

Horticultural research in the Netherlands: changes and challenges for 2010

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Abstract

Major shifts in world economy, society and technology will cause dramatic changes in Dutch horticulture and in the attitude of the government towards research.

The horticulture industry will change from a production-driven to a customer-driven strategy while developing market-oriented product chains. More than ever, knowledge becomes a critical factor in competition. In contrast with the past, the horticulture industry will protect knowledge to increase its profitability.

The government will choose to focus on basic sciences, leaving applied research mainly to the industry. This is a major shift since the government used to be responsible for most research. Complete institutional research programmes are no longer state-financed; instead, a system of financing research programmes by competitive bids is being developed. The government is also restructuring the infrastructure of agricultural research. Breakthroughs in science and technology will have strong effects on how the industry will develop. The more important ones are described.

In the future, research institutes will act in a competitive environment with great uncertainties. The knowledge market used to be dominated by governments, but will be dominated by internationally active private enterprises.

Both management and researchers will take more customer-oriented attitudes. Research institutes will need to develop strategies to survive under these circumstances. Some possibilities are discussed.

It is concluded that horticultural research will change. Instead of focusing on plant production, it will include many more disciplines and multi-disciplinary collaboration in agreement to the information flow in product chains. The horticulture industry will have to decide whether separate horticultural stations for applied research should remain and what kind of work must be done in the future.

1. Introduction

Horticulture has been a rather successful sector in the Netherlands. The basis for its international reputation is the existence of innovative growers and entrepreneurs, the co-operative habit and the support of an effective system of research, extension and education in agriculture. Today the system is rapidly changing because of major shifts in economy and society, government attitudes and resources available for research.

This paper will discuss the possible consequences of these changes for agricultural research in the Netherlands, specifically horticultural research and will present an overview of the transformation process in the Dutch agricultural research system. It will be argued that policy-makers, research managers and researchers have to cope with new challenges for research in the next decades of the 21st century.

2. Shifts in world economy and society

Major shifts in economy, society and technology create new dimensions and challenges for the world community (Naisbitt et al., 1990). Economic liberalisation, mass-individualism in society and a revolution in information and communication technology (ICT) really change existing relations between countries, communities, enterprises and individuals. Traditional trade-barriers gradually disappear, greater freedom of enterprise across borders, increased accessibility to different locations and extremely quick communication possibilities offer new challenges not only to multinationals but also to small companies and individuals. Global networks and interdependencies will develop, supported by ICT. Relations may globally intertwine on all levels (Van Oosten, 1998).

At the same time and as a result of the same trends, international competition will intensify everywhere, even on home markets. Competition on costs will remain important, but much more important will be the ability to create differences in markets and make effective use of differences between local markets and individuals. The pressure of international competition will lead to remarkable scaling up of companies. Differentiation implies a need for a continuous stream of new products and production processes. It requires a culture that stimulates innovation. Especially, it requires a dedicated marketing strategy and a thorough knowledge of markets and consumer preferences as well as the continuous changes in these preferences.

These major shifts above seem to be dominant world-wide. On the other hand, paradoxical developments can be detected everywhere. For example, globalisation may cause some standardisation of procedures, products and attitudes, but it is also the reason why many people in local communities look for local identities and differentiation, at least in parts of the Western world.

Whereas the World Trade Organisation (WTO) negotiate about freer world-trade conditions, regional trade unions of countries spring up everywhere. It is still questionable whether the formation of the European Union will contribute to free world trade. It is clear that trade within the EU will be freer than before, but how will it develop at the borders? Economic liberalisation is also criticized because of the dominance of strong economies and companies over weaker ones and because of its social and ecological implications. It is a matter of discussion whether governments, companies and supranational trade organisations like the WTO should include social and ecological aspects in their negotiations.

3. Changes in Dutch horticulture

From producer orientation to customer orientation

For many decades Dutch horticultural producers have been able to compete on national and international markets by supplying products of good, standardized quality at low costs. Initially, they developed a strong export position in fresh vegetables. Later on, in the sixties, floriculture came up which is now by far the most important branch of horticulture. Market forces such as price and quality have been mostly responsible for the fact that growers changed to other types of crop (for example from lettuce to tomato; from tomato to sweet pepper; from vegetables to flowers or green plants).

The strong position of the co-operative growers organisation continued for many years, but it made them less sensitive for 2 major changes in the market: the growing purchasing power of retailers and changing consumer habits. This was especially the case for food products, such as fruit, vegetables and mushrooms. Consumers in important markets went away from the standard Dutch products and preferred other, sometimes exotic products that better suited their desires. At the retail side, a process of increasing scale and consolidation of positions could be observed, leading world-wide to a small number of very powerful players. Retailers were able to purchase more products at their conditions in different production areas around the world. A new era was emerging under the pressure of free markets.

Changing consumer preferences and the countervailing power of retailers combined forces to cause a serious crisis in the Dutch industry. It proved very difficult to recognize these changes and to develop strategies to cope with new market conditions. This raised important questions about the future of Dutch horticulture, especially for vegetables, fruit and mushrooms. Would they be able to withstand the competitive pressure of growers from other production areas in Europe or even elsewhere in the world? What were the competitive advantages of the Dutch industry, what the weaknesses? And how might this eventually change?

The crisis led to the insight among growers, that a customer-oriented attitude is necessary to survive in the near future. The results of this strategic process have been twofold: a dramatic reorganization of growers' organisations and an open mind to go along with new ideas about market differentiation and to create more value for customers.

The culture of ornamentals, on the other hand, keeps extending. The main reasons can probably be found in its ever extending and rapidly changing assortment, the high and reliable quality standards, and relatively low costs and a still lacking concentration of

demand. Growers and their organisations are actively renewing their marketing methods in agreement with market developments and changing customer behaviour.

Customer demand: mass individualisation

Processes such as those occurring in vegetable growth and sales may also be observed in other agricultural production sectors. Essentially, they are not different from those in other economic sectors. A major driving force here is a phenomenon called *mass individualisation* (Papenhuijzen, 1998). It implies that it is no longer feasible to assume that there is some sort of standard demand by standard consumers; instead, the demand as a whole is individualized and thus differentiated. Each consumer will try to satisfy his or her individual needs (Meulenbergh, 1996). For the growers, it implies a huge turnabout in their thinking about production. After all, the goal is no longer to bring to the market a quality product meeting standard specifications, but rather to tune into hugely differentiated needs emerging at the market (Steenkamp, 1996). In the distant past, growers produced custom-made products for their clients, but industrial production generally put an end to this. It became possible to produce much less expensive and standardized products by following fixed specifications. This episode is now followed by the return of custom-made goods for the benefit of individual clients, although industrial methods of production will be applied. In horticulture, a similar development will go on, implying that differences within and between markets should not be ignored or destroyed, but rather seen as a challenge to make the best use of differences between markets and clients. Instead of being static objects, customers will demonstrate constantly changing preferences. This will require a great deal of flexibility in order to adjust to continuously changing market conditions.

Developing new agro-chains

For many decades, co-operative associations of growers have been working to everyone's satisfaction. They had a common interest: selling their product at the highest price possible. The auction system played a significant role in all this. The sales channel was a primary interest of all growers: sales were organised collectively in fixed quality levels, thus making it impossible to identify individual growers. As a result, quality differences between growers were kept hidden from the outside world.

In the future it will become necessary to create vertical structures rather than horizontal partnerships dominated by growers, i.e. that relations are organized based on a market orientation including consumers, retail, trade, production, seed growing and plant-breeding businesses (Van Roekel et al., 1998; Taylor, 1996). Production will be market-directed, while growers will be reliable suppliers of specified products delivered at pre-set

prices and quality levels. This may imply that specifications made by the market will exercise great pressure on growers to produce certain types of products.

The current change in the Netherlands is the transformation of the grower-oriented sales apparatus into a market-oriented organisation called 'The Greenery'. Many co-operatives have a share in the new organization. It is supposed to develop a method for selling its products that is in agreement with the market.

Globalisation of enterprises

Dutch horticulture has been strongly export-minded. However, the greater part of all exported goods remain in Europe: globalisation is mainly "Europeanization" (Bijman et al., 1997). But the European market is far from uniform. The future will require that local consumer needs are recognized and satisfied, meaning greater differentiating in marketing research and actual investments in local markets. In the industrial sector it can be observed how multinational enterprises install themselves in local markets all over the world. They do not do this to sell uniform products, but rather to take advantage of local differences and to develop locally needed networks (Bijman et al., 1997; Van Oosten, 1998).

In horticulture, too, a process of internationalization has been going on. The clearest signs can be found at the beginning and at the end of specific chains: the seed industry and retail trade. Only a decade ago, there was still a wide plethora of small, independent plant breeding businesses; today, many of them have been incorporated into a few companies of global stature that operate on an international level. As for the latter, most of them are not of Dutch origin (Heybroek et al., 1996). This is a strong indication of how trade and industry are increasingly growing international, in the Netherlands as well. Retail trade presents a similar picture.

The same process is also developing at the producer side, albeit more gradually: an increasing number of Dutch growers has branches in several places throughout Europe or even in the world. Thus, an increasing number of horticultural production businesses is establishing branches world-wide. In doing so, apart from production, other functionalities (e.g., trade, retail supply) are frequently added to the company. A broadening of commercial activities will be the result. This will certainly lead to the emergence of global networks of various links within specific chains. Their objective will be to operate in various markets. This will mean that chain building will stop being a national phenomenon and that it will become quite normal for *cross-border chains* to develop.

Knowledge as a competitive factor

Within Dutch horticulture, knowledge about products and production methods was considered to be a totally freely accessible good. As a result of their co-operational manner of organization, growers used to be colleagues rather than competitors. This open character and the free exchange of knowledge has strongly contributed to a swift diffusion of knowledge, new insights and innovations. This would certainly apply to the knowledge of products and production processes. Producers from all quarters of the world have benefited from that openness.

However, as soon as a market is not only defined by cost prices but also by significant differences between competitors, knowledge suddenly acquires different meaning. In that case, it turns into a strategic resource in fighting competition. And openness will be changed into secrecy, contracts, protected information and taking the best advantage of one's knowledge positions (Enzing, 1997; Van Oosten, 1998).

These considerations are being given ample attention. Groups of producers growing specific types of crops do not release their knowledge without stipulating conditions; rather, they use their expertise to optimize their own products. This has resulted in international alliances of producers in order to be able to offer certain types of products all year round. It will be clear that there is more involved here than knowledge about technological aspects of products and production processes. It also involves knowledge about markets, clients, social developments, international logistics networks, technological developments, distribution, etc. A modern production company needs a great deal of information that is not normally part of the standard package of horticultural research. Indeed, entrepreneurs will look beyond the borders of horticulture to find new developments that may be relevant to their commercial activities.

4. Changes in Dutch government policy

National governments also change their policies as a result of economic liberalization, globalisation, blurring national borders and, as was the case in Europe, establishing completely new trans-national relations. Through deregulation processes and by encouraging initiatives and commitment among market parties and individuals the economic development is given fresh impetus. Government authorities pull back, offering market parties and individuals more room to show initiative while at the same time actively promoting that social actors take responsibility (Jacobs, 1997; Verkaik, 1997; Van Oosten, 1998).

In the Netherlands, the national government has always contributed to a strongly developed agro-sector (including horticulture) by encouraging that authorities, private enterprise and knowledge institutes co-operate and exchange knowledge and information. During several decades, this policy was based on the fact that it was thought to be a primary interest that the population was assured of having food. A second reason was supporting export. Today, the idea has emerged that in this area government authorities should leave more room to the parties at the market. The Dutch government is seeing the agro-sector more as a normal economic sector and is focussed on accomplishing public goals, for example employment and income for its citizens and high-quality living conditions. In doing so, economic and ecological sustainability are being used as directing principles. Nevertheless, it is also in this more general perspective that the agro-sector is considered to be an important part of the national economy. Actually, it is a national asset. This implies that the government will make a great effort to encourage that this asset is further developed and is provided with a more distinct profile.

This becomes manifest in government activities to ensure that agricultural research and information meet all requirements of our modern day. The government will also behave more as a client because she needs knowledge for own policy-making on public themes.

As a result, structures and relations in the Dutch agro-knowledge complex are also changing drastically (Roseboom et al., 1998; Rutten, 1997). The government has also started a thorough reorganization of agricultural research with the ultimate goal to develop strong specializations in order to claim international top-level positions. To this end, it has been decided to integrate all public institutes for agricultural research into a single organization, i.e. the Knowledge Centre Wageningen. It includes the Agricultural University of Wageningen, various institutes of the Agricultural Research Department and some of the applied research stations. The Agricultural University of Wageningen has already combined

the departments of agriculture and horticulture into a single department called 'plant growing'.

The government is developing methods for funding research, technology and innovation processes in enterprises. As far as research is concerned, the government's financial efforts are focussed specifically on strengthening the area of basic research. In addition, the government intends to emphasize that trade and industry have their own roles to play; consequently, government subsidies will not be the only means to sponsor initiatives in basic research. Increasingly, it will be government and private enterprise combined who will be developing pre-competitive multidisciplinary research programmes of high scientific quality with potential ripple effects on trade and industry. Private enterprise will make substantial economic contributions to these types of programmes.

More than ever, applied research will become the responsibility of private enterprise. Studies on enterprise level will be entirely left to trade and industry. The public extension services for agriculture and horticulture have been completely privatized.

Many policy-making options are defined at a European level rather than on a national level. Dutch groups compete for projects using quality and collaboration as their line of approach, particularly in research. European framework programmes usually require fundamental perspectives and/or multidisciplinary lines of approach. Thus it can be said that, both nationally and on a European level, the dominant approach in research is thematic while crossing boundaries between crops rather than horticultural.

5. Dynamics in science and technology

Several developments in science and technology will be of great significance to the development of horticulture industry during the next few decades. Four of them are discussed below.

◆ *Dynamics in molecular biology (Van Kammen, 1997)*

Fundamental breakthroughs in molecular biology combined with a revolution in molecular technology have made it possible to make drastic innovations in vegetable production. New opportunities have emerged for all those disciplines that play relevant roles in plant research, plant growing and production capacity, although many basic issues are still in need of better understanding. A key issue in this respect is, I believe, how the operation of plant genomes is affected by molecular structures. Breakthroughs in three areas will result in useful applications and even now many amazing examples can be cited:

- *plant development biology.* There will be a growing understanding of the mechanisms directing plant development processes while the relation between genotype and phenotype will be better understood. This may contribute to designing plants with desirable characteristics.
- *plant-pathogenic interactions.* Plant resistance and defence mechanisms to ward off pathogens will be better understood, resulting in new strategies to protect plants against pests and diseases.
- *regulation of metabolic routes in plants.* One of the effects of a more adequate understanding will be that molecular techniques will be used to manipulate the metabolism of plants in such a way that new compounds are produced with greater efficiency.

◆ *Dynamics in information and communication technology (Meuleman et al., 1997)*

As a result of today's revolution in information and communication technology previous communication patterns will change completely. The huge amount of space-time compression will enable all businesses and individuals to contact others all over the world without having to overcome physical distances. With great speed new global networks are emerging, requiring new types of knowledge and skills.

Companies with several branches will have better possibilities to control internal communications and management. The same applies to communications with suppliers and clients. New possibilities will also develop for logistics and distribution, providing methods for efficiently controlling information and product flows. It will be possible to control production at several locations world-wide from a single site, while establishing links with market parties anywhere in the world. This means that product and information streams will be separated, which may have great potential effects on flow control. Production may become more footloose than it is today, with potential implications for shifting production sites all over the world. Available options will lead to completely different relations between growers and clients, while setting strict quality requirements for delivery world-wide. These developments will be sufficient both to intensify strongly the process of internationalization and to encourage entrepreneurs to take a more international perspective.

Computing powers and information-processing capacities will increase enormously in computers. One of the effects will be that unprecedented innovations may be conceived at plant, crop and product levels. The 'speaking plant' concept is illustrative of this new perspective. Other examples include the huge possibilities of data control for crop management and product quality management.

◆ *Dynamics in new chain concepts (Van Roekel et al., 1998)*

When demand-controlled chains are developed, producers will be required to command different types of knowledge and skills than they used to have. Continuous exchange of information will be required between partners in the chain and it will be essential to optimize and control this flow of information. The ultimate goal is to create added value for clients in all conceivable functions, including marketing (larger product ranges, product differentiation, brands, public relations), service (quality care, packaging, presentation, certification, logistics, production and delivery planning) and relation management (contracts, meeting commitments, being an active partner in thinking about product-market combinations, etc.). For entrepreneurs this implies the necessity to expand their knowledge of products, production methods, business organization, chains and markets. And to develop their skills in being alert, fast and flexible when responding to changing demands made by the market.

◆ *Dynamics in health-food relations and production ecology*

The relation between food and health is mentioned with increasing frequency. More specifically, positive health effects are attributed to certain dietary elements such as vegetables, fruit and soja products (Van de Brandt, 1997). It is assumed that certain

categories of 'bio-active' substances are responsible for those effects, e.g. flavonoids, polyphenol compounds and carotenoids. Bio-active substances in food are materials that do not make any energetic contributions while having favourable effects on human health and performance in small concentration.

However, the chemical reactions of bio-active substances are highly complex and it is often difficult to make adequate interpretations. Still, they constitute a potentially highly interesting field of study, particularly for horticulture since vegetables and fruit are frequently referred to in this respect.

Production ecology involves the integration of discipline-specific knowledge at system level. Increased production levels accomplished by influencing geometric or physiological characteristics of plants are almost complete. Fresh opportunities will develop as soon as plant characteristics may be modified by applying molecular technologies. If traditional production ecology is expanded by adding biological methods of crop protection this may result in the next agro-ecological revolution (Rabbinge, 1997).

6. Needs and expectations for horticultural research

The arena of knowledge institutes is changing rapidly. What is happening is that a knowledge market dominated by government authorities is turning into a knowledge market where internationally active enterprises will become the stronger parties. The government will act both as an architect to strengthen basic sciences and as a customer in need of knowledge on public themes. This requires radical changes in attitudes taken by both research directors, managers and researchers (Verkaik, 1997; Rutten, 1997; Van Oosten, 1998). Knowledge institutes will be increasingly forced to work in a competitive environment where they have to compete for projects from governmental agencies and private enterprises (through 'competitive bids'). At the same time, provisional partnerships will emerge, designed to carry out multidisciplinary projects and programmes. Even now, many examples of this combination of competitiveness and collaboration can be found in efforts to obtain EU assignments and they are expected to increase when efforts are made to acquire orders from international organizations and multinationals. It will also be essential for knowledge institutes to realize the value of their knowledge positions as a resource of strategic importance while distinguishing themselves at the market by showing a strong portfolio that is continually renewed.

At the same time, trade and industry will be changing drastically because new, partly international product chains will emerge and the interests of individual companies will be emphasized. The traditional orientation of acquiring knowledge about plants or crops will no longer suffice. It will also be necessary to have solid knowledge of markets, chains and technologies while being able to respond to new developments with great speed and resilience.

Research focussed to horticulture will have to adjust to a highly broadened demand for knowledge by the private sector of horticulture. As a result, both the management and the research staff of knowledge institutes will have to acquire entirely different research attitudes. Knowledge institutes are faced with the strategic challenge of repositioning themselves. Three future roles may be considered (Verkaik, 1997):

- *source of knowledge creation*: they manage to present themselves as internationally recognized, top-level institutes or university departments for scientific research in specific areas. They are successful in attracting both national and international funds to sponsor basic research. Their strong scientific position will also be the basis for establishing commercial contacts with private enterprise. Generating knowledge continues to be their primary focus.

- *co-operating innovator*: specific types of knowledge and skills are used to anticipate clients' wishes, taking part in clients' innovation processes. This means that the researcher should be willing and able to take part in design processes of new products, production methods and business systems that are directed and managed by their clients. In particular, they will have to develop skills to respond with creativity and effectiveness to issues and questions raised by clients.
- *knowledge broker*: in the competitive knowledge market of the future, it will be necessary for knowledge institutes not only to make the most of their knowledge, but also to find, to mobilize and to combine the right areas of knowledge for the benefit of their clients. In each case, problem-oriented consortia of research groups will have to be swiftly developed. This requires a thorough understanding of the knowledge and qualities available in research groups scattered all over the world.

Each of these roles requires different types of scientific expertise, skills and attitudes regarding scientific research and customers. The challenge of the future will be to select the best position and to develop the right core competence and the adequate client orientation.

References

- Bijman, W.J.J., R. van Tulder and M. van Vliet. 1997. (Agribusiness, R&D and internationalization: internationalization strategies of agribusiness firms and their implications for the firms' knowledge management). NRLO report no. 97/12 (English summary).
- Brandt, P.A. van der, 1997. (Bio active nutrition in relation to cancer) In: Bio-actieve componenten in voeding. Verslag van een workshop. NRLO rapport nr. 97/16 (in Dutch).
- Enzing, C.M., 1997. (Research institutes and internationalization: position of agro research institutes in the international market for knowledge). NRLO report nr. 97/14 (english summary).
- Heybroek, A.M.A., E.M.L. de Schutter and A.F. van Gaasbeek 1996. The world seed market. Rabobank Utrecht, the Netherlands.
- Jacobs, D., 1997. (Government, R&D and internationalization: space for national policy in science, technology and innovation within the agribusiness). NRLO report 97/13 (english summary).
- Kammen, A. van, 1997. (Dynamics in science and technology: Molecular plant biology). NRLO report nr. 97/36 (english summary).
- Meuleman, J. and P. van Weel 1997. (Dynamics in science and technology: agrophysics, information and communication technology in crop production). NRLO report nr. 97/24 (english summary).
- Meulenbergh, M.T.G. 1996. De levensmiddelenconsument van de toekomst. Essay in: Markt en consument 2010. NRLO rapport 96/4. (in Dutch).
- Naisbitt, J. and P. Aburdene (1990). Megatrends 2000. The new directions for the 1990's. Morrow and Co., Inc. New York
- Oosten, H.J. van 1998. Globalisering en agribusiness. NRLO rapport nr. 98/2 (in Dutch; english translation june 1998)
- Papenhuijzen, J.M.P. 1998. Markt en consument, NRLO rapport nr 98/3 (in Dutch; english translation june 1998)
- Rabbinge, R. 1997. (Dynamics in science and technology: Plant production systems and production ecology). NRLO report nr. 97/37 (english summary).
- Roseboom, J. and H. Rutten 1998. The transformation of the Dutch Agricultural Research System. World Development (in press).
- Roekel, J. van, and C. Broekmans. 1998. The new role of growers' organisations in market oriented added value chains. 2nd international symposium of ornamental plant growers. Mexico, January 28 - 30, 1998 (in press).

- Rutten, H., 1997. Coping with turbulence: strategies for agricultural research institutes. NRLO report nr. 97/27.
- Steenkamp, J.E.B.M., 1996. Markets and marketing strategies for Dutch agribusiness in 2010. In: (Market and consumer in 2010). NRLO report 96/4.
- Taylor, J.F. 1996. Influences shaping the international food chain: the next 100 years. In R.G. Goldberg (ed.): Research in domestic and international agribusiness management. Volume 12: 115-139.
- Verkaik, A.P., 1997. (Challenges and concepts for future agricultural research policy). NRLO report 97/17 (english summary)

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