

## EXPLORATION, ADAPTATION, EVALUATION, AMELIORATION

Asger Klougart  
The Royal Agricultural  
University,  
Institute of Horticulture

Rolighedsvej 23  
1958 Frederiksberg C  
Denmark

### 1. Introduction

If you have a factory for cars, furniture or being a dress maker, you will have to look for new styles uncreasing to keep up or increase sale. Sit down and wait for the customers cars miléages are up, the chairs broken or the dress worn out, you will soon be out of business! Production of potplants is today an industrialized process, where the greenhouse is the biological factory, where plants pots and substrate move into one end of the house and flowering or foliage products roll out of the other end. There is however a différence.

### 2. The customers wish

Surveys among the mass of consumers about their desire for flowers express that nearly everyone love flowers, but if they shall point out which they like the most, only 15% can specify their wish. Flowers are oft just symbols. Therefore a real deep felt desire for new style in flowers is not found in the majority. The floral business is 1000 years behind the dress world and 100 years behind the car manufactures! The succesful promotion and introduction of new plants ought to come from the wholesale or retail florists, but most of these people are conservative and stick to old, well known items. As flowers have an advertising quality in themselves some new types of well known plants have created a new market. Examples are: Kalanchoe, Begonia elatior-hybrids, Miniature

roses, and Streptocarpus.

### 3. Forgotten plants

Many plants has been introduced through the last century and forgotten. Why? Often because the finder-grower wish to have this plant for himself, but even big nurseries cannot open a market and make the plant generally popular. The mentioned plant-groups were broadly distributed through the plant licence holder and their propagators and pushed by advertising.

A new plant from the jungle or desert has no agents! It can be mixed into a collection and appreciated by the 15% minority, but if it is produced in big quantities, the majority of customers will not pay an extra price. They just want flowers! Production of today is based on profit per M<sup>2</sup>, and next year the plant may be found in the mixed corner bench. Nevertheless some unknown, wild plants break through the green curtain: Cyperus and Peperomia species. Schefflera, Ficus species and variations, new palms, ferns and coniferae, Radermachera and a few flowering plants.

### 4. The potential

As the purchasing capacity of today is greatest in the lower income classes, it is to look for and develop plants with a strong colour and direct appealing effect and suited for mass production. The Kalanchoe-hybrids had that quality and sold for the price of less than a packet of cigarets. When potplants become an article of easy access, little by little a desire for diversity and extra quality will open the way for new flowers and larger decorative plants. Pot-plants are the best horticultural travellers and specialisation of production is followed by big trading business. In my abstract I have used the terms Exploration, Adaptation, Evaluation and Amelioration, but really the introduction process ought to start with the sales potential. Producing and selling is like a chain -

it is an excellent tool for pulling, but damn useless for pushing! In Denmark we are fortunate in the fact that our cooperative and wholesalers are now crying for novelties and support a planned introduction scheme.

## 5. Exploration

The plant-kingdom is immense and greater than believed by horticulturists, spread out from arctic to tropics, from lowlands to mountains. It is in the tropics you find the plants for a temperature regime of our indoor living space. The growth capacity of tropical plants exceed the plants from the north.

The plant hunters and taxonomists have searched in some 500 years. In their search for spices they accidently found America. More than 300.000 different plant species are found described, put into orders, classes and families, then buried in herbarias and often forgotten.

## 6. Botany and horticulturists

The gardeners of the last century were often fine botanists and knew better the plant kingdom than our generation. 100 years ago came a book of a royal gardener in Berlin H. Gaerd of 700 pages containing lists of more than 3000 plants. Vilmorin also described many and L. H. Bailey's fame still remains. It is a sad story that the floriculturists of today have so little interest in botany. Even in university circles you have to use terms like mums, snaps, spider-ivy, polka dot or african violet, or use a wrong latin name like Poinsettia for Euphorbia and Geranium for Pelargonium to be understood. I have had many visitors from US and found that using latin names caused confusion.

I recall W. B. Turner's dictum: "A good gardener is a better gardener for also being a botanist - and a botanist is a better scientist if he tends a garden".

To be able to evaluate the potentiality of a plant some

knowledge of systematic botany is required. It is not just one or two courses, it is a lifelong, but fascinating study. The hort. students of the midcentury were more fascinated by the discoveries of Garner and Allard, Went, Salisbury, White, Murashige and Skoog and their new ideas and preferred to work on well known plants. Hundreds of papers about the effect of all sorts of peculiar chemicals grow wild in the journals. Very seldom a new plant is described and horticulturists do not browse the botanical magazines!

America's greatest contribution in botany to European floriculture has been the books of Alfred Byrd Graf Exotica and Tropica. The Christmas gift for years to nurserymen!

The hobby plant collectors or plant-societies like The Gesneriad Soc., Begonia-, Fuchsia-, Cactus-, Rhododendron- and Orchid Society as examples. These people are deeply engaged in a genus and many carry out a breeding program.

### 7. Gardeners hunt

Plant hunting in the tropics can still yield novelties. It is also possible to find a different clone of a known specie to raise hybrid vigour. Examples: Impatiens in New Guinea. Tulips from Asia, Achimenes from South Africa and Exacum from Socotra. Travelling nurserymen of today have brought home several plants as they look upon the potentiality as raw material to which they can apply their growth- and flowering technique, retardants and micropropagation etc. Examples: Pachystachys, Chrysothemis, Portulaca.

Botanical gardens are the natural sources for plant material. However it is oft difficult to evaluate the plant in the crowded conservatory, where the greenhouses are ancient monuments or they are just a flower show for the mass public. The number of species in their herbarium and the living assortment may be one to ten.

If you are interested in a genus a contact to a taxonomist, specialized in this particular plantgroup and see his collection and get his advice can be very valuable. Such collections of Cyclamen, Begonia, Kalanchoe and Gesneriads produced novelties.

To get seed and cuttings from the majority of botanical gardens in the tropic is a very slow process. You have to go to the place, but it is in the tropic you find the wealth.

A real growth in the assortments of pot plants sold in Europe has taken place. To illustrate the Danish situation Table 1. show the changes from the "big flowers period" up to 1940 and the diversity of today.

Table 1.

The "top-nine" pot plants in Denmark 1934-1985.	Parts of total sale
1934 9 Plant Genera	80%
1965 9 - -	38%
1985 9 - -	41%
Excl. Kalanchoe	34%

### 8. Flowers from seed

Seed propagated floral crops differ more from their origin than the clonal. If you compare the origin and the newest in the seed trade you are convinced of the great possibilities breeding the wild types. Look at the Cyclamen, Begonia semperflorens, and B. tuber-hybrids, Exacum, Primula malacoides, Saintpaulia and Achimenes! In many cases breeding is done by the grower himself. Hundred years of competition produced this fine material. The use of F<sub>1</sub>-technique gave an extra push, as it made the breeding more profitable. Sometimes a novelty can just be a "back to nature" introduction as Mini-Saintpaulia, Pelargonium and roses.

## 9. The clones

The vegetative propagated material of clonal varieties were handicapped as the breeder could not get a real profit and should be happy if his wife's name would be used for the variety. In Europe the breeding of such material started in a better scale when the law of breeders right came into action. The florists feared the law consequences of the royalty cost, but today's best big articles made a break through. The patent act from 1930 gave us some good pot plants within the Chrysanthemum, Azalea and it is evident, that 'Poul Mikkelsen' Poinsettia opened the way for this plant in Europe.

The growers great number of a certain plant gave a possibility to find usefull mutations. The grower can train his eye to find and keep valuable improvements and some have had a profit out of it. Bougainvillea, Cissus, Fittonia are examples. Breeding work done in nurseries using hired geneticists take place where there is a certain surplus of money and interest. The percentage of clone-propagated in Denmark is now 87,3% to the sown 12,7% .

The registrated numbers of plants and their families in Denmark is shown in Table 2. and 3.

Table 2.

The number of plant: genera and cultivars sold in Denmark 1985.

Number of items in registration	1041
Flowering plants	513
Foliage	529
Number of plant families	71
- - genera	278

## 10. Adaptation

Growing a collection of new plants under just one set of conditions is not a fair trial. The material must be

treated with a number of floricultural treatments right from Garner and Allard to the newest retardants. Here is a real workshop for the trained horticulturist! Fantasy and creativity are needed and often found more in non-academical circles in the world of artists.

### 11. Evaluation

It is very important to have the sales people to help in sorting out the potential plant-type. They will tell the missing quality characters and give advices to further improvements. It could be lack of colour effect, inharmonious growth, difficult to sleeve and transport. Flower drop or lack of keepability.

### 12. Amelioration

The breeding program start where cultural technique come too short. It is a long term procedure, where patience may be the most important quality needed. In the past some good plants came out of mass-crosses done by bees, nurserymen or amateurs. Some came even they did not obey the law of Gregor Mendel and the respect for the chromosome number. Examples: 'Apeldoorn' tulip, Primula kewensis.

The modern plant breeder have many methods in their hands to cross the former barriers, using haploidy, treatment during meiosis, embryoculture, colchicine, radiation and now DNA-gene manipulation. The problem is that these highly specialized guys and dolls are engaged in treating barley and yeast, Streptomyces and sugar cane. There are many more interesting tasks in the floral world, but less money! The future breeding will be carried out in big propagating nurseries and the expenses paid by the royalty.

Institutions and universities is retarded by lack of funds and as it is long term projects, it is difficult to keep the "born breeder" as they will be overpaid by the business. The result will be that the "bread and butter" flo-

wers will come from the companies and the "spices" from the university. It is easy to make a hybrid, but it needs a big nursery to select the real breakthrough.

### 13. Amelioration

Amelioration is a combination of breeding and the possible refined cultural technique. The commercial florist of today is facing hard competition and he is not going to grow a new plant just for fun and interest. If it gives him a lower net profit per m<sup>2</sup> than his major crop there is no stimulus to change. There are however two ways 1. to find a better and cheaper cultural method to catch up with the major crop (shorter production time, smaller plants, retardants, earlier flower induction etc.) and 2. a higher price. The last has to do with marketing and advertising. To get a higher price, a claim has to be made of some qualities. Examples: Compact plant grow slower, are desired but if the special quality is not told to the retailer and the customer, he will take the cheaper Dieffenbachia instead of a keepable 'Silver King' Aglaonema.

The most grown plants of total 71 families is shown in Table 3. and also the number of genera. Acanthaceae is the leading in number. Generiaceae the next. Both families have many genera and a wide distribution pattern.

Table 3.

Flowering potplants ranged taxonomic into families, numbers of cultivated genera ( ) and the production value. GASA, Odense 1985.

	Mill. D.kr.		Mill. D.Kr.
1. Crassulaceae (6)	33	Kalanchoe	31,6
2. Begoniaceae (1)	19,9	Elatior-Types	
3. Malvaceae (4)	19,2	Hibiscus	19,0
4. Compositae (9)	18,7	Chrysanthemum	13,6



	Mill. D.kr.		Mill. D.kr.
5. Cactaceae (9)	15,0	Schlumbergera	8,8
6. Gesneriaceae (11)	13,0	Aeschynanthus	4,2
7. Acanthaceae (13)	9,9	Hypoestes	3,3
8. Euphorbiaceae (5)	8,6	E. Pulcherrima	5,7
9. Gentianaceae (2)	6,8	Exacum	6,7

The tropical world is a source of flowers, but there is a long way from Mandalay to the greenhouse, but the way from the nursery to the customer may be more difficult to cross than the indian ocean.

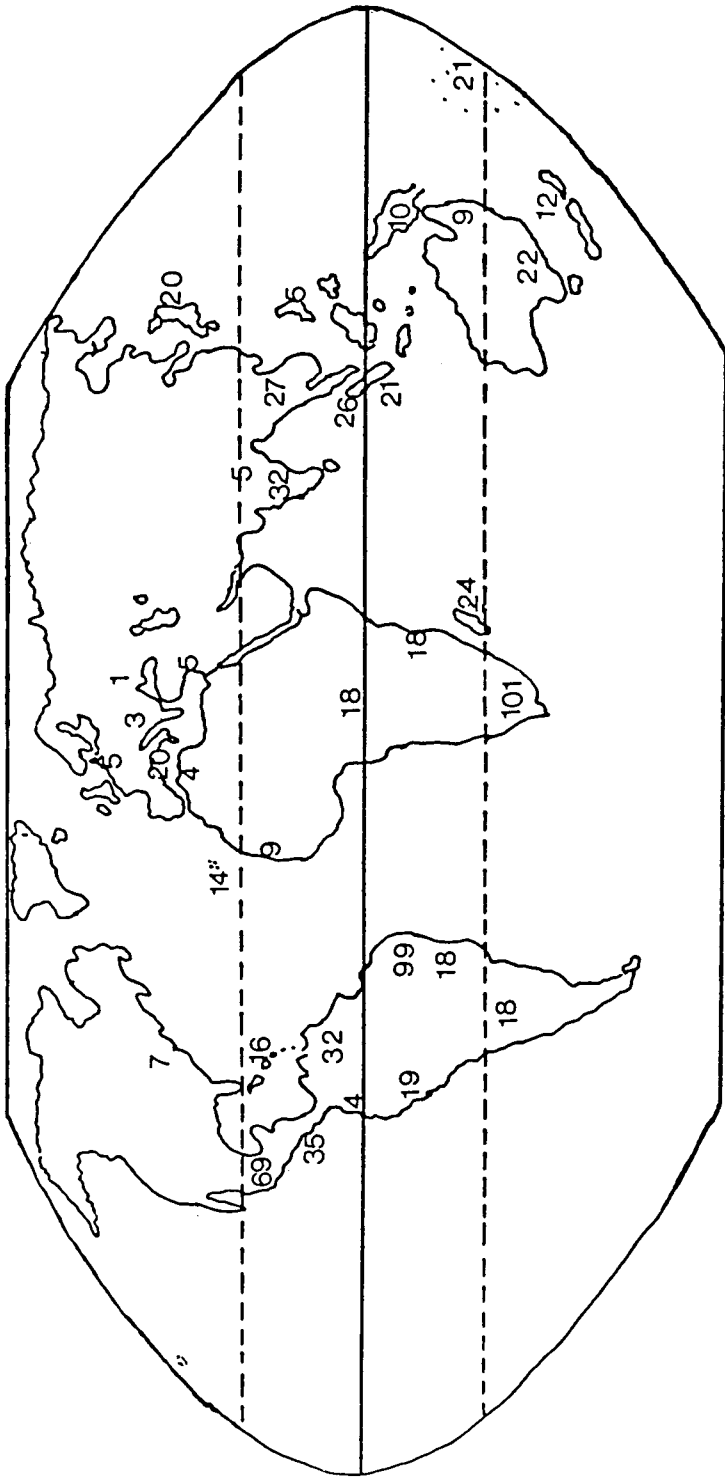


Fig.1. The place of origin of 638 greenhouse plants, grown in Europe . Source: A.Klougart:Veksthusplanter1979.