BREEDING ROSES IN HOLLAND

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The history of humanity goes hand in hand with the history of the rose. There is no period in time when the rose did not play a role. It has been painted a thousandfold; numerous poems and songs have been devoted to it and in literature it figures more than any other flower. Its image is reproduced on coins, postage stamps, vases, and on primitive wall paintings.

My interest in roses dates back to the beginning of the 1960s. It was by chance that I came in contact with the families, Dickson and McGredy. The work in rose breeding of these two families held a very particular fascination for me and, in all fairness, I must admit it was they who inspired me to take up rose breeding. They taught me a great deal during our many discussions and they quite often made it clear that the breeding of roses was not just a simple matter of putting pollen on stigmas, but rather, involved the building of a line toward a specific goal. In addition, I was assured that the breeding of roses would be an extremely expensive "hobby".

As the rose is a heterozygote there are many more possibilities for its manipulation than with shrubs.

It seemed to me a fascinating occupation to operate such a concern alongside our traditional nursery stock business—to introduce new roses, with other forms and characteristics, and then to find a market for them; in 1964 we began to set up a breeding program for roses.

A rose breeder must know the material of all roses; the good points and the bad points and must know the laws of genetics.

Most botanical roses are diploid; that is, that they contain genetic information in duplicate and have two copies of seven chromosomes. A method of manipulating this information is through crossing, the chromosome number is doubled and most of the roses on the market, such as floribundas, hybrid teas and greenhouse cultivars, contain genetic information which is tetraploid: four copies of the seven chromosomes. Some roses, for example, *Rosa canina*, which is quite often used as a rootstock, is pentaploid and has 35 chromosomes, five copies of the information.

For breeding it is sometimes necessary to breed roses with different numbers of chromosome copies. A diploid species can give a haploid gamete, and a tetraploid can give a diploid gamete. Crossing these two results in a triploid offspring. It is common that triploid plants are partly or totally sterile. If you find a triploid

which is not totally sterile it is possible to transfer genetic information from the diploid species to a tretraploid species. In this way new genetic information can be introduced in cultivated species, which are mostly tetraploid. There are two disadvantages in doing this: First, all genes are not necessarily alike. Constant crossing of a strain means current cultivars have an unknown mixture of genes, so one cannot predict what characteristics the descendants will have, often all descendants are different. Secondly, one cannot obtain a cultivar that can be propagated true through seeds. Genetic research of roses is still in its infancy. We do not know if a characteristic is dominant or regressive. For example, we know that non-perpetual flowering botanical roses are dominant over perpetual flowering ones. If one crosses a non-perpetual flowering sort with one that is, you will obtain only non-perpetual flowering sorts in the first generation; and by crossing them with a perpetual sort you will obtain 50% perpetual and 50% non-perpetual.

It takes a minimum of two generations or three years to select a perpetual flowering cultivar where one can be assured that not too many non-perpetual characteristics were inherited.

New cultivars are bred by cross-pollination, so the breeder must intervene before nature has her way. Thus we begin crossing quite early in the morning, especially for garden cultivars, as it is necessary to collect the pollen from a flower before it self-pollinates.

After all flowers have been pollinated we place the left-over pollen in small round containers in a desiccator (a large glass bowl-like container) containing silica-gel to absorb moisture. The desiccators are then placed in a refrigerated unit. This ensures the availability of pollen, should there be no fresh pollen on any particular day.

Crossing takes place in Holland from April until the end of June. Then over the summer months the rose hips grow and the seeds ripen. Around the second week of September we begin to collect the rose hips, open them, count the seeds and note the crossings.

From about 35,000 crossings we average 180,000 seeds, with a germination factor of approximately 40 to 50%, giving us about 90,000 seedlings to select. From these 90,000 we will have made about 1,000 garden selections and 1,000 greenhouse selections.

Following this, the greenhouse selections are potted-up and checked for: color and form of bud and flower; the number of flower petals; length and stability of stem, and other characteristics such as thorns, resistance to disease, persistence of color, production and, of course, vase life. For our "Spray cultivars" we also note the spray form and if all flowers on one stem open simultaneously.

This strict selection leaves maybe a couple of hundred seedlings which we then graft on a rootstock in December or January and plant in February. We again make selections based on performance. Those up to our standards are forwarded to our representative who once again will graft and plant these selections, making further tests similar to those which we have conducted. From there, with great anticipation, we await the reaction of the growers, hoping that they will choose our selections. Meaning that finally, after years of work and high costs we are fortunate enough to have a "new rose" worthy of placing on the market! For garden cultivars, after the first selection these are budded in a field. The following year a second selection is made according to the following criteria: color of the flower, is it a floribunda, HT, ground-cover patio or shrub; is the flower full or single; is it perpetual flowering or not; is it self-cleaning; is it resistant to diseases, and does it remain in good condition during wet weather? Approved selections from here are then forwarded to rose trials all over the world.

THE DARTHUIZER ROSE FAMILY HISTORY

Some years after World War II, when The Netherlands was still recovering from the war damage, the Dutch Government Parks and Garden Services began rebuilding. Every year many new houses had to be built in order to repair the ravages of war...and all this in a country which was not only flat, but to a large extent, bare of trees as well. Thus, the polyantha rose was used by landscape architects to add the necessary color effects. Millions of roses were planted in the ensuing years...roses such as 'Peace', 'Hollanderin', 'Queen Elizabeth', 'Fanal', 'Lili Marlene' and others. We could perhaps conclude that the use of such large numbers of roses was a form of fashion.

In the early 1960s there was a distinct change, people wanted something different. A new generation of architects emerged who were no longer content with just polyantha roses. Thus, the "shrub" rose made its entrance. Modern ecological insights also caused many landscape architects to completely change their views. The excessive use of the polyantha rose was becoming too costly due to the rising cost of maintenance. The shrub roses, while becoming more in demand, had a major disadvantage since they virtually all only flowered for a short time in the spring.

It was our decision then, to begin a breeding program to develop shrub roses that would flower throughout the season, and which would also have ground-cover characteristics in order to keep maintenance costs at a minimum. And of course, this all in as wide a range of colors as possible.

Many crossings were used to find a favorable blood line. We crossed 'Mozart', 'Ballerina' and 'Yesterday' with the polyantha 'Rimbanbella'. The resulting seedlings gave us a great many descendants that had many of the characteristics sought by us. These shrub types with ground cover characteristics were a result of the named crossings crossed with certain seedlings developed by us over the years.

In the early 1970s, we brought a few cultivars on to the market, such as 'Fair Play', 'Smarty', 'New Face', 'Rosy Cushion', Summerrose', 'Red Blanket'. It is interesting to note here that our 'Lavender Dream' came from this line (a crossing of 'Yesterday' × 'Nasterana'). 'Lavender Dream' is a rose with extraordinary qualities because it does very well in hot climates.

In the very near future we will be introducing a yellow shrub and a yellow ground cover cultivar, which was a high priority in our program.

These shrub roses clearly met a great need and were planted within and outside Holland in large quantities. Very few rose breeders can make a living from breeding only garden cultivars. What began as a hobby for me, some 25 years ago, grew into a professional rose breeding department under the name "Interplant" (International Plant and Trading Company). The costs of breeding became so great that we realized we had to make a decision for the future: a) to keep it as a hobby, where the chance of producing good roses is rather slim; or, b) to make it a professional endeavour taking on personnel who have graduated with a degree in genetics and to create a department capable of delivering a profit. We choose the latter. And, as a consequence of this decision, Interplant now employs a supervisor and a technician, both graduates from high level universities, and two graduates with college level horticultural education.

In order to make a profit, we realized we would have to breed greenhouse as well as garden cultivars. As you may know, Aalsmeer in Holland, is the largest rose greenhouse market in the world, where each year 10 million roses are sold.

The big question was, what must one breed for this market? After much consideration we decided to try to produce a "spray rose". After all, we have the spray carnation and the spray chrysanthemum—why not a spray rose?

Many crossing possibilities were attempted, and after many disappointments we finally managed, eight years ago, to introduce our first spray rose...'Porcelina' later followed by 'Joy' and 'Evelien'. In 1988, 'Nikita' and 'Princess' were introduced. At this time we are proud to announce that "Interplant" is the largest producer of spray roses in the world. This year we introduced

four new spray cultivars; 'Purple Prince', 'Swing', 'Sentyna' and 'Elegance'. High on our priority list now is to develop a yellow spray rose.

Next to the spray roses we introduced new cultivars of long-stemmed roses. Among these are 'Only Love' a beautiful red HT and 'Rosette' a very exceptional rose producing 350 flowers per sq m.

Our company has been successful but we have to realize that the success of today is not the success of tomorrow. The proposed new laws on Plant Breeders Rights and the proposed revision of UPOV means breeders will receive far better protection. Everything being equal, we will obtain protection of the end product and hope to have the right to choose patents and/or plant breeders rights. In the future, large companies using biotechnology to produce new roses will require the permission of the original owner to use any material in their ''breeding'' programs.

The cost of rose breeding is phenomenal. It is estimated that breeding on our scale costs about 1 million guilders per year! Then when you realize that it can take up to 10 years or more before you begin to market a new rose, you have a slight idea of one's output before you realize any profit.

We also try to keep in tune with future trends and needs. We are trying to do our part by recognizing the environmental problems and taking steps to prevent further pollution. Our goal is to develop roses that are absolutely resistant to mildew and black-spot for both inside and outdoor cultivars. Rose breeders should be atuned to this problem taking similar steps. This is perhaps where biotechnology can assist us.