sackston, W.F.	CDN	19.1
Richardson, B.D.	AUS	36.2	Rollins Jr., H.A.	USA-C	11.1	Sacre, J.C.	B	5.2
Richardson, F.R.	USA-I	26.1	Rom, R.C.	USA-E	7.1	Sadabe, H.	J	42.1
Richardson, L.T.	AUS	36.2	Romani, R.J.	USA-K	7.1	Sadai, K.	J	11.2
Richardson, N.L.	GB	22.1	Romaniuk, J.	PL	18.1	Sadamori, S.	J	16.1
Richardson, P.	CDN	30.1	Romanowski, R.R.	USA-M	3.2	Sadik, Sidki,	USA-B	6.1
Richfield, J.M.	AUS	25.1	Rombach, J.	NL	12.9	Sadowski, A.	PL	22.6
Rick, C.M.	GB	42.1	Romberg, L.D.	USA-H	6.1	Sagane, S.	J	36.1
Rickard, P.C.	ZA	6.4	Romshe, F.A.	USA-H	3.1	Sagawa, Y.	USA-M	3.2
Ricketson, C.L.	USA-K	7.1	Ronde, J.H.de	CDN	37.2	Sahlström, H.	S	1.1
Ridder, N.A.de	GP	41.1	Ronde Kristensen, H.	DK	1.1	Saidak, W.J.	CDN	28.1
Rieger, B.A.	CDN	37.1		DK	6.1	Saini, G.R.	CDN	9.1
Riekels, J.W.	NL	12.4	Rondomanski, W.	PL	18.2	Saint, Mue A.M.Le	F	15.1
Riener, P.S.	CDN	26.1	Rondon, M.	PE	6.1	Saito, H.	J	33.1
Riera, F.J.	NL	12.9	Roof, J.	USA-K	3.1	Saito, T.	J	24.2
Ries, S.K.	F	3.4	Roorda van Eysinga, J.P.N.L.	NL	11.1		J	34.1
Riethus, H.	USA-F	13.1	Roos, T.S.	ZA	7.1	Sakaguchi, H.	J	36.2
Righolt, J.W.	D	5.4	Roosje, G.S.	NL	13.1	Sakai, K.	J	43.1
Rigot, N.	NL	12.4	Rosa, N.	CDN	3.1	Sakai, T.	J	4.1
Riis Lavsén, F.	B	9.1	Rosager, H.	DK	5.8	Sakai, Y.	J	3.2
Rijtema, P.J.	DK	5.8	Rosenau, W.A.	USA-A	11.1	Sakakibara, M.	J	1.1
Riley, F.A.	NL	12.4	Rosenberg, N.J.	USA-G	21.1	Sakanishi, Y.	J	32.2
Ringøet, A.	GB	16.1	Rosenstiel, R.G.	USA-J	14.1	Sakamoto, H.	J	38.1
Rings, R.W.	NL	12.6	Roslycky, E.B.	CDN	30.1	Sakamoto, I.	J	18.3
Risser, G.	USA-F	7.1	Ross, B.C.	GB	29.1	Sakamoto, T.	J	5.2
Ritcher, P.O.	F	16.1	Ross, R.G.	CDN	6.1	Sakanoto, I.	J	41.3
Ritchie, J.Y.	USA-J	14.1	Rossouw, G.G.	ZA	7.1	Sākō, J.S.	FL	11.1
Ritter, C.M.	GB	34.2	Roth, P.L.	USA-G	26.1	Sakoda, S.	J	18.2
Rivadeneira, V.H.	USA-B	15.1	Rothwell, J.R.	GB	37.1	Sakuma, N.	J	6.2
Rivard, M.I.	PE	6.1	Rothwell, K.	GB	46.1	Sakurai, H.	J	29.1
Rivers, C.F.	CDN	22.1	Roubaix, F.de	B	3.2	Sakurai, S.	J	29.1
Roath, C.W.	GB	8.1	Rousi, A.H.	FL	11.1	Sakurai, Y.	J	1.1
Roberts, A.N.	USA-I	24.1	Rousselon, M.	F	20.1	Salas, A.	CF	1.1
Roberts, A.W.F.	USA-J	13.1	Roux, E.R.	ZA	2.1	Salas, M.A.	PF	5.1
Roberts, C.R.	GB	33.1	Roux, F.J.le	ZA	7.1	Salinas, Mrs.A.	PF	6.1
Roberts, D.	USA-G	26.1	Roux, J.	F	12.1	Salokangas, Miss K.H.	FL	11.1
Roberts, E.C.	USA-B	10.1	Roux, J.C.le	ZA	4.1	Salter, P.J.	GB	45.1
Roberts, H.A.	USA-G	18.1	Roux, M.S.le	ZA	7.1	Salunkhe, D.K.	USA-I	9.1
Roberts, R.S.	GB	45.1	Roux, P.M.T.le	ZA	6.5	Sampson, D.R.	CDN	32.4
Robertson, G.I.	USA-I	9.1	Powberry, R.G.	CDN	26.1	Samuels, C.E.	USA-J	14.1
Robertson, G.W.	NZ	1.2	Rowe, P.R.	USA-F	18.1	Samuelson, S.D.	WAN	2.1
	CDN	32.3	Rowe, R.N.	AUS	23.2			

San Antonio, J. P.	USA-C	3.1	Schierbeek, E.W.	NL	12.4	Seinhorst, J.W.	NL	12.5
Sánchez, F.	PF	6.4	Schilleter, J.C.	USA-G	18.1	Seki, M.	J	33.2
Sanders, Mary F.	USA-A	7.1	Schimmelpfeng, H.	D	27.3	Sekiguchi, A.	J	26.3
Sanderson, K.C.	USA-D	54.1	Schippers, B.	NL	4.1	Sekiguchi, K.	J	14.1
Sandfaer, J.	DK	8.1	Schippers, P.A.	NZ	6.1	Sekiguchi, T.	J	40.9
Sandford, L.	USA-I	18.1	Schliemann, G.K.G.	ZA	7.1	Sekino, S.	J	19.2
Sandmeier, M.	F	11.1	E.	D	9.18	Sekiya, H.	J	26.3
Sandór, F.	H	7.1	Schlottmann, H.	D	13.1		J	38.2
Sandsted, R.F.	USA-B	6.1	Schmidle, A.	D	5.4	Sekiya, K.	J	19.1
Sandvad, K.	DK	7.1	Schmidt, A.	D	10.1		J	38.2
Sandved, G.	N	10.3	Schmidt, Miss H.	D	22.11	Sekizawa, H.	J	16.2
Sandved, M.	N	10.3	Schmidt, S.	PL	59.1	Seko, T.	J	29.1
Sandy, J.M.	USA-D	40.1	Schmitz, F.B.	USA-D	11.1	Self, B.F.	GB	10.1
Sanford, K.H.	CDN	6.1	Schneider, A.W.	USA-E	32.3	Self, R.S.	USA-D	46.1
Sanki, Y.	J	34.1	Schneider, E.	CDN	6.1	Selhime, R.G.	USA-D	33.1
Sano, Y.	J	22.3	Schneider, F.	NL	12.8	Selimi, A.	AUS	24.1
Sant, L.E. van't	NL	12.5	Schoenemann, J.A.	USA-F	18.1	Selman, I.W.	GB	27.1
Santerre, J.	CDN	17.1	Schoeneweiss, D.	USA-F	12.1	Semal, J.	B	2.5
Santorio, T.	USA-B	8.1	F.	USA-F	12.1	Semb, L.	N	10.5
Sasaki, A.	J	11.2	Scholten, G.	NL	1.1	Semel, M.	USA-B	9.1
Sasaki, F.	J	37.1		NL	12.5	Sendulsky, T.	BR	11.2
Sasaki, Y.	J	17.1	Scholz, E.W.	USA-G	11.1	Senga, K.	J	1.1
Sato, I.	J	41.5	Schomer, H.A.	USA-G	11.1	Senn, T.L.	USA-D	8.2
Sato, J.	J	30.2	Schoneveld, J.A.	NL	2.1	Sento, T.	J	5.4
Sato, K.	J	19.1	Schouwenburg, J.			Serf, L.	H	1.2
Sato, K.	J	24.1	C. van	NL	12.9	Seutin, E.	B	2.1
Sato, M.	J	12.2	Schrader, Th.	D	25.1	Sequeira, L.	USA-F	18.1
Satō, M.	J	34.1	Schreiber, K.F.	D	24.1	Serizawa, M.	J	26.1
Sato, N.	J	45.1	Schreiber, L.	D	27.6	Sewell, W.G.F.	GB	10.1
Sato, R.	J	8.1	Schröder, J.	D	9.3	Seyama, N.	J	16.1
Sato, S.	J	30.3	Schroeder, R.A.	USA-F	15.1	Shackelford, J.		
Satō, T.	J	31.2	Schroeder, W.T.	USA-B	4.1	P.	USA-D	50.1
Satō, Y.	J	39.1	Schubert, Bernice			Shackleton, D.A.	NZ	1.2
Sato, Y.	J	41.3	G.	USA-A	7.1	Shanks Jr., C.H.	USA-J	10.1
Sauer, G.	NL	12.6	Schubert, O.E.	USA-C	9.1	Shanks, J.B.	USA-C	4.1
Sauer, M.R.	AUS	20.1	Schuffelen, A.C.	NL	12.9	Shannon, S.	USA-B	4.1
Saunders, J.	CR	1.1	Schulte, H.K.	D	12.2	Sharma, Ravi Datt	NL	12.9
Saunt, J.E.	AUS	6.1	Schulte-Scherle-			Sharpe, R.H.	USA-D	24.1
Saupe, D.S.	USA-F	12.2	beck, H.	D	29.1	Sharples, G.C.	USA-H	18.1
Saure, M.	D	14.1	Schultes, R.E.	USA-B	1.1	Sharples, R.O.	GB	10.1
Sauthoff, W.H.F.	D	5.10	Schultze, H.W.	USA-J	14.1	Shaulis, N.J.	USA-B	3.1
Savage, E.F.	USA-D	15.1	Schuphan, W.	D	9.19	Shaw, C.G.	USA-J	6.1
Sawa, M.	J	13.1	Schupp, F.	D	13.2	Shaw, Dorothy,		
Sawa, Y.	J	20.2	Schupper, J.F.B.			E.	AUS	41.1
Sawachi, N.	J	40.9	M.	NL	6.1	Shawa, A.Y.	USA-J	2.1
Sawada, E.	J	12.3	Schutte, F.H.	USA-G	18.1	Shay, J.R.	USA-F	9.1
Sawada, K.	J	12.1	Schütz, E.	S	4.1	Shea, K.	AUS	12.1
Sawada, T.	J	40.9	Schwabe, W.W.	GB	46.2	Shear, C.B.	USA-C	3.1
Sawamura, K.	J	16.1	Schwarten, Lazel-			Sheard, G.F.	GB	26.1
Sawano, M.	J	13.2	la	USA-A	7.1	Shebeski, L.H.I.	CDN	42.2
Sawyer, R.L.	USA-B	9.1	Schwartz, A.	ZA	3.1	Sheehan, T.J.	USA-D	24.1
Sayre, R.M.	CDN	28.1	Schwartz, C.D.	USA-J	7.1	Sheets, W.A.	USA-J	12.1
Scannelli, R.J.	USA-B	6.1	Schwarz, K.G.	D	18.1	Sheldrake Jr., R.	USA-B	6.1
Schadegg, E.	DK	6.1	Schwarz, R.E.	ZA	3.1	Shepardson, E.S.	USA-B	6.1
Schaeffers, G.A.	USA-B	4.1	Schwerdtfeger, G.	D	24.1	Sherk, L.C.	CDN	32.3
Schaeffer, A.	F	8.1	Scora, R.	USA-K	15.1	Sherwood, C.H.	USA-G	18.1
Schaes, F.D.	USA-C	11.1	Scott, A.	CDN	13.1	Shiba, H.	J	26.1
Schaller, G.C.	USA-D	62.1	Scott, D.H.	USA-C	3.1	Shibata, S.	J	13.1
Schanderl, H.	D	9.6	Scott, E.G.	USA-C	9.1		J	39.2
Schans, R.P.H.P.			Scott, F.H.	USA-C	11.1	Shibata, Y.	J	22.5
van der	NL	5.1	Scott, L.E.	USA-C	4.1	Shibamoto, K.	J	26.3
Schaufler, E.F.	USA-B	6.1	Scriven, W.A.	GR	30.1	Shibazaki, O.	J	23.1
Scheer, Miss C.			Scudder, W.T.	USA-D	36.1	Shibutani, S.	J	31.3
van der	NL	12.11	Seaman, A.	GB	34.2	Shibukawa, J.	J	3.1
Schelling, J.	NL	5.1	Seaton, R.D.	GR	11.1	Shichijo, T.	J	7.2
Schelstraete, A.	B	13.1	Sebök, Mrs.I.	H	1.2	Shiffriss, O.	USA-B	16.1
Schenck, N.C.	USA-D	30.1	Seeley, J.G.	USA-B	6.1	Shiga, M.	J	24.1
Schenk, Elizabeth	D	21.1	Sefick, H.J.	USA-D	8.2	Shiizaki, Y.	J	43.1
Schenk, E.W.	D	12.5	Segall, R.H.	USA-D	33.1	Shikura, A.	J	18.3
Schenk, P.K.	NL	9.1	Segawa, S.	J	16.2	Shimada, H.	J	37.1
Schenk, W.	D	9.14	Segura, M.	PE	6.2	Shimada, N.	J	1.1
Scheys, G.	B	7.1	Seibert, R.J.	USA-B	12.1	Shimada, S.	J	35.1
						Shimada, T.	J	33.3

Shimizu, M.	J	19.3	Sinnamon, H.I.	USA-B	14.1	Smock, R.M.	USA-B	6.1
Shimizu, S.	J	19.1	Sipos, E.	H	1.2	Smooth, J.J.	USA-D	33.1
Shimizu, T.	J	6.2	Siqueira Jaccoud,			Smolarz, K.	PL	18.1
Shimo, M.	J	18.2	R.J.de	BR	11.2	Smolarz, S.	PL	18.1
Shimokawa, M.	J	19.2	Sironval, C.	B	4.1	Snacken, F.	B	3.2
Shimosako, K.	J	23.1		B	6.1	Snapp, O.I.	USA-D	17.1
Shimosako, M.	J	7.1	Sisa, M.	J	1.3	Snyder, L.C.	USA-G	3.1
Shimotsuna, M.	J	19.4	Sistrunk, W.A.	USA-E	7.1		USA-G	6.1
Shimoyama, T.	J	20.1	Sitton, B.G.	USA-D	55.1	Snyder, R.J.	USA-C	4.1
Shimura, I.	J	19.1	Sitton, G.B.	USA-D	51.1	Snyder, W.E.	USA-B	16.1
Shinkaji, T.	J	19.1	Sjo, J.B.	WAN	2.1	Snyder, W.H.	USA-I	19.1
Shino, H.	J	11.3	Skage, O.	N	10.3	Sobajima, Y.	J	22.2
Shinoda, A.	J	19.3	Skapski, H.	PL	18.2	Sobczykiewicz, D.	PL	18.1
Shinoda, H.	J	1.1	Skelton, B.J.	USA-D	8.2	Soczek, Z.	PL	18.1
Shinohara, G.	J	36.2	Skerrett, E.J.	GB	28.1	Soderholm, P.K.	USA-D	31.2
Shinohara, K.	J	5.1	Skierkowski, J.	PL	18.2	Soenen, A.	B	4.1
Shinohara, S.	J	37.3	Skilbeck, D.	GB	27.1		B	6.1
Shintani, T.	J	43.2	Skotland, C.B.	USA-J	5.1	Soergel, K.P.	USA-C	4.1
Shiobara, K.	J	29.1	Skorupska, U.	PL	5.1	Soest, W.van	NL	11.1
Shiono, I.	J	34.1	Skou, J.P.	DK	8.1	Sointa, S.	PL	8.1
Shiozawa, K.	J	15.1	Skrabonja, E.	PE	6.3	Sol, H.H.	NL	4.1
Shirai, T.	J	37.2	Slaats, M.	B	3.6	Sölom, L.	H	1.2
Shiraishi, S.	J	7.1	Slachetko, W.	PL	22.5	Söma, E.	J	12.2
Shiraishi, T.	J	30.2	Slade, D.A.	NZ	3.1	Söma, M.	J	3.1
Shiraki, S.	J	9.1	Slate, G.L.	USA-B	4.1	Somers, E.	GB	28.1
Shiratori, T.	J	26.2	Slater, C.H.W.	GB	10.1	Somme, L.	N	10.5
Shirogane, S.	J	12.1	Sleesman, J.P.	USA-F	7.1	Sommer, N.F.	USA-K	7.1
Shioura, H.	J	39.2	Slogteren, D.H.M.			Sommerijns, Gh.	B	2.4
Shiroyama, M.	J	1.1	van	NL	9.1	Somorowski, K.	PL	18.1
Shiu-Ying Hu	USA-A	7.1	Slootweg, A.F.G.	NL	9.1	Somos, A.	H	1.2
Shoemaker, J.S.	USA-D	24.1	Slowik, K.	PL	18.1	Sondern, J.A.	NL	12.7
Shōji, K.	J	37.3	Slusher, J.P.	USA-G	26.1	Sönderhausen, E.	DK	4.1
Short, J.L.	GB	23.1	Sluth, B.	USA-H	13.1	Sono, S.	J	35.1
Short, K.C.	USA-D	41.1	Sluys, P.van der	NL	5.1	Soost, R.K.	USA-K	15.1
Short, Miss M.N.	GB	8.1	Smale, B.C.	USA-C	3.1	Sørensen, A.	DK	7.2
Shotton, F.E.	GB	23.1	Smart, N.A.	GB	16.1	Sørensen, H.	DK	8.1
			Smeets, L.	NL	12.8	Sørensen, I.	DK	7.1
Showalter, R.K.	USA-D	24.1	Smeltzer, G.G.	CDN	6.1	Soria, J.	CR	1.1
Shulis, N.J.	USA-B	4.1	Smet, L.A.H.de	NL	5.1	Sosa, M.	PE	4.1
Shutak, V.G.	USA-A	16.1	Smillie, R.M.	AUS	10.1	Soto, M.	PE	6.3
Shykhuis, J.T.	CPN	32.3	Smit, C.J.	ZA	8.1	Soudain, P.	F	15.1
Slaens, B.	B	12.2	Smith, B.C.	CDN	23.1	Soule, J.	USA-D	24.1
Siddale, R.G.	GB	15.1	Smith, B.D.	GB	28.1	Southern, P.J.	AUS	41.1
Sieber, J.	D	27.15	Smith, C.B.	USA-B	15.1	Southey, J.F.	GB	16.1
Siebert, L.	D	12.14	Smith, C.R.	USA-B	16.1	Southwick, F.W.	USA-A	5.1
Siekierzyński, K.	PL	18.2	Smith, D.R.	GR	12.1	Sowell Jr., G.	USA-D	15.1
Sienkiewicz, M.	PL	18.2	Smith, D.W.	CDN	50.1	Spalding, G.	USA-K	2.1
Sievers, E.	D	9.14	Smith, E.V.	USA-D	38.1	Spangelo, L.P.S.	CDN	32.4
Sijs, C.	B	3.2	Smith, F.G.	GB	41.1	Sparks, D.	USA-D	11.1
Sik, Mrs. K.	H	1.2	Smith, G.	GB	17.1	Sparks, W.C.	USA-I	18.1
Silbereisen, R.	D	24.1	Smith, G.E.	USA-F	3.1	Sparnaay, L.D.	NL	12.8
Silbernagel, M.			Smith, G.L.	USA-H	11.1	Specht, C.H.	USA-B	8.1
J.	USA-J	5.1	Smith, H.C.	NZ	2.1	Specht, H.B.	CDN	6.1
Sillibourne, Miss			Smith, J.E.	USA-E	15.1	Spedaro, J.	USA-D	61.1
J.M.	GB	10.1	Smith, J.H.	AUS	14.1	Spek, J.van der	NL	12.5
Silván, A.	E	14.3	Smith, J.W.M.	GB	26.1	Spek, J.C.	NL	12.7
Silver, C.N.	NL	12.10	Smith, M.L.G.	GB	4.1	Spencer, D.M.	GB	46.1
Simmonds, M.J.	GB	30.1	Smith, M.S.	GB	27.1	Spencer, E.L.	USA-D	21.1
Simmonds, N.W.	GB	3.1	Smith, Miss M.W.			Spencer, E.Y.	CDN	30.1
Simms Jr., E.T.	USA-D	8.2	G.	GB	13.1	Spierings, F.H.		
Simón, J.	PE	6.1	Smith, Ora	USA-B	6.1	F.G.	NL	12.5
Simone, J.	F	5.1	Smith, P.F.	USA-D	33.1	Spijk, P.	NL	12.4
Simons, D.H.	AUS	25.1	Smith, P.G.	USA-K	7.1	Spiller, D.	NZ	1.2
	AUS	31.1	Smith, Miss P.M.	GB	26.1	Spithost, L.S.	NL	11.1
Simons, R.K.	USA-F	12.2	Smith, P.M.	USA-D	8.2	Spoelstra, P.A.	NL	12.7
Simpson, W.R.	USA-I	20.1	Smith, R.	USA-K	5.1	Sprent, P.	GB	10.1
Sims, C.	USA-F	8.1	Smith, R.J.	USA-K	15.1	Spruit, C.J.P.	NL	12.9
Sims, R.P.A.	CDN	32.2	Smith, R.L.	USA-I	9.1	Spurling, D.R.	AUS	26.1
Singer, Gertrud	D	13.1	Smith, T.A.	GB	46.2	Spurling, M.B.	AUS	25.1
Singletary, C.C.	USA-D	52.1	Smith, W.	USA-B	16.1	Spurr, A.P.	USA-K	7.1
Singleton, H.P.	USA-J	5.1	Smith, W.H.	GB	25.1	Spuy, J.E.van de	ZA	7.1
Singleton, V.L.	USA-K	7.1	Smith, W.W.	USA-C	3.1	StaaIduine, P.van	NL	12.3
Sink Jr., K.C.	USA-F	13.1				Stace-Smith, R.	CDN	64.1

Stadelbacher, G.				Stobiecki, T.	PL 13.1	Sugiyama, C.	J 19.2
J.	USA-C 4.1			Støen, J.	N 10.5	Sugiyama, T.	J 40.3
Staden, D.F.A. von	ZA 6.5			Stoffers, J.A.	NL 12.7	Suit, R.F.	USA-D 28.1
Staden, O.L.	NL 12.2			Stoffert, G.	D 12.5	Sullivan, C.Y.	USA-G 21.1
Stadler, J.D.	ZA 7.1			Stofford, G.R.	USA-J 11.1	Sullivan, D.T.	USA-H 16.1
Stafford, L.M.	AUS 21.1			Stokes, W.N.	USA-H 4.1	Sumbak, J.H.	AUS 39.1
Stahl, E.A.	USA-J 11.1			Stol, Ph.Th.	NL 12.4	Sumita, A.	J 19.1
Stakman, W.P.	NL 12.4			Stoll, U.	D 6.1	Sumitomo, A.	J 39.1
Stall, R.E.	USA-D 23.1			Stone, O.M.	GB 26.1	Summer, J.W.	USA-D 5.1
Stanford, G.	USA-M 3.2			Stone, Ruth	USA-B 10.1	Sunagawa, S.	J 13.1
Stanley, W.L.	USA-K 1.1			Stone, W.J.H.	USA-H 18.1	Sundheim, L.	N 10.5
Stant, M.Y.	GB 22.1			Stonebridge, W.C.	WAN 2.1	Sunding, A.M.	N 6.2
Stanton, D.J.	NZ 5.1			Storck, H.	D 27.4	Sunding, P.	N 6.2
Stapel, Chr.	DK 6.1			Storey, J.B.	USA-H 7.1	Surface, R.W.	USA-J 11.1
Staples, R.C.	USA-B 10.1			Storey, W.B.	USA-K 15.1	Suska, J.	PL 18.1
Starck, J.R.	PL 22.7			Storm Pedersen, J.	DK 5.8	Suski, Z.	PL 18.1
Stark, A.	USA-I 9.1			Stormon, J.O.	USA-G 15.1	Suszka, B.	PL 6.1
Stark, F.C.	USA-C 4.1			Storms, J.J.H.	NL 12.5	Sutherland, A.M.	GB 2.1
Starling, J.G.	USA-D 45.1			Storow, J.A.	GB 20.1	Sutherland, D.J.	USA-B 16.1
Staszek, I.	PL 14.1			Stortenbeker, C.W.	NL 3.1	Sutton, P.	USA-D 34.1
Staszewski.	PL 18.1			Story, R.L.	WAN 2.1	Suyama, T.	J 16.1
Staudennaier, Th.	D 9.6			Stothart, J.G.	CDN 54.1	Suzuki, H.	J 2.1
Stauning, A.	DK 5.1			Stott, K.G.	GB 28.1	Suzuki, K.	J 19.1
Stechman, E.	PL 15.1			Stotzky, G.	USA-B 8.1	Suzuki, M.	J 7.2
Steckel, W.	D 25.1			Stouffer, R.E.	USA-D 24.1	Suzuki, S.	J 40.9
Stecki, Z.	PL 6.1			Stout, B.B.	USA-B 16.1	Suzuki, T.	J 44.1
Stedman, R.L.	USA-B 14.1			Stoutemyer, V.T.	USA-K 12.1		J 1.1
Steed, J.N.	AUS 25.1			Stoutjesdijk, F.	NL 12.6		J 37.3
Steele, D.A.	GB 9.1			Stover, L.H.	USA-D 30.1		J 44.1
Steele, W.M.	WAN 2.1			St. Pierre, A.	CDN 13.1	Suzuki, Y.	J 40.8
Steen, T.N.	DK 3.1			Strachan, C.C.	CDN 63.1	Svejda, F.J.	CDN 32.4
Steele, R.L.	USA-C 3.1			Strachan, G.	NZ 1.1	Swain, G.S.	CDN 6.1
Steere, W.C.	USA-B 1.1			Strain, B.R.	USA-K 15.1	Swait, A.A.W.	GB 10.1
Steffens, R.	B 3.2			Straub, J.	D 17.1	Swardt, G.H.de	ZA 7.1
Steib, Th.	D 27.11			Streets, R.B.	USA-H 22.1	Swart, H.J.	ZA 2.1
Stein, M.	GB 34.2			Streissle, G.	USA-B 10.1	Swartwout, H.G.	USA-E 15.1
Steinbauer, C.E.	USA-C 3.1			Stretch, A.W.	USA-B 16.1	Sweep, A.A.N.	NL 11.1
Steinberg, M.P.	USA-F 12.2			Streu, H.T.	USA-B 16.1	Sweet, R.D.	USA-B 6.1
Steinbuch, E.	NL 12.2			Strickland, A.G.	AUS 25.1	Sweitzer, R.F.	USA-C 9.1
Steiner, A.A.	NL 12.1			Strickland, A.H.	GB 16.1	Swenson, K.	USA-J 14.1
Stellwaag-Kittler, F.	D 9.13			Strider, D.L.	USA-D 4.1	Swensson, O.	DK 5.8
Stembridge, G.E.	USA-D 8.2			Stringer, A.	GB 28.1	Swift, F.C.	USA-B 16.1
Stene, J.	N 7.1			Strobel, J.W.	USA-D 26.1	Swingle, H.D.	USA-E 3.1
Stenersen, J.	N 10.5			Strømme, E.	N 10.3	Swink, J.	USA-I 7.1
Stenseth, C.	N 10.5			Strommen, A.M.	USA-F 19.1	Sydow, E.v.	S 3.2
Stenning, L.	GB 22.1			Stroyan, H.L.G.	GB 16.1	Syer, Miss M.A.	CDN 37.1
Stenvers, N.	NL 12.2			Struble, F.B.	USA-H 3.1	Sykes, Miss P.	GB 10.1
Stephens, S.E.	AUS 15.1			Struchttemeyer, R.	USA-A 1.1	Sylvain, P.G.	CR 1.1
Stephenson, K.Q.	USA-B 15.1			A.		Sys, S.	B 4.1
Steur, G.G.L.	NL 5.1			Struckmeyer, B.		Sytsema, W.	NL 1.1
Stevens, J.M.	ZA 7.3			E.	USA-F 18.1	Szabó, I.	H 1.2
Stevens, L.P.	USA-C 10.1			Stryckers, J.	B 3.6	Szabo, S.	USA-B 10.1
Stevens, R.F.	USA-C 2.1			Strydom, D.K.	ZA 7.3	Szalay, F.	H 7.1
Stevenson, A.B.	CDN 37.2			Strydom, E.	ZA 6.3		
Stevenson, C.D.	AUS 14.2			Strydom, G.	ZA 6.3	Szalay Marzso, L.	H 1.5
Stevenson, E.C.	USA-F 9.1			Strydom, G.J.	ZA 6.1	Szász, I.	H 1.2
Steward, F.C.	USA-B 6.1			Strydom, J.C.	ZA 6.3	Szczepański, K.	PL 18.1
Stewart, A.D.	PF 6.2			Stuart, N.W.	USA-C 3.1	Szczygieł, A.	PL 1.1
Stewart, D.K.R.	CDN 6.1			Stubbs, R.W.	NL 12.5	Szczypieńska, E.	PL 3.1
Stewart, I.	USA-D 28.1			Studziński, A.	PL 13.1	Szelényi, G.	H 1.5
Stewart, I.W.	WAN 1.1			Stultz, H.T.	CDN 6.1	Szendel, J.	PL 9.1
Stewart, J.A.	CDN 63.1			Stupnicka, H.	PL 18.2	Szenes, Mrs.E.	H 1.3
Stewart, J.K.	USA-K 8.1			Stushnoff, C.	USA-B 16.1	Szent-Ivany, J.J.	AUS 41.1
Stewart, R.N.	USA-C 3.1			Styczynska, J.	PL 22.10	H.	
Stewart, W.S.	USA-K 2.1			Suber Jr., R.D.	USA-D 9.1	Szirmai, J.	H 1.5
Steyers, G.E.	USA-C 9.1			Suekane, T.	J 17.1	Szklarska, J.	PL 18.2
Steyn, P.A.L.	ZA 7.1			Sugawara, K.	J 17.1	Szmidt, O.	PL 22.10
Steyn, S.	ZA 6.1			Sugawara, H.	J 16.1	Szögi, J.	H 5.1
Stigter, H.C.M.de	NL 12.1			Sugawara, Y.	J 37.1	Szönyi, Mrs.A.	H 1.2
Stiles, H.O.	USA-A 10.1			Sugimoto, S.	J 31.1	Szpakowska, A.	PL 18.2
Still, G.W.	USA-F 7.1			Sugitani, T.	J 36.2	Szpond, W.	PL 23.1
Stinson, R.F.	USA-F 13.1					Szejda, W.	PL 18.2

Tabata, I.	J 23.1	Tanaka, H.	J 40.9	Terpó, A.	H 1.2
Tachibana, S.	J 12.2	Tanaka, K.	J 1.1	Terry, H.J.	GR 35.1
Tachikawa, K.	J 30.1		J 26.3	Teskey, R.J.F.	CDN 26.1
Tachikawa, T.	J 37.2	Tanaka, M.	J 3.2	Tew, R.P.	GB 10.1
Taconis, P.J.	NL 12.10		J 7.2	Teyema, Miss H.L.	NL 12.6
Tada, Y.	J 39.2		J 12.2	Thames, W.H.	USA-H 7.1
Taft, T.N.	USA-B 3.1		J 33.1	Thayer, D.P.L.	USA-D 20.1
Taga, T.	J 12.1	Tanaka, O.	J 21.1	Therrien, H.	CDN 18.1
Taguchi, A.	J 42.1	Tanaka, S.	J 7.1	Thibault, B.	F 1.1
Tahon, J.	B 2.7	Tanaka, T.	J 6.2	Thiele, G.F.	NZ 2.2
Takada, K.	J 19.1		J 37.1	Thiele, I.	ZA 7.1
Takada, M.	J 9.1	Tanaka, Y.	J 1.1	Thomas, D.de S.	ZA 3.1
Takagi, M.	J 19.5		J 3.1	Thomas, G.F.	GB 21.1
Takagi, R.	J 37.2	Tanigushi, T.	J 13.1	Thomas, G.G.	GB 46.3
Takagi, Y.	J 33.2	Tanno, S.	J 2.1	Thomas, L.A.	AUS 12.1
Takahae, K.	J 25.1	Tanzawa, H.	J 34.1	Thomas, W.D.E.	GB 28.1
	J 25.2	Tape, N.W.	CDN 32.2	Thomas, W.O.	USA-D 47.1
Takahashi, B.	J 40.1	Taper, C.D.	CDN 19.1	Thomas, W.P.	NZ 5.2
Takahashi, E.	J 4.2	Tarjan, A.C.	USA-D 28.1	Thompson, A.E.	USA-F 12.2
Takahashi, F.	J 12.1	Tarjányi, F.	H 1.2	Thompson, A.H.	USA-C 4.1
Takahashi, H.	J 25.1	Tarui, M.	J 26.3	Thompson, B.D.	USA-D 24.1
	J 25.2	Tarutani, T.	J 17.3	Thompson, F.C.	GB 46.3
Takahashi, I.	J 22.5	Tasaka, K.	J 40.9	Thompson, H.C.	USA-F 7.1
Takahashi, K.	J 16.1	Tasaki, M.	J 46.4	Thompson, H.J.	USA-K 12.1
	J 16.2	Taschenberg, E.		Thompson, H.S.	CDN 32.3
	J 36.2	F.	USA-B 3.1	Thompson Jr., J.	
	J 40.3	Tashiro, T.	J 19.1	E.	USA-H 20.1
Takahashi, S.	J 2.1	Tate, H.F.	USA-H 22.1	Thompson, J.M.	USA-D 13.1
Takahashi, T.	J 26.4	Tateishi, S.	J 26.4	Thompson, L.S.	CDN 4.1
Takahashi, Y.	J 2.1	Tatham, P.B.	GB 12.1	Thomson, A.	DK 6.1
	J 37.2	Tatsumi, T.	J 19.1	Thomson, A.D.	NZ 1.2
	J 38.1	Tatsumi, Y.	J 19.1	Thomson, J.R.	GB 11.1
	J 40.9	Taveirne, B.	B 11.1	Thomson, R.	NZ 4.2
Takai, T.	J 16.1	Taverne, R.	B 3.2	Thomson, R.W.	USA-K 15.1
Takakura, S.	J 30.1	Taylor, A.	CR 1.1	Thornberry, H.H.	USA-F 12.2
Takala, M.	FL 9.1	Taylor, A.A.	GB 41.1	Thorne, D.W.	USA-I 9.1
Takanashi, K.	J 19.1	Taylor, B.K.	AUS 24.1	Thorne, Miss P.	
Takano, T.	J 1.3		AUS 33.1	M.	AUS 41.1
	J 26.3	Taylor, C.F.	USA-B 15.1	Thorne, R.F.	USA-K 6.1
Takashima, S.	J 22.2	Taylor, D.G.	GB 11.1	Thorpe, R.H.	GB 9.1
Takasugi, K.	J 9.1	Taylor, G.	GB 22.1	Thorsrud, J.	N 5.1
Takata, M.	J 30.3	Taylor, G.A.	USA-B 16.1	Thorup, S.	DK 7.2
Takatori, F.H.	USA-K 15.1	Taylor, G.S.	USA-A 14.1		DK 9.1
Takatsuka, K.	J 19.1	Taylor, H.F.	GB 46.1	Thresh, J.M.	GB 10.1
Takayana, A.	J 46.2	Taylor, I.F.	GB 34.2	Thuesen, A.	DK 3.1
Takayanagi, Y.	J 33.2	Taylor, J.	GB 4.1	Thung, S.B.	NL 12.2
Takechi, F.	J 5.2		USA-D 13.1	Thygesen, T.B.	DK 6.1
Takeda, K.	J 19.5	Taylor, J.B.	NZ 1.2	Tibbitts, T.W.	USA-F 18.1
Takeda, Y.	J 26.3	Taylor, J.C.	CDN 26.1	Tichelaar, G.M.	NL 12.5
Takei, A.	J 1.1		USA-D 56.1	Ticknor, R.L.	USA-J 12.1
Takemae, S.	J 26.3	Taylor, J.W.H.	GB 15.1	Tiel, N. van	NL 12.10
Takeshita, O.	J 36.2	Taylor, M.E.V.	NZ 5.1	Tiesen, H.	CDN 26.1
Takeshita, S.	J 19.2	Taylor, O.C.	USA-K 15.1	Tilemans, E.M.	B 2.9
Takeuchi, S.	J 16.1	Taylor, S.	USA-I 9.1	Tilkin, V.E.	B 5.1
	J 21.2	Taylorson, R.B.	USA-D 19.1	Till, M.R.	AUS 25.1
Takeuchi, Y.	J 41.5	Teittinen, P.	FL 10.1	Tillema, T.E.	ZA 6.3
Takishima, I.	J 35.1	Teixeira, A.R.	BR 11.2	Tillge Avelen,	
Taksdal, G.	N 10.5	Teixeira Eiten,		Lise	DK 5.7
Talboys, P.W.	GB 10.1	L.J.	BR 11.2	Timberlake, C.F.	GR 28.1
Talsma, T.	AUS 6.1	Telford, H.S.	USA-J 6.1	Timm, H.	USA-K 7.1
Tamada, A.	J 29.1	Tengné, J.	S 9.1	Tims, E.C.	USA-D 54.1
Tamai, T.	J 5.3	Tenpas, G.H.	USA-F 16.1	Tindale, G.B.	AUS 23.1
Tamamura, K.	J 23.1	Tepe, W.	D 9.5	Tindler, W.A.	USA-D 15.1
Tamássy, I.	H 1.2	Terabun, M.	J 13.2	Ting, I.W.	USA-K 15.1
Tammen, J.	USA-B 15.1	Terami, H.	J 46.1	Tinga, J.H.	USA-C 11.1
Tamura, K.	J 40.9	Teramura, T.	J 22.4	Titus, J.S.	USA-F 12.2
Tamura, S.	J 37.3	Teranuma, T.	J 22.3	Tjallingii, F.	NL 12.5
Tamura, T.	J 7.2		J 45.1	Tod, H.	GB 11.1
	J 12.3	Terasmae, E.	CDN 26.1	Toda, H.	J 33.2
	J 29.1	Terblanche, J.A.	ZA 7.1	Toda, M.	J 19.1
Tanabe, S.	J 29.1	Tereshkovich, G.	USA-D 15.1	Todd, J.C.	GB 13.1
Tanaka, A.	J 41.3	Terley, W.R.	USA-D 7.1	Todd, J.M.	GB 11.1
Tanaka, J.	USA-M 3.2	Termohlen, G.P.	NL 11.1	Todd, S.H.	USA-C 4.1

Togano, T.	J	36.2	Trebouchet, G.	F	14.1	Uraki, M.	J	41.3
Togashi, D.	J	2.2	Trefois, R.	B	5.5	Urano, K.	J	26.2
Togura, T.	J	4.1	Tremaine, H.W.	CDN	64.1	Urchs, J.	D	27.9
Toit, P.P.du	ZA	7.2	Treshow, M.	USA-I	12.1	Ure, R.	USA-I	4.1
Tojyö, Y.	J	26.3	Trevett, M.F.	USA-A	1.1	Uriu, K.	USA-K	7.1
Toki, T.	J	4.1	Trickett, E.S.	AUS	6.1	Urushibara, K.	J	41.3
Tokimoto, T.	J	31.2	Trim, A.R.	GB	8.1	Uschdraweit, H.A.	D	5.8
Tokita, T.	J	19.1	Trinick, M.J.	AUS	41.1	Ushirozawa, K.	J	26.3
Tokumasu, S.	J	5.3	Trioreau, P.	F	13.1	Ushiyama, K.	J	19.2
Tokumitsu, T.	USA-B	10.1	Tromp, J.	NL	13.1	Usui, S.	J	37.1
Toler, R.W.	USA-D	19.1	Troost, G.	D	9.10		J	45.1
Tomala-Bednarek, J.	PL	22.2	Trout, S.A.	AUS	14.2	Utada, A.	J	19.1
Tomaszewski, M.	PL	6.1	Trowell, G.F.	GB	10.1	Utsumi, M.	J	27.1
Tomaszkiewicz, H.	PL	13.1	Trudeau, R.W.	USA-F	9.1	Utsumi, S.	J	19.1
Tomes, M.L.	USA-F	9.1	Truelsen, T.A.	DK	8.1	Uys, B.	ZA	7.1
Tometorp, G.	S	1.1	Trujillo, P.M.	USA-H	15.1	Uzo, J.O.	WAN	1.1
Tominaga, N.	J	37.1	Truscott, J.H.	CDN	37.1			
Tomita, E.	J	43.2	Truter, Miss J.	ZA	4.1			
Tomita, K.	J	6.2	Truter, W.	ZA	7.1	Vaagan, J.	N	10.3
Tomkins, J.P.	USA-B	6.1	Trzcinski, T.	B	5.3	Vaarama, A.	FL	16.1
Tomkins, R.G.	GB	25.1	Tubbs, F.R.	GB	10.1	Vacek, F.C.	USA-K	15.1
Tomlinson, J.A.	GB	45.1	Tucker, J.M.	USA-K	7.1	Vahl, E.von	D	14.1
Tomlinson, P.B.	USA-D	31.1	Tukey Jr., H.B.	USA-B	6.1	Vajna, Mrs.K.	H	1.5
Tomlinson, P.R.	WAN	2.1	Tukey, L.D.	USA-B	15.1	Valanne, Mrs.N.	FL	16.1
Tomona, T.	J	44.2	Tukey, R.B.	USA-F	9.1	Valentine, E.W.	NZ	5.2
Tomonaga, E.	J	30.1	Tulecke, W.	USA-B	10.1	Valerio, J.	CR	1.1
Tomosányi, P.	H	1.6	Tulloch, H.W.	AUS	30.1	Valette, J.	WAN	2.1
Toms, B.M.	GB	15.1	Turley, R.H.	CDN	62.1	Válio, I.F.M.	BR	11.2
Toms, H.N.W.	CDN	64.1	Turnbull, A.L.	CDN	23.1	Valk, G.G.M.van der	NL	12.4
Tonks, N.V.	CDN	62.1	Turner, Miss E.A.	GB	30.1	Valle, C.G.Del	USA-D	19.1
Tonnel, A.	F	12.1	Turner, J.	USA-B	10.1	Valle, J.E.	USA-E	7.1
Toole, V.K.	USA-C	3.1	Turner, J.T.	USA-D	38.1	Valset, K.	N	10.3
Toomey, M.J.	AUS	21.1	Turner, K.C.	CDN	46.1	Valverde, C.	PE	6.1
Toop, E.W.	CDN	52.1	Turner, N.	USA-A	14.1	Vance, B.F.	USA-G	18.1
Toovey, F.W.	GB	26.1	Turquand, Mrs.E.			Vandal, J.O.	CDN	13.1
Topolaski, L.D.	USA-B	6.1	D.	GB	24.1	Vandemark, J.S.	USA-F	12.2
Török, S.	H	1.3	Turnquist, O.C.	USA-G	6.1	Vandenbroeck, H.	B	7.4
Torfason, W.E.	CDN	55.1	Twardowski, K.	PL	18.3	Vandenboudt H.	B	3.2
Torgeson, D.	USA-B	10.1	Tweedy, B.	USA-B	10.1	Vanderlinden, L.	B	6.1
Torikata, H.	J	1.3	Twigg, B.A.	USA-C	4.1	Vanderwalle, R.	B	2.4
Torres, C.	PE	6.1					B	2.5
Tóth, E.	H	1.1	Ubels, E.	NL	12.5		B	2.8
Tóth, G.	H	1.2	Ubrizsy, G.	H	1.5	Vang-Petersen, O.	DK	7.2
Tóth, T.	H	1.2	Uchibori, H.	J	21.2	Vanhooren	B	12.2
Touzard, J.	F	6.1	Uchida, K.	J	14.1	Vanwetswinkel, G.	B	4.1
Townsend, J.L.	CDN	37.2	Uchida, M.	J	19.2	Vanwezer, J.	B	13.1
Townsend, L.R.	CDN	6.1	Udagawa, H.	J	41.3	Varga, A.	NL	12.9
Toy, St.J.	USA-K	5.1	Udo, A.	J	43.2	Vargas, H.	PE	2.1
Toyoda, T.	J	42.1	Udok, G.B.A.	WAN	2.1	Vargas, L.	PE	6.1
Toyota, I.	J	1.1	Ueda, Y.	J	28.1	Vargas, O.	PE	7.1
Toyama, S.	J	41.5		J	37.2	Vargas Saco, R.	PE	6.1
Toyama, T.K.	USA-J	5.1	Uematsu, J.	J	34.1	Varney, E.H.	USA-B	16.1
Tsuchimochi, T.	J	25.2	Uematsu, T.	J	9.1	Varseveld, G.W.	USA-J	14.1
Tsuchiya, H.	J	12.1	Uemoto, S.	J	7.3	Vas, K.	H	1.2
	J	26.3	Uemura, N.	J	22.1	Vasaasen, S.	N	10.3
Tsuchiya, K.	J	6.2	Ueno, H.	J	43.2	Vaughan, E.K.	USA-J	14.1
Tsuchiya, S.	J	16.1	Ueno, K.	J	19.3	Veale, J.A.	NZ	7.1
Tsuchiya, T.	J	6.2	Ueno, R.	J	36.2	Vedel, H.	DK	5.3
	J	37.2	Ueno, T.	J	23.1	Veen, H.	NL	12.1
Tsuda, M.	J	32.1	Ueno, Y.	J	35.1	Veinbrandts, N.	AUS	19.2
Tsugawa, C.	J	3.1	Ueyama, O.	J	30.3	Vejlby, K.	DK	5.4
Tsui, R.	USA-B	8.1	Ugolik, M.	PL	13.5	Veken, van der	B	2.7
Tsujimoto, T.	J	22.5	Ujje, T.	J	16.1	Vélasquez de Medina,	PE	6.1
Tsukamoto, J.Y.	CDN	65.1	Ukkelberg, R.G.	USA-D	18.1	D.	B	3.11
Tsukamoto, M.	J	13.2	Ulrich, R.	F	15.1	Veldman, R.	PE	3.11
Tsukamoto, S.	J	2.2	Umeda, S.	J	19.1	Velsen, R.J.van	AUS	39.1
Tsukamoto, Y.	J	22.3	Umeda, Y.	J	1.1	Venekamp, J.H.	NL	12.5
Tsuru, H.	J	27.1	Umemoto, T.	J	44.1	Venema, H.J.	NL	12.9
Tsuru, N.	J	33.2	Underwood, V.H.	USA-D	4.1	Venis, M.A.	CDN	30.1
Tsurushima, H.	J	40.9	Unruh, M.	PL	18.1	Venter, F.	D	27.2
Tsutsui, K.	J	42.1	Uota, M.	USA-K	8.1	Verheggen, E.	B	13.1
Tramier, R.	F	2.2	Upshall, W.H.	CDN	37.1	Verhey, E.W.M.	NL	12.7
			Urabe, S.	J	28.1			

Verhoeff, K.	NL	11.1	Wagner, J.R.	USA-K	1.1	Watanabe, T.	J	11.2
	NL	12.5	Wagner, R.	F	8.1		J	19.2
Verhoeks, J.L.	NL	12.9	Wain, R.L.	GB	27.1	Watanabe, Y.	J	30.2
Verity, D.	USA-K	12.1	Wain, R.L.	GB	46.1	Waterfield, A.E.	GB	18.1
Verkerk, K.	NL	12.9	Wakabayashi, S.	J	38.2	Waterfield, R.L.	USA-C	14.1
Verkinderen, A.	B	3.10	Waki, H.	USA-M	9.1	Watkins, D.A.M.	GB	28.1
Verlaet, J.G.	NL	2.1	Wakikawa, K.	J	39.2	Watkins, R.	CDN	32.4
Vervelde, G.J.	NL	12.3	Wakisaka, M.	J	19.3	Watson, A.G.	NZ	1.2
Vervier, R.	B	2.2	Wakizaka, I.	J	41.4	Watson, D.P.	USA-M	3.2
Vestheim, S.	N	10.3	Wako, M.	J	16.1	Watson, Miss J.	NZ	5.1
Vetter, K.	D	9.10	Waldo, G.F.	USA-J	14.1	Watson, J.P.	USA-B	4.1
Veyrat Garcíá, P.	E	5.1	Walker, D.E.	USA-B	15.1	Watson, W.L.	USA-C	15.1
Vickery, R.K.	USA-I	12.1	Walker, D.R.	USA-I	9.1	Watson, W.W.	USA-D	53.1
Vidal Barraquer, J.Ma.	E	3.3	Walker, Miss E.E.	NZ	1.2	Watt, B.J.	CDN	15.1
Vidalón, C.	PE	6.3	Walker, E.J.	CDN	32.3	Watts, A.V.	USA-C	13.1
Vidme, T.	N	10.5	Walker, J.	CDN	42.2	Watts, J.G.	USA-H	16.1
Viehmeier, G.	USA-G	22.1		GB	17.1	Watts, L.E.	GB	45.1
Vijlder, H.de	B	13.1	Walker, J.H.	GB	10.1	Watts, W.H.	USA-E	7.1
Vik, J.	N	2.1	Walker, J.M.	GB	26.1	Way, D.W.	GB	10.1
Villacosta, A.	PE	2.1	Walker, J.R.L.	NZ	5.1	Way, R.D.	USA-B	4.1
Villanueva, D.de	PE	6.1	Walker, J.T.	USA-B	8.1	Waywell, C.G.	CDN	26.1
Villiers, E.A.de	ZA	3.1	Walker, W.F.	AUS	36.2	Waxman, S.	USA-A	15.1
Villiers, O.T.de	ZA	7.1	Walkey, D.G.A.	GB	45.1	Weaver, G.M.	CDN	28.1
Villiers, S.F.de	ZA	3.1	Walkof, C.	CDN	40.1	Weaver, M.L.	USA-J	6.1
Vilmorin, M.de	F	14.1	Wall, E.T.	GB	15.1	Weaver, R.J.	USA-K	7.1
Vince, D.	GB	40.1	Wall, R.E.	CDN	28.1	Webb, A.D.	USA-K	7.1
Vine, Miss S.J.	GB	10.1	Wallace, D.H.	USA-B	6.1	Webb, R.A.	GB	28.1
Vines, H.M.	USA-D	29.1	Wallace, H.R.	AUS	28.2	Webb, R.E.	USA-C	3.1
Virág, J.	H	1.2	Wallen, V.R.	CDN	32.3	Webber, R.J.	AUS	19.1
Viscardi, K.	PL	18.2	Wallenburg, C.van	NL	5.1	Weber, J.H.	USA-H	19.1
Vise, C.	PE	2.1	Wallis, L.W.	GB	7.1	Webster, A.B.	NZ	3.2
Visnyovszky, Z.	H	7.1	Walschot, L.	B	3.2	Webster, G.	USA-K	7.1
Visser, A.C.	ZA	7.1	Walter, J.M.	USA-D	21.1	Webster, O.J.	WAN	2.1
Visser, H.	ZA	6.3	Walter, M.W.	WAN	2.1	Weeks, W.D.	USA-A	5.1
Visser, T.	NL	12.8	Walter, T.E.	GB	10.1	Wegenaar, C.	NL	12.7
Visser, W.C.	NL	12.4	Walters, Mrs.M.			Wegerek, W.	PL	13.1
Vissia, R.	NL	12.7	S.	USA-K	19.1		PL	13.2
Vital, D.M.	BR	11.2	Walters, W.E.	USA-D	21.1	Wehlburg, C.	USA-D	20.1
Vite, J.P.	USA-B	10.1	Waltham, C.S.	USA-E	11.1	Wehr, B.	D	5.7
Vittum, M.T.	USA-B	4.1	Walton, G.S.	USA-A	14.1	Weigle, J.L.	USA-G	18.1
Vittrup Christensen, J.	DK	7.1	Walton, P.D.	WAN	2.1	Weigman, F.H.	USA-D	54.1
Vivanco Guerao, I.	E	10.2	Walton, R.R.	USA-H	3.1	Weimberg, R.	USA-K	15.2
Vogelmann, A.	D	27.4	Wambecke, A.van	B	3.2	Weinberger, J.H.	USA-K	8.1
	D	27.5	Wand, W.F.	ZA	7.1	Weintraub, M.	CDN	64.1
Vogts, Mrs.M.M.	ZA	7.1	Wang, D.	USA-B	10.1	Weinstein, L.H.	USA-B	10.1
Voight, R.	USA-F	11.1	Wanic, D.	PL	12.1	Weir, T.S.	USA-G	3.1
Voipo, I.	FL	12.1	Wann, E.V.	USA-D	7.2		USA-G	6.1
Volk, N.J.	USA-F	9.1	Wanscher, J.H.	DK	5.1	Weisaeth, G.	N	10.3
Volz, E.S.	USA-G	18.1	Want, J.P.H.van der	NL	12.9	Weiser, C.J.	USA-G	6.1
Von, H.H.	USA-E	9.1		CDN	30.1	Weissenborn, K.	D	14.1
Vos, L.de	NL	12.2	Ward, E.W.B.	CDN	28.1	Weissich, P.	USA-M	3.3
Vos, Miss N.P.de	NL	9.1	Ward, G.M.	AUS	18.1	Welch, H.E.	CDN	23.1
Voss, A.	S	9.2	Ward, K.M.	NZ	3.1	Welch, J.E.	USA-K	7.1
Voth, V.	USA-K	7.1	Ward, Miss M.A.	USA-D	38.1	Welker Jr., W.V.	USA-B	16.1
Voûte, A.D.	NL	3.1	Ware, L.M.	GR	10.1	Welkie, G.W.	USA-I	9.1
Voysse, O.	PE	6.1	Warman, T.M.	USA-F	9.1	Wellensiek, S.J.	NL	12.9
Vozmediano Redal, J.	E	14.1	Warren, G.F.	USA-M	3.2	Weller, F.	D	24.1
Vrie, M.van de	NL	12.5	Warner, R.M.	USA-D	54.1	Welling, B.	DK	6.1
	NL	13.1	Wascom, B.W.	USA-L	6.1	Wells, D.A.	GR	41.1
Vries, H.C.P.de	NL	12.7	Washburn, R.H.	NL	1.1	Wells, P.A.	USA-B	14.1
Vukovich, L.	H	5.1	Wasscher, J.	NL	12.9	Welsh, M.F.	CDN	63.1
Vulsteke, G.	B	12.1	Wassink, E.C.	USA-B	16.1	Welvaert, W.	B	3.7
Vyncke, G.	B	10.1	West, R.F.	J	11.3	Wensley, R.N.	CDN	28.1
			Watahara, T.	J	5.2	Went, Miss J.	NL	3.1
Wada, H.	J	39.2	Watana, H.	J	24.1	Werckmeister, P.	D	9.6
Waddington, D.V.	USA-B	15.1	Watanabe, E.	J	4.2	Werken, H.van den	USA-E	3.1
Wadley, B.N.	USA-I	9.1	Watanabe, H.	J	12.1	Werner, F.G.	USA-H	22.1
Wadsworth, S.E.	USA-J	14.1	Watanabe, J.	J	32.1	Wernicke, R.	D	27.6
Waggoner, B.E.	USA-D	49.1	Watanabe, K.	J	29.1	Wertheim, S.J.	NL	13.1
Wagner, H.W.	CDN	37.2	Watanabe, S.	J	17.3	Wesenberg, R.G.	USA-I	9.1
				J	29.1	Wesseling, J.	NL	12.4
				J	44.2	Wesselius, J.S.	NL	12.9

Westbrook, C.J.	USA-E	6.1	Williams, A.M.	GB	7.1	Woltz, S.S.	USA-D	21.1
Wester, R.E.	USA-C	3.1	Williams, D.D.F.	USA-M	1.1	Womersley, J.S.	AUS	40.1
Westerveld, G.J.				USA-M	6.1	Wong Ley, F.	PE	7.1
W.	NL	5.1	Williams, D.W.	GB	11.1	Wood, B.M.	GB	5.1
Westgate, P.J.	USA-D	36.1	Williams, E.B.	USA-F	9.1	Wood, C.A.	GB	14.1
Westigard, P.	USA-J	17.1	Williams, G.R.	USA-C	16.1	Wood, C.B.	USA-C	11.1
Westle, C.B.	GB	30.1	Williams, H.	USA-K	2.1	Wood, C.E.	USA-A	7.1
Weston, E.W.	GB	27.1	Williams, K.	CDN	63.1	Wood, G.W.	CDN	9.1
Westwood, M.N.	USA-J	14.1	Williams, M.W.	USA-J	11.1	Wood, M.B.	GB	12.1
Wet, A.F.de	ZA	7.3	Williams, P.H.	USA-F	18.1	Wood, T.G.	NZ	5.2
Weydahl, E.	N	7.1	Williams, R.R.	GB	28.1	Woodbine, M.	GB	34.2
Weyland, H.	USA-G	18.1	Williamson, C.E.	USA-B	2.1	Woodbridge, C.G.	USA-J	6.1
Wharton, A.L.	GB	4.1	Willison, R.S.	CDN	37.2	Woodbury, G.W.	USA-I	19.1
Wharton, G.F.	USA-F	3.1	Willits, C.O.	USA-B	14.1	Woodcock, D.	GB	28.1
Wheatley, G.A.	GB	45.1	Wilner, J.	CDN	32.3	Woodfin, V.I.	USA-H	9.1
Wheeler, Jocelyn			Wilsenach, R.	ZA	2.1	Woodham, R.C.	AUS	20.1
M.	NZ	6.1	Wilski, A.	PL	13.1	Woodley, E.L.	CDN	33.1
Wheeler, S.S.	USA-I	3.1	Wilson, C.T.	USA-C	11.1	Woodruff, J.G.	USA-D	15.1
Whetham, Miss E.			Wilson, D.	GB	28.1	Woods, G.S.	ZA	7.1
H.	WAN	2.1	Wilson, J.D.	USA-F	7.1	Woodward, C.F.	USA-B	14.1
Whitaker, T.W.	USA-K	11.1	Wilson, J.F.	GB	10.1	Woodward, R.S.	USA-D	56.1
White, Dorothy,			Wilson, J.M.	NZ	7.1	Wooley, P.H.	USA-F	13.1
A.	USA-C	7.1	Wilson, J.W.	USA-D	36.1	Woolley, D.P.	USA-K	13.1
White, D.B.	USA-G	6.1	Wilson, M.L.	USA-H	16.1	Woolliams, G.E.	CDN	63.1
White, G.A.	CDN	30.1	Wilson, W.A.	USA-F	6.1	Workman, M.	USA-I	3.2
White, G.C.	GB	10.1	Wilson, W.F.	USA-D	60.1	Workman, R.B.	USA-D	25.1
White Jr., J.W.	USA-B	14.1	Wilson, W.H.	USA-B	15.1	Worley, R.	USA-D	19.1
White, J.W.	USA-B	15.1	Wilson Hoehne	BR	11.2	Wortman, S.	USA-M	3.4
White, R.A.J.	NZ	3.2	Wilton, B.	GB	34.2	Worthing, C.R.	GB	26.1
White, R.C.	GB	30.1	Wimberg, D.	E	9.1	Wouts, W.	NZ	5.2
White, R.G.	CDN	9.1	Winchester, J.A.	USA-D	20.1	Woycicki, S.	PL	22.5
White, T.K.	PE	6.2	Winckel, A.van	B	7.4	Woyke, H.	PL	22.9
Whitehead, V.B.	ZA	7.1	Wind, G.P.	NL	12.4	Woyke, J.	PL	22.6
Whitfield, A.B.	GB	10.1	Windecker, C.	USA-I	25.1	Wricke, G.	D	12.2
Whiting, G.C.	GR	28.1	Windham, S.L.	USA-D	47.1	Wright, D.S.G.	NZ	4.2
Whitner, B.F.	USA-D	36.1	Winoto Suatmadji,			Wright, D.W.	GB	45.1
Whitney, W.C.	USA-G	21.1	R.	NL	12.9	Wright, H.B.	NZ	1.1
Whittington, W.J.	GB	34.2	Winsor, G.W.	GB	26.1	Wright, J.R.	CDN	6.1
Whitton, L.	USA-I	11.1	Winspear, K.W.	GB	42.1	Wright, N.S.	CDN	64.1
Whitwell, J.D.	GB	24.1	Winstead, N.N.	USA-D	4.1	Wright, S.T.C.	GB	46.1
Wiackowski, S.	PL	18.1	Winter, B.de	ZA	6.1	Wucherpfennig, K.	D	9.12
Wicken, A.J.	NZ	2.2	Winter, E.J.	GB	45.1	Wyatt, I.J.	GB	26.1
Widmer, R.E.	USA-G	6.1	Winter, F.	D	24.2	Wyatt, R.E.	WAN	2.1
Widmoyer, F.B.	USA-H	16.1	Winter, H.F.	USA-F	7.1	Wyllie, H.G.	CDN	23.1
Wiebe, H.H.	USA-I	9.1	Winters, H.F.	USA-C	3.1	Wyman, D.	USA-A	7.1
Wiebe, H.J.	D	12.6	Winzer, W.	USA-G	23.1	Wynn, W.	USA-B	10.1
Wiebe, J.	CDN	37.1	Wirth, H.	D	20.1			
Wiebosch, W.A.	NL	2.1	Wishart, R.L.	AUS	25.1	Xenides, V.	ZA	7.1
Wienhaus, H.	D	9.6	Wisk, E.	USA-C	1.1			
Wienarska, J.	PL	9.1	Wislocki, S.	PL	13.1	Yagi, M.	J	37.1
Wiersma, J.H.	NL	12.9	Wiśniewska, J.	PL	18.1	Yagisawa, S.	J	40.5
Wierszyłowski, J.	PL	13.5	Wit, H.C.D.de	NL	12.9	Yakushiji, H.	J	30.2
Wierzbiicki, S.	PL	1.1	Witt, J.A.	USA-J	8.1	Yakushiji, K.	J	5.2
Wiese, I.H.	ZA	6.1	Wittwer, S.H.	USA-F	13.1	Yakuwa, T.	J	12.3
Wiggans, S.C.	USA-A	3.1	Włodek, J.	PL	18.1	Yamabe, K.	J	31.2
Wight, N.M.	GB	11.1	Wöhrmann	D	20.1	Yamada, A.	J	41.3
Wijk, H.P.D.van	ZA	5.1	Wojciechowicz, M.	PL	19.1	Yamada, B.	J	19.1
Wijnhoven, J.	B	7.1	Wojnarowska, P.	PL	13.1	Yamada, K.	J	23.1
Wilcox, G.E.	USA-F	9.1	Wojniakiewicz, A.	PL	18.1	Yamada, M.	J	3.1
Wilcox, J.C.	CDN	60.1	Wojniakiewicz, T.	PL	18.1		J	41.3
	CDN	63.1	Wojtkiewicz, A.	PL	23.1	Yamada, S.	J	37.1
Wilde, D.	B	3.8	Wojtkiewicz, W.	PL	23.1	Yamada, T.	J	32.1
Wilde, E.de	B	13.1	Wójtowski, F.	PL	13.2	Yamada, Y.	J	33.3
Wilde, J.J.F.E.de	NL	12.9	Wolf, E.A.	USA-D	20.1		J	37.1
Wiley, R.C.	USA-C	4.1	Wolf, J.	D	15.1	Yamaguchi, K.	J	5.2
Wilke, S.	D	16.1	Wolfe, H.R.	USA-J	11.1	Yamaguchi, M.	USA-K	7.1
Wilking, E.	D	21.1	Wolfe, J.S.	GB	42.1	Yamaguchi, S.	J	23.1
Wilkinson, A.T.S.	CDN	64.1	Wolfenbarger, D.			Yamaguchi, Y.	J	15.1
Wilkinson, D.G.	GB	25.1	A.	USA-H	13.1	Yamaguishi, N.T.	BR	11.2
Wilkinson, E.H.	GB	27.1	Wolfenbarger, D.			Yamakawa, K.	J	14.3
Wilks, J.M.	CDN	63.1	O.	USA-D	26.1	Yamamoto, H.	J	46.2
Willer, K.H.	D	13.1	Wolstenholme, B.			Yamamoto, K.	J	43.1
Williams, A.H.	GB	28.1	N.	ZA	4.1			

Yamamoto, M.	J 33.2	Yen, D.E.	NZ 6.1	Zadoks, J.C.	NL 12.9
	J 40.4	Yeo, D.	GB 43.1	Zagaja, S.W.	PL 18.1
Yamamoto, N.	J 37.1	Ymada, Y.	J 6.2	Zagaja, W.	PL 18.1
Yamamoto, R.	J 31.1	Yokoi, M.	J 4.2	Zahara, M.B.	USA-K 7.1
Yamamoto, S.	J 37.1	Yokoi, S.	J 3.2	Zajdler, Z.	PL 18.1
	J 43.2	Yokomizo, H.	J 16.1	Zalewski, W.	PL 18.1
Yamamoto, T.	J 27.2	Yokomizo, T.	J 19.2	Zaliwski, S.	PL 9.1
Yamamoto, Y.	J 21.2	Yokota, K.	J 26.3	Zamorski, C.	PL 22.2
	J 39.2	Yokoyama, J.	J 22.5	Zandvoort, R.	NL 12.10
Yamamura, B.	J 43.2	Yokozawa, Y.	J 28.2	Zattler, G.	PE 3.1
Yamanaka, A.	J 38.1	Yoneda, K.	J 40.1	Zaumeier, W.J.	USA-C 3.1
Yamanaka, T.	J 5.2	Yonemura, K.	J 1.1	Zavaleta, A.	PE 6.3
Yamane, K.	J 8.1	Yoneyama, K.	J 41.3	Zawadzka, B.	PL 18.1
Yamane, M.	J 41.4	Yoneyama, S.	J 14.1	Zawadzka, B.	PL 22.5
Yamane, Y.	J 16.1	Yoneyama, Y.	J 16.3	Zawadzki, Z.	PL 15.1
Yamano, I.	J 14.4	Yoshida, M.	J 19.1	Zaylskie, J.J.	USA-G 11.1
Yamaoka, S.	J 37.2	Yoshida, T.	J 14.4	Zderkiewicz, T.	PL 9.1
Yamasaki, K.	J 7.2		J 26.3	Zdyb, H.	PL 8.1
Yamasaki, S.	J 43.2	Yoshida, Y.	J 16.1	Zeeuw, D.de	NL 12.6
Yamashita, S.	J 43.2	Yoshihara, C.	J 11.1	Zeeuw, D.J.de	USA-F 13.1
Yamashita, T.	J 22.5	Yoshihara, Y.	J 25.1	Zeiger, D.C.	USA-D 3.1
Yamashita, Y.	J 41.3	Yoshiike, T.	J 16.2	Zeilinga, A.E.	NL 12.8
Yamato, H.	J 39.2	Yoshikuni, T.	J 18.2	Zelitch, I.	USA-A 14.1
Yamato, M.	J 7.2	Yoshimura, E.	J 20.2	Zender, J.	PE 6.3
Yamato, T.	J 27.2	Yoshimura, M.	J 33.1	Zielinski, Q.B.	USA-J 14.1
Yamatsu, K.	J 37.2	Yoshinaga, K.	J 19.1	Zielonko, A.	PL 22.8
Yamaya, K.	J 12.1	Yoshinaga, N.	J 21.2	Zilai, J.	H 1.2
Yamazaki, T.	J 2.1	Yoshioka, M.	J 5.2	Zimmer, K.	D 12.15
	J 12.1		J 33.2	Zimmerman, C.S.	USA-F 4.1
Yamazaki, Y.	J 33.2	Yoshiyama, H.	J 45.1	Zimmerman, R.	USA-C 3.1
Yamazoe, G.	BR 11.3	Young, D.A.	CDN 9.1	Zimmermann, Helena	D 12.6
Yanase, H.	J 16.1	Young, H.J.	ZA 3.1	Zimmermann, L.	BR 11.2
Yang, H.Y.	USA-J 14.1	Young, H.N.	USA-C 11.1	Zink, F.W.	USA-K 7.1
Yano, R.	J 6.2	Young, H.W.	USA-D 35.1		USA-K 16.1
Yasuda, I.	J 31.3	Young, J.O.	USA-G 21.1	Zinno, M.	J 5.2
Yasui, A.	J 28.2	Young, L.C.	CDN 9.1	Zitnak, A.	CDN 26.1
Yasui, H.	J 7.2	Young, R.A.	USA-J 14.1	Zmarlicki, C.	PL 18.1
Yasui, K.	J 31.3	Young, R.E.	USA-A 11.1	Zonneveld, I.S.	NL 5.1
Yasukawa, J.	J 26.3	Young, R.S.	USA-C 8.1	Zsoldos, L.	H 1.2
Yasunobu, Y.	J 19.2	Young, T.W.	USA-D 26.1	Zubeckis, E.	CDN 37.1
Yates, A.R.	CDN 32.2	Ystaas, J.	N 4.1	Zuilen, E.J.van	NL 5.1
Yatomi, F.	J 45.3	Yuda, E.	J 37.5	Zwet, T.van der	USA-D 51.1
Yaya, R.	PE 4.1	Yūkura, Y.	J 40.2		USA-D 55.1
Yazima, K.	J 27.1	Yumura, H.	J 31.1	Zwick, R.	USA-J 16.1
Yeates, H.F.	USA-D 44.1			Zych, C.C.	USA-F 12.2
Yeatman, J.	USA-C 3.1	Zachariae, A.	D 6.1	Zyl, H.J.van	ZA 7.1
Yee, W.	USA-M 3.2	Zacher, Z.	H 1.3	Zyl, J.A.	ZA 7.2