

## **6 The Herbarium Vadense and its contribution to economic botany of the tropics**

**P.C.M. Jansen**

### **6.1 Introduction**

The scientific study of plants directly or indirectly utilized by man is commonly named 'economic botany'. Direct usage can be domestic, commercial or ornamental; indirect usage includes the need of man's livestock and the maintenance of the environment. Economic botany is multidisciplinary and includes besides purely botanical disciplines like taxonomy, ecology, physiology, cytology and biochemistry also certain aspects of agriculture, forestry and horticulture concerned with the propagation, cultivation, harvesting, manufacture and economics of production and marketing, and certain ethnobotanical aspects (Wickens, 1990).

Only in the second half of its existence (since around the 1950's), Herbarium Vadense was considerably enlarged with collections of tropical plants, after H.C.D. de Wit had been nominated professor at the Wageningen Agricultural University (WAU) to teach plant taxonomy and plant geography of the tropics and subtropics. Professor de Wit realized very early on that the quickly growing WAU, where a large practical impact was evident, sooner or later would call him to account for the significance of plant taxonomy for other university disciplines. Although it is a scientifically sound statement that taxonomic research of the wild flora is basic to all other plant sciences, he knew that in a world of agronomists, plant breeders and foresters such an explanation would not be accepted as sufficient. Applied botanical research and economic botany were needed and would also have the future in terms of financial grants. Therefore, since the beginning of tropical taxonomy at WAU, economic botany has always played a modest but constant role in the research programmes and not rarely it were projects on economic botany in Africa that also made it possible to collect for the study of the general flora of Africa and vice versa.

Economic botany research at the Department of Plant Taxonomy has always been based on the following principles:

- The identity of the plants studied should be checked thoroughly.

- Type specimens should be consulted and voucher specimens should be deposited in the herbarium and referred to in the publications.
- The correct names of the plants should be used and nomenclatural problems should be solved as far as possible.
  - The botanical aspects of the research should be studied profoundly. The plants should be described based on original measurements and observations, and compared with existing literature, from seedling to seed, including morphology, phenology, variability and distribution. Illustrations should be based on original material if possible.
  - Non-botanical data (ethnobotanical aspects, vernacular names, uses, preparations, cultivation, etc.) should be collected in the field and compared with data from the literature.
  - The research results should become available by publication in books or periodicals.

Tropical economic botany at the Dept. of Plant Taxonomy has been mainly effected for Africa and South-East Asia. For Africa work concentrated on pulses, oil producing plants, spices and condiments, medicinal plants and vegetables. For South-East Asia work is mainly concentrated on participation in the Plant Resources of South-East Asia (PROSEA) programme.

## **6.2 Economic botany in Africa**

Between 1965 and 1977 Herbarium Vadense was enriched with about 30,000 Ethiopian plant specimens, collected all over Ethiopia by staff members, students and cooperators of WAG. In the same period a project, coded NUFFIC-LHW/2 and financed by NUFFIC (Netherlands University Foundation for International Cooperation) and DGIS (Directorate General for International Cooperation, Netherlands Ministry of Foreign Affairs), was executed which aimed to survey the useful plant resources of Ethiopia. This project has been the largest economic botany contribution for Africa by Herbarium Vadense. The project was a cooperation between the Alemaya College of Agriculture (being the Faculty of Agriculture of the Addis Abeba University) and the Departments of Plant Taxonomy and Tropical Crops of the Wageningen Agricultural University. During the 7 years of the project, the home-base of the Dutch participants in Ethiopia was the College of Agriculture at

Alemaya, where housing and working facilities were provided and where also the Ethiopian counterparts Dr. Tadessa Ebba and Dr. Amare Getahun were stationed. Besides doing the work for the project, the Dutch cooperators also headed the Alemaya herbarium and participated in botany teaching at the College. Four main surveys were produced: on the pulses by Westphal (1974), the agricultural systems by Westphal (1975), the spices, condiments and medicinal plants by Jansen (1981; Fig. 30) and on oil plants by Seegeler (1983). Mainly due to political circumstances in Ethiopia, field work had to be terminated in 1977.



Fig. 30. Dr. P.C.M. Jansen botanizing.

Various other economic botany projects were carried out by staff members and students in a wide range of other tropical African countries. A short overview of these economic botany activities in Africa, ordered by subject and subdivided by country, is presented below.

### 6.2.1 Pulses (Ethiopia)

In 1974, Westphal finalized his work on the pulses with a PhD thesis entitled: 'Pulses in Ethiopia, their taxonomy and agricultural significance'. This was the first result of the NUFFIC-LHW/2 project on Ethiopian useful plants, after fieldwork in Ethiopia from April 1967 to August 1968.

After introductory chapters on the physical and biological environment, the agro-ecological regions in which Ethiopia can be divided, the agricultural systems and some taxonomic problems with special reference to 'cultivar' taxonomy, the book deals with 19 papilionoid crops, roughly in accordance with the guidelines as indicated above.

Although seemingly obvious, Westphal had the brilliant idea to collect seed and other plant material offered for sale at the numerous local markets in Ethiopia. By growing those samples in Alemaya and in Wageningen and collecting all relevant stages for the herbarium, this proved to be a quick and reliable method, besides collections directly made in the field, to obtain a wide survey of the diversity and variability of Ethiopian useful plants. Westphal's successors followed similar methods.

A key based on general characteristics and a key on seed characteristics precede the thorough treatments of the 19 major pulse crops in the book. All species are illustrated with one or several original botanical full page drawings and all distinguished cultivars are illustrated by a black and white photograph of the seed. Some important Ethiopian pulses (all Leguminosae) are:

*Cicer arietinum* L. (chickpea). The most important pulse crop of Ethiopia (also of the Middle East and India). Based on the morphology and colour of the seed for Ethiopia 7 cultivars were designated.

*Pisum sativum* L. (pea). Westphal distinguished cultivar (cv.) group Abyssinicum with 4 cultivars and cv. group Sativum with 6 cultivars for Ethiopia.

*Phaseolus vulgaris* L. (common bean). Based on colour and shape of the seed, 33 cultivars can be distinguished in Ethiopia.

### 6.2.2 Oil plants (Ethiopia)

In 1983, Seegeler published his PhD thesis as a result of the project on Ethiopian useful plants (NUFFIC-LHW/2). It was entitled:

'Oil plants in Ethiopia, their taxonomy and agricultural significance'. Fieldwork had been carried out in Ethiopia between July 1971 and December 1973.

After cereals and pulses oil plants are the third major component of Ethiopian agriculture. The seeds are a major source of energy and protein. Although data from the literature are conflicting, it is estimated that about 700,000 ha oil crops are cultivated annually in Ethiopia. Seegeler treats 12 species elaborately, 11 species get a shorter treatment and in a long list of 20 pages numerous other oil containing species are surveyed in tabular form only.

The long and short treatments follow roughly the guidelines mentioned above and the set up is comparable to the pulses treatment of Westphal. Many species are illustrated with a full page botanical drawing or with a photograph. Specific attention has been given to the ecology with special subparagraphs on temperature, water, soil and light. Very useful for surveying markets is a table of 321 market places all over Ethiopia indicating on which day(s) of the week the market is held. Two remarkable species are:

*Cordeauxia edulis* Hemsley (Leguminosae; vernacular names: sulei, mogollo). A very interesting 3 m tall shrub, growing in the hot dry climate of a limited area of Somalia and adjoining Ethiopia. The plant can live for more than 200 years. It starts flowering just before the first rains fall and, depending on the amount of rain, the fruits can develop in less than 2 weeks. As soon as the rains cease, fruit formation stops immediately, the ovaries are not shed but remain dormant for 4–5 months and attain maturity in about one week as soon as the next rain falls. The seed is eaten raw, roasted or cooked, having a sweet agreeable taste and they contain a yellow oil. From its leaves a tea is brewed and the extract is also used as a dye.

*Guizotia abyssinica* (L.f.) Cassini (Compositae; trade name: niger seed). The most important oil crop of Ethiopia, estimated to be cultivated annually on 400,000 ha producing 260 million kg seed. The oil extracted from the seed is the prime supplier of cooking oil. It is pale yellow with a faint odour and a sweetish taste, consisting for about 70% of linoleic acid. Besides for cooking, the oil is also used for anointing the body, for adulterating more valuable oils and medicinally to control birth and to treat syphilis (cooked with spices). Refined oil is used for soaps and paints, for lighting, and for cleaning machinery.

### 6.2.3 Spices, condiments (Ethiopia, Cameroun)

#### Ethiopia

As a result of the project on Ethiopian useful plants (NUFFIC-LHW/2) Jansen published in 1981 his PhD thesis: 'Spices, condiments and medicinal plants in Ethiopia, their taxonomy and agricultural significance'. He performed fieldwork in Ethiopia from April 1975 to July 1977. In his book he described 12 spices (condiments) which really occur in Ethiopia (wild or cultivated) in detail, and in a long table many other species are listed. For Ethiopians, the significance of spices can hardly be over-estimated as they always enter the sauce ('wot') in which the bread (in the form of a pancake: 'enjera') is dipped before being eaten. The more sorts of spices are added to the 'wot', the more it is appreciated.

The treatment of the 12 spice-species is similar to the treatments of the Ethiopian pulses by Westphal in the same project. Some spices worth mentioning are:

*Aframomum corrorima* (Braun) Jansen (Zingiberaceae; trade name: korarima; Fig. 31). An aromatic, rhizomatous, indigenous Ethiopian mountain forest species bearing glossy red fruits containing packets of somewhat angular, brownish seeds. The seeds have a mild sweet aroma and taste, and are used to flavour all kinds of wots, butter and coffee. Their quality is better than the seeds of the better known Grains of Paradise or Melegueta pepper (*Afra-momum melegueta* (Rosc.) K. Schum.) from West Africa.

*Anethum foeniculum* L. and *Anethum graveolens* L. (Umbelliferae; trade names: fennel and dill respectively). Seeds of fennel and dill can be found on every market in Ethiopia, often mixed also with cumin (*Cuminum cyminum* L.), and are popular spices to flavour all kinds of dishes. Jansen concluded that fennel and dill belong to the same genus; nevertheless fennel remains better known as *Foeniculum vulgare* Miller.

*Rhamnus prinoides* L'Hér. (Rhamnaceae, trade name: buckthorn, gesho). In Ethiopia, the leaves and branches of this shrub have a function like hops for beer, to prepare alcoholic beverages like 'talla' (beer) and 'tedj' (a kind of honey drink).

#### Cameroun

In 1980, Westphal et al. published: 'A conspectus of spices in Cameroon'. This study is part of a much wider survey of the edible

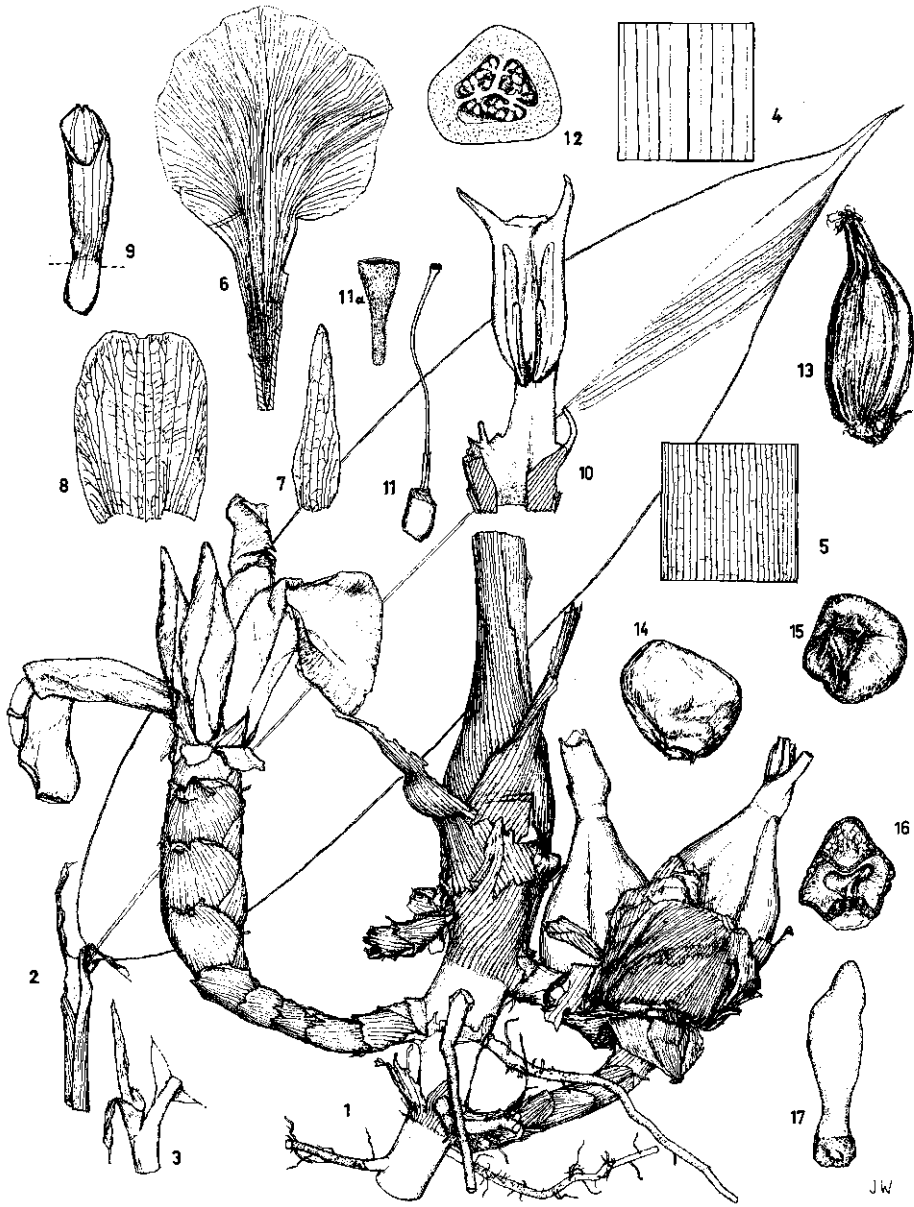


Fig. 31. Drawing with many plant details of *Aframomum corrorima* (Braun) Jansen.

plants of Cameroun, a project undertaken by Westphal et al. in the period 1975–1979 at the National Advanced School of Agriculture at the University Centre of Dschang. Spice specimens and samples were collected in gardens, fields, markets and from the wild all over Cameroun, and, sometimes after being grown to obtain all relevant stages, deposited in the WAG and YA herbaria. The Wageningen Dept. of Plant Taxonomy also assisted in identifying the species. Although more than 50 spices were found in Cameroun, in this publication only 30 have been described and the others are listed in tabular form. Many species are illustrated with black-and-white photographs. In Cameroun, the spices are mainly used to add flavour to various sauces, like the yellow sauce for taro, meat or fish sauces, vegetable sauces and a peculiar sauce called 'nkui', prepared from the branches of *Triumfetta cordifolia* A. Rich., producing a sticky mucilaginous fluid to which numerous spices are added and which is eaten with couscous of maize. Like everywhere in Africa, *Capsicum* peppers are the most important spice, but Cameroun shows a remarkable wealth of wild spice species. Some notable species are:

*Scorodophloeus zenkeri* Harms (Caesalpinoideae; vernacular names: olom (bark), doumka (seed)). An up to 30 m tall tree, of which the scaly older bark and the seeds are used to give a garlic flavour to the 'nkui' sauce.

*Parkia biglobosa* (Jacq.) R.Br. ex G. Don (Mimosoideae; vernacular names: African locust bean, néré). This up to 20 m tall tree produces fruits with edible pulp and its seeds are decorticated, crushed and left to ferment, dried, rolled to balls or sticks and, having a penetrating odour, used to flavour sauces.

*Dorstenia scabra* (Bureau) Engl. (Moraceae; vernacular name: afousi). A 1 m tall herb from West and South Cameroun. The red-brown roots are dried, crushed and used to flavour sauces.

#### 6.2.4 Vegetables (Benin [Dahomey], Côte d'Ivoire, Cameroun)

##### Benin (Dahomey)

Since 1963 the 'Centre de Formation Horticole et Nutritionnelle de Ouando' was established in southern Benin to promote horticulture and to improve nutrition in Benin. G.J.H. Grubben was project leader of NEDERF (Fondation Néerlandaise pour la Création de Jardins Familiaux) in this Centre from 1968–1972 and Director of the Centre from 1972–1973. Besides his duties as project leader and director, Grubben did much research on the leaf vegetables of



Dahomey and was assisted in this work by trainees from Dutch Universities (e.g. van der Zon, Jansen, Siemonsma).

In 1975 Grubben published his PhD thesis entitled: 'La culture de l'amarante, légume-feuilles tropical', based on his research in Benin. The collective name amaranth comprises all species and cultivars of the Amaranthaceae that are used as leaf vegetable (mainly *Amaranthus cruentus* L., *A. dubius* Mart. ex Thell., *A. tricolor* L. and *Celosia argentea* L.). His PhD is a thorough study of this important group of vegetables dealing with a wide variety of subjects such as cultivation in Benin, consumption and food value, botany and geography, cultivation methods and breeding. Especially for the chapter on botany the Dept. of Plant Taxonomy was involved. A full page botanical drawing for each of the 5 major species accompanies a thorough overview of the taxonomy of those species, vouchers of which were deposited in WAG. A key facilitates identification.

In 1976 van der Zon and Grubben published the book: 'Les légumes-feuilles spontanés et cultivés du Sud-Dahomey' as a follow-up of the work in Benin. After a short introductory chapter with details on e.g. nutritional value, cultivation and commercialization of the leaf vegetables, and the vegetation of southern Benin, the book presents alphabetically 69 species used in Dahomey as leaf vegetable. All species were collected, identified, stored in WAG and described and illustrated by van der Zon at the Dept. of Plant Taxonomy. Many wild species are eaten as a leaf vegetable and sometimes also sold at local markets. Some much appreciated wild leaf vegetables in Benin are: *Crassocephalum rubens* (Juss. ex Jacq.) S. Moore (Compositae), *Croton lobatus* L. (Euphorbiaceae), *Emilia praetermissa* Milne-Redhead (Compositae), *Erigeron floribundus* (Kunth) Sch. Bip. (Compositae), *Justicia anselliana* (Nees) T. Anders. (Acanthaceae), *Stachytarpheta angustifolia* (Mill.) Vahl (Verbenaceae) and *Vitex doniana* Sweet (Verbenaceae).

A most remarkable plant is *Fleurya aestuans* (L.) Gaud. ex Miq. (Urticaceae): its leaves can be eaten as a vegetable but are also used to treat ulcers, and above all, it is a sunshine plant possessing secret powers to stop the rain. *Peperomia pellucida* (L.) Kunth (Piperaceae) is the counterpart: it can be used to start the rain.

### Côte d'Ivoire

From the 1950's to the 1990's WAU had its 'Centre Néerlandais' near Abidjan, Côte d'Ivoire, domiciled at the French ORSTOM

Institute, to enable students and scientists to do research under tropical circumstances. The Dept. of Plant Taxonomy has always been well represented at the Centre, and many persons performed plant taxonomic research there and deposited collected specimens in WAG. Siemonsma (Dept. of Tropical Crops, WAU) was director of the Dutch Centre between 1976 and 1980. In 1982 he published his PhD thesis entitled: 'La culture du gombo (*Abelmoschus* spp.), légume-fruit tropical (avec référence spéciale à la Côte d'Ivoire)'. His thesis represents a thorough study of okra in all its aspects and Siemonsma paid much attention to the botanical part, for which he deposited numerous voucher specimens in WAG.

### Cameroun

Between 1975 and 1979 J.M.C. Stevels studied and collected traditional vegetables in Cameroun and worked out her data at the Dept. of Plant Taxonomy. In 1990 she published her PhD thesis: 'Légumes traditionnels du Cameroun, une étude agro-botanique'. The study deals with 67 traditional vegetables, of which 20 species are discussed in greater detail. Differential keys to groups of species and to individual species, based on characteristics of the edible product, are supplied. Introductory chapters deal a.o. with agro-ecological regions of Cameroun and nutritional aspects. The treatments of the 20 species are thorough and roughly follow the above-mentioned guidelines. Many species are illustrated with detailed original botanical drawings and black-and-white photographs. Voucher specimens have been deposited at WAG. Some remarkable species are:

*Vernonia amygdalina* Del. (Compositae; vernacular name: bitter-leaf). This shrub, up to 4 m tall, is widespread in tropical Africa, and in Cameroun its leaves are a popular vegetable. At higher altitudes, *V. hymenolepis* A. Rich. is used in a similar way.

*Gnetum africanum* Welw. & *Gnetum buchholzianum* Engl. (Gnetaceae; vernacular names: okok, koko). The leaves of these two very similar-looking lianas are used as a vegetable in Cameroun. The 2 species can be distinguished by their different male inflorescences.

*Abelmoschus caillei* (A. Chev.) Stevels & *A. esculentus* (L.) Moench (Malvaceae; vernacular names: okra, gombo). The young fruits of these species are very popular as a vegetable and sometimes the leaves are used as well. *A. caillei* has been discovered by Siemonsma in Côte d'Ivoire as an okra species different from *A. esculentus* but it has been named by Stevels (Fig. 32).



Fig. 32. *Abelmoschus caillei* (A. Chev.) Stevels, a new species described by J.M.C. Stevels.

### 6.2.5 Medicinal plants (Côte d'Ivoire, Ethiopia, Moçambique, Sénégal)

#### Côte d'Ivoire

Between May and December 1973 Mrs E. Visser did anthropological work amongst the Ando people in Côte d'Ivoire and concentrated on collecting information on wild and cultivated food plants and medicinal plants. In 1975 she published the information on the latter as: 'Plantes médicinales de la Côte d'Ivoire'. Voucher specimens were deposited in WAG where also final identifications were made. In Côte d'Ivoire Mrs Visser was assisted by the Wageningen taxonomist De Koning, director of the 'Centre Néerlandais'. Mrs Visser included in her publication data on plants collected by De Koning. After an introductory part, the publication comprises a survey of the collected plants, arranged alphabetically by family and within family by genus and species. Of each species the vernacular Ando names and the medicinal and other uses are described and several species are illustrated with a botanical drawing. A lot of interesting information is presented. It is remarkable, for example, that the Ando people classify some useful plants in a much more detailed way than botany does. For the yams they distinguish 42 varieties, botanically classified into 2 species only (*Dioscorea cayenensis* Lamk & *D. rotundus* Poir.); one could imagine, however, that the Ando varieties can be botanically considered as cultivars. Less useful species, however, are not differentiated by the Ando people; for example the botanically very different species *Hoslundia opposita* Vahl (Labiatae), *Lantana camara* L. (Verbenaceae), *Momordica cissoides* Planch. ex Benth. (Cucurbitaceae) and *Passiflora foetida* L. (Passifloraceae) are not individually distinguished by name and collectively called 'bird-food'. The Ando people do not separate sharply the natural and spiritual worlds; as a consequence, in their view medicinal plants lose their power if not applied properly.

#### Ethiopia

In his thesis of 1981 on Ethiopian useful plants Jansen also treated medicinal plants, 13 in a detailed way, in a format similar to his treatments of the spices, and in a table numerous other species are listed. Ethiopia still has a rich medicinal plant lore, because about 85% of the population is not reached by modern medicine. It is

amazing that '... almost all plants of the Ethiopian flora are used somewhere somehow medicinally'. Some remarkable plants are:

*Catha edulis* (Vahl) Endl. (Celastraceae; vernacular name: chat).

This shrub of 2–6 m height (seldom a tree up to 25 m tall) is a good source of income for the Ethiopian Hararge Province where it is cultivated widely by smallholders. Besides being considered as a panacea (curing 501 diseases), chat is much more a stimulant. Fresh young leaves and twigs are chewed (ca 500 g, 2 hours of chewing), making the chewer feel excited, strong, and not hungry. It has become a daily necessity for many people in East Africa and South–Arabia to chew chat, and because fresh parts are preferred, chat is quite expensive due to high transportation costs. It is not considered as a drug to which one might become addicted. Nevertheless, many people cannot live without it (just like tobacco), and, when used in too large quantities, harmful effects may result. Ethiopia and Yemen are the main producers of chat, consumers are mainly Moslems in East Africa and southern Arabia.

*Hagenia abyssinica* (Bruce) J.F. Gmelin (Rosaceae; vernacular name: kosso). Tea made from the dried female flowers of this up to 20 m tall tree is used as a powerful anthelmintic in Ethiopia, especially to expel tape worm. It is a strong medicine, and dangerous when used in excess dosages. In the past, every Ethiopian had his 'kosso day' once every 1–3 months.

*Phytolacca dodecandra* L'Hér. (Phytolaccaceae; vernacular name: endod). The roots and fruits of this common lianescent shrub are used to cure venereal diseases, to induce abortion, to heal wounds and the berries are commonly used as soap to wash clothes. The saponin present in the berries is also a powerful snail killer and much research has been devoted to this activity to find a cheap method to kill bilharzia-transmitting snails.

### Moçambique

In the period 1980–1985 Jansen worked in Moçambique to make a survey of the Moçambican medicinal plants. He started a series of books, together with his Moçambican colleague Orlando Mendes, on the 'Plantas medicinais, seu uso tradicional em Moçambique', of which 5 were completed but only 4 have been published up to now. In each book the plants are presented alphabetically by family and within the family by genus and species. Every species is illustrated with a full page drawing and a map of its distribution in Moçam-

bique. Due to political circumstances the work could not be completed. In total about 150 species were treated (all species from Acanthaceae to Compositae). Some remarkable species are:

*Sclerocarya caffra* Sond. (Anacardiaceae; vernacular names: canho, tsula). This up to 18 m tall tree is considered in Moçambique as the 'Queen of all trees' because from its fruits the popular drink 'bukanye' is prepared. The tree is very common all over Moçambique and it always fruits unbelievably rich in October–December. From the flesh of the rather small fruits a nice sweet–sour soft drink, or, after distillation, a strong alcoholic beverage is prepared. One can imagine that in those months the atmosphere in the country side is often gay and high–spirited. The soft drink is very healthy, containing up to four times more vitamin C than orange juice.

*Strophanthus kombe* Oliv. (Apocynaceae; vernacular names: utsulo, kombe). The seeds of this liana are very poisonous and used as arrow poison wherever they occur. Medicinally the seeds are highly valued and internationally traded – they contain the glucoside strophanthin which is used to prepare medicines against heart diseases.

*Warburgia salutaris* (Bert. f.) Chiov. (Canellaceae; vernacular name: chibaha). The roots and bark of this 10 m tall tree of southern Africa is widely used to cure fevers (malaria) and especially throat diseases. Because of its popularity as medicine, the tree is threatened by extinction as stripping the bark and cutting the roots kills the trees.

At the 14th International Botanical Congress in Berlin, 24 July – 1 August 1987, a special session was devoted to medicinal plants. During this symposium Angelina Maite presented a paper on some medicinal Malvaceae of Moçambique. In Moçambique, Mrs Maite had been supervised and guided by Jansen and De Koning to prepare a MSc thesis on medicinal Malvaceae of Moçambique. Unfortunately, the promising and skilful scientist Mrs Maite was cowardly killed together with her husband by RENAMO soldiers in May 1992.

### Sénégal

Ms Lieke van der Steur collected ethnobotanical information in eastern Sénégal from June to December 1991. She stayed 7 months amongst the people of which she wanted to study the traditional medicinal system, learned their language and by gaining their

confidence she succeeded in collecting very useful ethnobotanical information. In 1993, she published a MSc thesis entitled: 'Les plantes médicinales de Gouloumbou, Sénégal-Oriental, une recherche ethnobotanique intégrée'. In this study anthropological, botanical and pharmacological data are given and 64 medicinal plant species are described and illustrated. Vouchers have been deposited at WAG. A summary of the botanical and medicinal information was published in 1994. Unfortunately, Lieke died by an accident on Crete (Greece), where she was working on medicinal plants, and with her a much promising and capable ethnobotanist passed away.

#### *6.2.6 Miscellaneous subjects*

##### Agricultural systems in Ethiopia

In 1975 Westphal & Westphal-Stevels published the book: 'Agricultural systems in Ethiopia'. This book provides a wealth of background information for the work on the useful plants of Ethiopia (NUFFIC-LHW/2 project). It treats the agricultural systems in Ethiopia: the seed-farming, ensat-planting and pastoral complex and shifting cultivation. Numerous photographs, tables and maps contribute to its usefulness. From the viewpoint of the economic botanist, especially chapter 8 is interesting, in which a checklist of about 400 useful Ethiopian plant species is presented in tabular form, alphabetically by their scientific name with family name, vernacular names, uses and references to the sources of information. Chapter 7 presents an overview of plant products that can be encountered on markets.

##### Ethnobotany of the Wagenia (Kisangani, Zaire)

In 1976 Bokdam & Droogers published: 'Contribution à l'étude ethnobotanique des Wagenia de Kisangani, Zaire'. A very interesting study, giving much information on the Wagenia, a tribe of about 7000 people living along the river Zaire near Kisangani, who live from fishing and gathering wild plants. The authors especially collected information on the names and uses of 110 plant species, of which voucher specimens have been deposited in WAG.

The information on the plants is given by family (alphabetically) and within the family alphabetically by genus and species. Numerous photographs and botanical drawings contribute to the attractiveness of this publication.

## Vernacular plant names in Moçambique

In 1993 De Koning published the 'Checklist of vernacular plant names in Mozambique'; a very useful publication for everybody working with Moçambican plants. The list has been compiled from all available sources and gives about 7000 names, arranged in two ways: alphabetically by the vernacular name referring to the scientific name and alphabetically by the scientific name and listing the vernacular names by language.

## Other publications

Since the Dept. of Plant Taxonomy focused on Africa, numerous taxonomical publications of the staff and cooperators appeared, especially on African Loganiaceae, Apocynaceae, Dichapetalaceae, Begoniaceae, Connaraceae and Gramineae (see Literature list elsewhere in this publication). Most of these publications also contain directly or indirectly valuable information for and on African economic botany. The taxonomic support of staff members and of the Herbarium Vadense for authors on African economic botany has been very important but too numerous to mention here separately.

## **6.3 Economic botany in South-East Asia**

Although there is no direct connection between the Herbarium Vadense and work on economic botany in South-East Asia, staff members of the Dept. of Plant Taxonomy have been and are involved in two major projects on economic botany in South-East Asia which should be mentioned here.

### *6.3.1 Rumphius Memorial Volume*

In 1959 the 'Rumphius Memorial Volume' to celebrate the 250th anniversary of Rumphius' death was published (editor professor de Wit). Rumphius (?1627-1702) is the greatest naturalist that ever lived and worked in the Moluccas (Indonesia) and one of the first and most famous economic botanists. Besides editing the whole volume, prof. de Wit wrote the introductory chapter on the life and work of Rumphius and made a checklist to his most famous work on plants, 'Herbarium Amboinense', which de Wit described as 'indestructible,



an ever green and ever flourishing garden, the inspiring evidence of the life of a great man and great scientist'.

### 6.3.2 PROSEA

What Rumphius started and what was continued by numerous economic botanists in South-East Asia (e.g. Heyne in Indonesia, Burkill in Malaysia, Brown in the Philippines) came to a new climax in the project: Plant Resources of South-East Asia (PROSEA). This project started in 1985 as a cooperation between the Wageningen Agricultural University (WAU) and the Indonesian Institute of Sciences (LIPI) to document and make available the existing wealth of information on the plant resources of South-East Asia for education, extension work, research and industry in the form of a computerized data bank and a multi-volume handbook. PROSEA grew out to become the largest economic botany project that ever existed, and is now a Foundation under Indonesian law with an international charter, governed by a Board of Trustees formed by the participating institutes: FRIM in Malaysia, LIPI in Indonesia, IEBR in Vietnam, UNITECH in Papua New Guinea, PCARRD in the Philippines, TISTR in Thailand and WAU in the Netherlands. It consists of a Network Office in Bogor (Indonesia) coordinating 6 Country Offices in South-East Asia and a Publication Office in Wageningen (Netherlands). A major task is producing a handbook of 20 volumes, of which 10 have been published to date. Each volume deals with a survey of one plant commodity group (e.g. Pulses, Edible fruits and nuts, Dye and tannin-producing plants, Timber trees, Rattans, Bamboos, Vegetables etc.) and is written by an international group of author-specialists and editors. A thorough overview of the state of knowledge of every useful South-East Asian plant species is given, covering all fields of plant sciences (taxonomy, botany, agronomy, forestry, horticulture, plant breeding, plant genetics, phytopathology, etc.). The Dept. of Plant Taxonomy has been involved in PROSEA from its very beginning, and at present 4 full-time staff members are working for it, focusing on editorial work regarding the botanical, taxonomic and silvicultural aspects of the handbook. Due to the success of PROSEA in Asia, plans are being made to start a similar project for Africa.

## 6.4 Miscellaneous contributions to economic botany

### 6.4.1 *Cicer* L.

In 1972 van der Maesen published his PhD thesis entitled: '*Cicer* L., a monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation'. He had worked on *Cicer* since 1967 and made collecting trips to India, Turkey, Spain and northern Africa. In his monograph van der Maesen distinguishes 39 species (8 annual, 31 perennial). The species are arranged alphabetically and besides the botanical treatment, notes on geography and ecology are given. All species are illustrated with a full page botanical drawing and a key to the species makes identification possible. The larger part of the thesis is dedicated to chickpea, the third pulse crop in the world after beans and peas. About 90% of the total worldwide chickpea cultivation of about 10 million ha is effected in India and Pakistan. Chickpea, as other pulses still has the image that it is food for the poor, although it is very nutritious and healthy and eaten by all classes of society. It may contain up to 30% protein and is of major importance in vegetarian diets, and as part of balanced foods it may form an important supplement to the protein nutrition of children. In traditional medicine it has many applications. In the Middle Ages it was generally believed that it acted, like most pulses, as a sexual stimulant and priests and scholars should not eat them to avoid '...an inhibition of high spiritual principles and the process of thinking'.

### 6.4.2 *Metroxylon*

In 1986 Rauwerdink published: 'An essay on *Metroxylon*, the sago palm'. Sago palms are very important wild and cultivated food plants in Asia and 5 species exist. The best known species is *M. sagu* Rottb., a very variable species. Rauwerdink reduced the number of existing infraspecific taxa for this species from 21 to 4. Remarkable was his discovery that the former distinction on species level of sago palm with spines and spineless sago palm could not be upheld.

## 6.5 Conclusions

At its 100th Anniversary, the Herbarium Vadense can look back proudly at its role in the numerous contributions to the economic botany of the tropics. Economic botany cannot exist without plant taxonomy and all economic botany research undertaken by the Dept. of Plant Taxonomy has always been carried out on a sound taxonomic base.

Plant taxonomy and economic botany are complementary sciences which ideally walk hand-in-hand at the same institute. Economic botany reveals the diamonds that have been named and often discovered by plant taxonomy and lets them shine. It makes use of the pathways laid by plant taxonomy in the jungle of the plant kingdom, to reveal uses and capacities of plants for the well-being of man and to satisfy man's ethnobotanical interest. While doing so, it also makes plant taxonomy more popular in the non-scientific world and contributes significantly to its survival.

No economic botany without taxonomy but also no taxonomy without economic botany; with these two principles in its flag, the Herbarium Vadense can trustfully start its next 100 years.