The Importance and Domestication of South African Plants

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INTRODUCTION

The first records of the use, indicating the importance of South African plants in horticulture, can be traced back to the second half of the seventeenth century.

The Dutch, who arrived in the Cape in 1652, were stunned with what they were exposed to in their new country. It was not only a new world, geographically speaking, but the diversity of birds, insects, mammals, and plants in particular kept them gazing in disbelief. Many of these plants soon found their way to Europe. Simon van der Stel in particular, exported many species to the Netherlands. Descriptions and coloured prints of plants in the magnificent two volumes produced by Jan Commelijn (1697) and his nephew Casper (1701) of plants grown in the botanical garden in Amsterdam, include many of these plants from South Africa. Although many of the names have since been changed, the plants can unmistakably be identified from the descriptions and colour plates. The following serves as examples: *Aloe arborescens, A caulescens, Gloriosa superba, Polygala myrtifolia, Salvia africana-lutea*, and *Zantedeschia aethiopica*. Amongst the trees grown, were an *Encephalartos* sp., *Leucadendron argenteum,* and *Sideroxylon inerme.* The diversity was so large and the opportunities so unlimited, that for the first 50 years collectors from the northern hemisphere experimented with almost everything. That it was not always easy, was also true. The winter rainfall climate of the Cape, with mild temperatures differed in so many ways from the European climate, that the focus changed and preference was given to those plants that could be grown in glasshouses, like bulbs, herbaceous plants, and succulents.

The nineteenth century saw a new revival of interest in South African plants, especially when plants from other parts of South Africa, especially Natal, became available. The climate of the Drakensberg in particular with a summer rainfall and bitterly cold winters, often with snow, was close to the European climate. Examples of genera that can be listed are the following: *Agapanthus, Euryops, Kniphofia, Osteospermum, Phygelius, Rhodohypoxis,* etc. (Rourke, pers. comm.). *Encephalartos altensteinii,* grown at Kew and dating back to 1775, can probably be regarded as the oldest glasshouse plant.

Closer to home reference is made of the Company Garden in Cape Town, and to Simon van der Stel who appointed, amongst others, also persons with botanical knowledge. They introduced a wide variety of plants which they collected on their expeditions to the interior. Many of these plants in particular though, were of more interest to botanists, than to cooks. The names of the two botanists Oldenland and Hartog, must be mentioned, both of whom added many South African plants to the Company Garden (McCracken and McCracken, 1988). It is not the intention to dwell much on the history of South African gardens and collections, but a reference to Schonberg's Estate, "Felhausen", in Flora Herscheliana by Warner and Rourke, 1996, is very interesting and serves as an example of the early domestication of many South African plants, mainly bulbs from the western Cape. On a detailed plan of the estate, prepared by Sir John Hershell, who, with his family occupied

the house between 1834-1838, a bulb garden is indicated. It is not known for sure whether Schonberg or his predecessors established the bulb garden, but Hershell definitely used the position as a nucleus for his own collection. By the autumn of April 1835 he reported: " I have at least 100 sorts of Cape bulbs in progress and all have rooted and are doing well (Warner and Rourke, 1996, p.149).

Apart from drawing the flowers with the aide of a camera lucida by Hershell himself and beautifully painted by his wife Margaret, the intention was undoubtedly to build up a vast collection of bulbs to send back to friends in England as well as to take back himself at the conclusion of his Cape sojourn.

It is not clear how many species Hershell collected, but it must have been extensive, both in numbers and in volume. He did record that he lost some thousands of plants, due to moles. It is a fact though that he succeeded in taking back to England "hardly less than 200 species" (Warner and Rourke, 1996, p.159).

THE CURRENT STATUS

It is common knowledge today that we have an exceptionally rich and diverse flora in South Africa. Though it is difficult to precisely establish what percentage of the 23,258 known taxa (species, subspecies, and varieties) are in cultivation today, it must be substantial.

A survey carried out in commercial nurseries across South Africa, indicated that there is a growing awareness of South African plants amongst the public. This must certainly be ascribed to numerous popular books on South African plants, radio and TV programmes, articles in journals, newspapers, and promotions by nurserymen. In this regard, I think it is fitting to mention the name of the late Kristo Pienaar, who has done so much to promote our flora. Undoubtedly, the tireless efforts by the horticultural staff of our national botanical gardens should also be mentioned.

The total number of species grown and displayed in the eight botanical gardens today is estimated to be in the order of 12,000 species. It must, however, be kept in mind that only plants with either horticultural, medicinal, educational, or scientific merit, specifically rare and endangered plants, are normally selected.

It is very encouraging to note that there is a new revival amongst some of our universities to develop botanical gardens and to expose their students to our unique flora. A proper survey still needs to be carried out, but it seems as if a national awareness outside the institutions already mentioned, is still lacking.

Kruger (1988) in one of a few reports available, reports that 271 different species of indigenous plants are used in amenity horticulture by 16 Cape local authorities. These plants were specifically selected for their resistance to drought, frost, and wind. Of these 271 species, more than 60% were recorded only once.

The examples mentioned this far, dealt mainly with the utilitarian value as display plants in botanical gardens, home gardens and parks, or trees planted for their shade, etc.

Without going into too much detail or trying to give a comprehensive report on the status of the industry, especially the commercial side of it, the following is just an attempt to draw the attention to other areas of importance of the South African flora.

COMMERCIAL IMPORTANCE

For most propagators, this may certainly be the most important facet in dealing with indigenous plants. The potential of each "new" plant as a source of revenue is very carefully considered and compared to other plants in cultivation, new trends in the industry, etc. The question can, however, be asked, how do you estimate the value of an indigenous species? Higgins and Cowling (1997), concluded that this indeed is very difficult: "As many fynbos species have horticultural potential, we considered that the minimum value of a species is the cost of producing a new horticultural variety. In essence this means that we are using the cost of commercial breeding and hybridisation to estimate the value of a species."

Agriculture. Looking at the way income is generated, a distinction must be made between growers and farmers harvesting from the veld. Unfortunately the sales figures are not always indicated separately, with the result that the importance of indigenous plants as a "crop" is difficult to establish.

Uncontrolled harvesting from the veld, specifically fynbos, is of great concern, especially looking at it from a conservation point of view, as the depletion of the seed resource could lead to the extinction of species.

Not trying to justify this kind of activity in any way, but in order to put it into perspective, Middleman, 1990 states: "in spite of it being true in some instances that the natural veld is over-exploited by opportunistic elements, the wild flower industry has created public awareness of the rich floral heritage, and also protected the natural veld from transformation for other pursuits, to some extent its loss to invasive alien species. The industry earns nearly R30 million per annum and provides jobs for 10,000 to 15,000 people."

As far as the intensive cultivation of indigenous plants is concerned, the Proteaceae are the most widely used wildflower from the Cape floral kingdom in the international floricultural trade. The genus *Protea*, with 15 species used commercially is the most important genus in the family.

This is illustrated in a report on the status of industry development by Malan (1977) where he provides a summary of intensive cultivation of three genera of the Proteaceae.

	Hectare	Total plants (× 1000)	Flower production (× 1000)
Type	1996	1996	1997/1998
Protea	207	1132	3000
Leucospermum	66	173	1300
Leucadendron	12	60	900

Unfortunately no monetary value was attached to this report.

This same phenomenon is also reflected in the yearly report from Miltiflora (March 1998 - February 1999) with *P. compacta* on the top of the list with 381,407 stems sold and *P. repens* with 309,936 stems sold, in a close second place.

The sales figures of indigenous flowers by Multiflora according to this report, indicates a turnover of ± R10.4 million.

Due to the new Government's initiative, more land has now become available to small farmers. Looking at the potential of indigenous plants, especially to these farmers, Leivers (1998) refers to a trial planting of six collections of indigenous bulbous plants in the church grounds of the Moravian Mission Church at Pella. Based on an average yield of 150 bulbs m^{-2}, 60% area per ha planted and an income of 5c per bulb, an income of R45,000 per ha is attainable.

Although the utilization of indigenous plants by man can be traced back for many centuries, it is only in the latter part of this century that the cultivation of plants on a commercial scale began in South Africa. Reference has already been made to the use of fynbos plants, mainly in the floricultural trade, and enough has been said about it. I would like to focus on other fynbos genera that have received a lot of attention in recent years.

Rooibos tea produced from various *Aspalathus* spp. is becoming increasingly popular. Until the 1930s it was not commercially cultivated, but today the annual production is more than 11,000 tons.

Another local tea, honeybush tea, produced from mainly 10 different *Cyclopia* spp., has suddenly become almost a household name. Many small farmers have became involved in the production. Although the annual production, in many cases still harvested from the veld, is ± 50 ton, export to England, Germany, and the far East is growing.

Medicinal. The use of indigenous plants by traditional healers is part of the history of Africa. The pharmaceutical industry is on a continual basis busy screening many of our plants for the medicinal properties. Many claims have been made and wonderful success stories are being told about the use of products made from local plants — the most recent being the various aloe products, and the African potato, *Hypoxis hemerocallidea* (*H. rooperi*), for the treatment of rheumatoid arthritis. Extracts from buchu and honeybush are also now available in other "forms".

Tourism. The important role of South Africa's flora in the tourism industry is receiving more and more attention. It can be assumed that the majority of the visitors to the Kruger National Park and the other South African parks are attracted by the animal life in the first instance. It cannot be denied though, that the vegetation, supporting the wildlife does not go unnoticed.

However, a visit to Namaqualand during the springtime, or the various wildflower shows, can only be to enjoy the beauty and diversity of our flora.

Visit numbers to the various National Botanical Gardens are increasing every year, with more than 600,000 visitors to Kirstenbosch alone this past year. Our estimate is that ± 20% of these visitors are from overseas.

"LOST OPPORTUNITIES"

That South Africa has lost many opportunities in the international trade is a well known fact. Leivers (1998, pers. comm.) states that Holland earns more foreign exchange annually from the export of plants originally discovered in South Africa than South Africa earns from the export of gold. However, he concluded that it is futile to bemoan the commercial loss to South Africa of many of the plants that are now household names through the world — pelargoniums, freezias, gerberas, and nerines, to name but a few.

Littlejohn (1998) dealing with the hybridisation of *Leucadendron* states along the same lines that Australia and New Zealand realised long before South Africa that *Leucadendron* had commercial potential as cultivated product. Not less than six well known cultivars originated from these two countries. In response to this the ARC Fynbos unit of Elsenberg has undertaken since 1986 a hybridisation programme using seven *Leucadendron* species. From these hybrids, the following cultivars were released: "Chameleon", "Rosette", "Laurel", "Flash Gordon", "Disco", "Kam-ee-lion", and "Robin Red". The tragic irony is that many of the plants which originated from South Africa and were domesticated in other countries are now being exporting back to South Africa — e.g., *Sandersonia aurantiaca, Clivia miniata, Gerbera jamesonii,* and various *Pelargonium* species.

MEASURES TO ACCELERATE THE DOMESTICATION OF SOUTH AFRICAN PLANTS

Similar to the fashion world, there is and always will be a need for new cultivars, be it better colour form, bigger flowers, longer shelf-life, better resistance to pests and diseases, drought or frost tolerant, etc.

It is not my intention to report on the excellent work done by, for example Elsenberg, Roodeplaat, Hadeco, and various other nurseries/growers to develop and introduce better selections or new cultivars, but to briefly reflect on the work done by the National Botanical Institute (NBI).

Research. The NBI lacks the facilities and other resources to conduct breeding programmes. Through the years, however, the horticulturists were always aware of and on the look out for variations that occurred. By carefully selecting and propagating material for display in the gardens, they managed, not only to introduce several forms of superior quality, but also to create an awareness amongst the public of the potential of our indigenous plants.

The discovery made by De Lange (1990) and co-workers of the long overlooked effect of smoke on the germination of seed is an important finding which promises to be of a major economic importance. Brown (1995) reports that approximately 180 species from the *Proteaceae, Ericaceae, Restionaceae, Bruniaceae, Asteraceae, Fabaceae, Geraniaceae, Rutaceae,* and *Poaceae* have been screened for a response to smoke. Of these, at least 95 species showed significantly improved seed germination. They reported that amongst the Cape reed species (*Restionaceae*), an increase in germination from 0.2% to 50.6% was obtained when the seed of *Rhodocoma capensis* was treated with smoke. Similar results were obtained with various *Erica* species. The most outstanding was *Erica glouca* var. *glouca* (14 seedlings per gram for untreated seed to 1000 seedlings per gram of smoke treated seed).

Reference has already been made to honeybush tea. In order to establish this industry, packets of tea were sold under the name of Kirstenbosch. The South African Honeybush Tea Producers Association was established on 24 Feb. 1999, and the future looks very promising. (This is mainly due to the initiative of Mr. Hannes de Lange from the NBI).

An Ethnobotany Unit has been established at the Natal Herbarium, Durban, to study medicinal plants, particularly those threatened by extinction. This has lead to the compiling of a Medicinal Plants database (Medbase) as well as the establishmentt of medicinal gardens in several of our National Botanical Gardens.

The Medbase consists of four separate databases, one of them, the "Muthi-base," deals with medicinal uses, chemical analysis (where available).

Publications. The horticultural staff at the NBI have, over the years, produced a wide range of publications ranging from taxonomic treatments to popular books, horticultural notes, and pamphlets on the cultivation of plants. The latest being the Kirstenbosch gardening series on how to grow proteas, cycads, agapanthus, and succulents.

Commercialisation. Mention has been made of the role played by horticulturists in the selection of plants of exceptional horticultural merit. In an attempt to become more self sufficient, it was decided not to display these plants initially, but to make them available to interested parties through trial agreements.

Unfortunately a significant number of these plants with horticultural potential currently in the NBI's possession are already in the market due to various activities of the NBI's, e.g. plant and seed sales, or plants that have simply "disappeared" from our collections, resulting in limited success.

Since April 1995, the NBI has entered into 18 trial agreements for evaluation, with local nurserymen, totaling 59 plants.

Experience has also shown that in a few cases, some of the plants did not survive the growers standard production methods because special growth media or specialised propagation methods were required.

Plants exported to four overseas countries also died because of the methyl bromide treatment in quarantine. On request 143 plants were provided to the Pershore College of Horticulture in the U.K., to be tested under local conditions. Of all these plants, only one was released in the U.K.

A research and licence agreement with Ball is currently in its final stage of drafting and will be discussed with local stakeholders before it is signed. It is a 5-year agreement, restricted to horticultural/floriculture products, and will result in technology transfer and benefit sharing.

Agreement With Straathof Seeds. In order to promote the utilization of our South African flora and acknowledging the highly repute name of "Kirstenbosch" being synonymous with indigenous flora, Straathof will market their range of indigenous seed under this name.

Education. The NBI realised that in order to conserve and preserve our flora for future generations, it is important to educate and inform the youth — especially those that in the past, very seldom visited our gardens — of the importance of our plants. For this reason an outreach programme has been launched in Kirstenbosch. It consists of two programmes:

- Bringing children from the townships to the garden,
- Involving the township communities in greening programmes.

Today 28 schools on the Cape Flats are involved in this environmental education programme.

In our other gardens the staff has also been, to a lesser extent, involved by developing school gardens, donating trees to schools and hospitals, etc.

Acknowledgements. I would like to thank the following persons for sharing their knowledge and making information available: Mr. T. Arnold (NBI - Medbase), Dr.

N. Brown (NBI), Mr. J. Coetzee (Multiflora), Dr. H. de Lange (NBI), Mr. R. Jaques (NBI), Mrs. M. Middleman(Sappex), Mrs. F. Powrie (NBI), Dr. J. Rourke (NBI), Mrs. J. Loedolff (MNI) for taking the slide, the NBI for permission to use their slides and Mrs. G. Kriel for typing the manuscript.

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