

Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A & M COLLEGE

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Reselection of Carnation Varieties

By W. D. Holley

The running out of varieties has been argued by horticulturists since horticulture and floriculture began. There are many who say that a vegetatively propagated variety will remain the same as long as we wish to propagate it. Developments in the field of genetics during the past 40 years indicate that some plants and some varieties in particular are extremely variable. Since many degenerate forms are more reproductive, a variety subject to this variability can run out in a hurry, if it is not reselected periodically.

Crane and Lawrence, in their text on genetics, state that mutations or bud sports are most likely to occur on plants when they are 1) heterozygous or mixed up genetically, 2) propagated extensively, and 3) tetraploids. Most rose varieties fit all three of these provisos while carnations fit the first two.

Binkley and Mussenbrock (Colo. Misc. Ser. 385) were able to reselect Spectrum Supreme carnation thereby eliminating the grassy tall growing types. We have been able to accomplish many improvements in Better Times rose by reselection. For the past five years we have been re-

selecting most of the popular carnation varieties in Colorado and indexing these selections for performance and the appearance of degenerate mutants.

The technique is simple but time and space consuming. Outstanding individual plants from disease free stock are used as a starting point. One row of five plants is propagated from each selection, benched direct and flowered from June to the following March, or later if possible. Coded tags are placed over the plants as flowers are cut so that records of all off-types may be kept. At the end of the flowering period, or sometimes before, the selections can be evaluated by what their progenies have produced. Naturally the selections whose progenies have produced few or no off-types become the nucleus stock from which our cultured mother stock is derived.

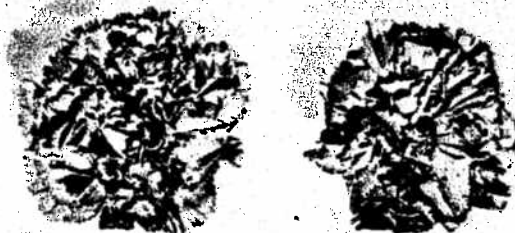
Each year all plants in the nucleus stock are rechecked by flowering one row from each mother plant. Plants are either multiplied or discarded on the basis of this performance. Outstanding new selections are brought into the nucleus block after they have proven themselves in progeny tests.

Degenerate Forms

Just how good or how poor a carnation will be is determined by its inheritance and the environment under which it

is grown. Many off-types are produced during the heat of summer which seldom if ever show up during winter and spring.

Small flowers with flat or hollow centers are of common occurrence during summer and early fall. Red Sim produces more of these than most other Sim sports. We have never found selections of Red Sim that produce all large flowers, but we have discarded several selections that have almost all small flowers in hot weather. These same selections produced flowers of creditable size in winter and spring.



Normal and hollow centered flowers



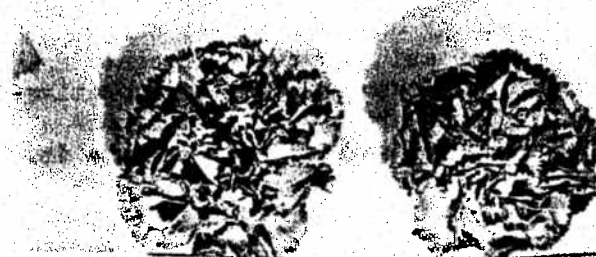
Normal vs small flowers in Pink Sim

The inward curling of the petal edges detracts seriously from the value of carnations. Sleepiness has been a serious fault of the light pink sports of Sim for several years. This trouble appears most frequently in Colorado during our hottest weather. Last summer we had progeny tests on 14 selections of Pink Sim. Six of the 14 progenies produced sleepy flowers at some time during the summer and fall, with the progeny of one selection producing almost 50% sleepy flowers. After discarding the six selec-

Sleepiness

Flat crowns and hollow centers, or semidoubleness may also occur on large flowers. These faults are associated with both environment (high temperatures and possibly dry soils) and heredity. Some selections produce these off-types while others do not.

tions which produced sleepy flowers, this summer's progeny tests of Pink Sim have been almost free of sleepiness.



Normal and "sleepy" flowers

We have been able to reduce the amount of calyx splitting especially in Red Sim and Pink Sim by this method of indexing for performance. Two of the 14 Pink Sim selections under test last summer produced about 25% splits, whereas the

Calyx Splitting

progenies of other selections produced negligible numbers of splits or none at all. The splitting tendencies of other varieties have been reduced by discarding selections whose progenies produced significant numbers of splits.

Other Abnormal Types

We must be ever watchful for abnormal types of growth in mother blocks, since intensive propagation will multiply these many times. Some of these off-types are known to be mutants and therefore transferred to cuttings from mother stock. Whether others are inherited must still be shown. Whether or not they are inherited, plants containing abnormal growths should be discarded.

pect. This type is known to be a degenerate mutant. We have found it in Red and White Sim so far.



Grassy mutant of Red Sim

Grassy or vegetative plants arise occasionally in most carnation varieties. Unfortunately these plants produce many more cuttings than normal plants so the percentage of vegetative plants will increase each year unless they are rogued before propagation starts. Plants that are unusually late in blooming, having tall stems with many cuttings, are always sus-

Lazy virescent plants (described by Mehlquist in 1941) are also mutants, the character passing on to cuttings. The plant is weak, has less chlorophyll, is grayish in color with distinct lighter longitudinal stripes on leaves and stems. There is some tendency for the leaves to twist and the flowers are small and hollow. We have found this off-type in White Sim and Gayety. It will probably arise in all Sim sports.

Fasciations

There are several types of abnormal growth which we group under fasciations. In one the stem is flattened and cuttings are produced slowly, if at all. In another a cluster of flattened growths seem to originate at a single point. In neither of these two (illustrated in accompanying figure) do the cuttings arising appear normal. Probably both types are inherited so that even normal cuttings from a fasciated plant would have a good chance of becoming fasciated. A third type of fasciation is probably due to injury of a growing point. Instead of a single cutting, there arises 12 to 20 or more cuttings which are normal in appearance but slow of growth because of competition. Due to intensive breaking of cuttings from mother blocks, some of these are bound to arise. We break them off but do not discard the mother plant.



Normal vs lazy virescent



Two types of fasciated growth

Briefly on Mutants

Dr. G. A. L. Mehlquist has shown that color sports of Sim are periclinal chimeras. In plain everyday language this means that only the outer shell of tissue is affected by the change. When tissue of both the mutant and parent forms are present in a plant, that plant may give rise to cuttings which have either or both forms of growth. The variety Sim Gayety illustrates this point with flower color. Gayety mutates back and forth

between its own variable color and red. Most mutants for degenerate types of growth are probably periclinal in nature, for several of these have been observed to mutate back to the normal type.

In our indexing for performance we have found some selections to be genetically unstable. We are able to discard those selections from which degenerate types are constantly arising.

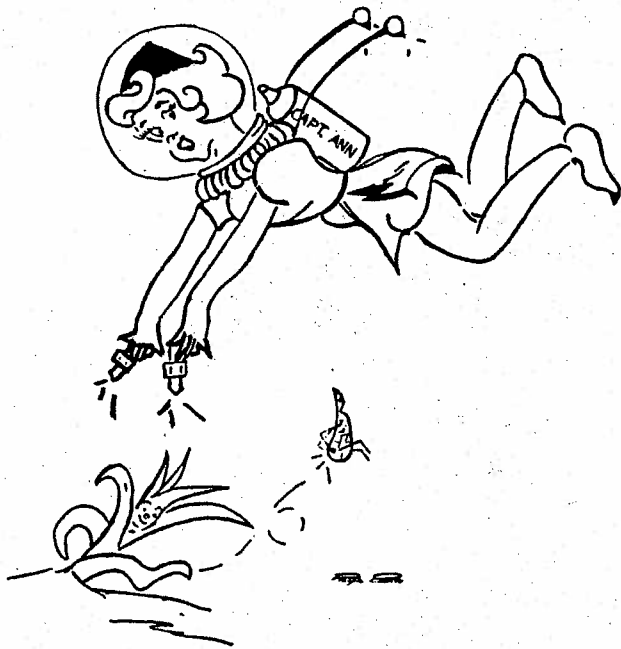
Alternaria and Mist Propagation

R. E. Skiver /1

The first in a series of experiments investigating some diseases which may attack carnation cuttings under mist propagation is completed with promising results. Cuttings of Red Sim and Miller's Yellow were stuck in perlite and sprayed with a suspension of *Alternaria dianthi* spores. This organism causes leaf spot and branch rot on carnations. The cuttings

were allowed to root for 21 days in full natural light, and the foliage was sprayed with mist approximately 4 seconds of each minute from 7 am to 6 pm. Captan was introduced into the water line which misted 3 of the 6 plots so that the mist contained 10 ppm Captan while the alternate plots were sprayed with water only.

/1 CFGA Research Assistant working on plant disease problems.



Results indicate treatment with Captan, while not eliminating the pathogen, reduced the total number of cuttings infected. A highly significant reduction in severity of disease was also observed. In addition, it was noted Miller's Yellow is more susceptible to Alternaria than is Red Sim.

Another experiment was conducted in the laboratory using the plate-disc technique. Captan at 100 ppm inhibited spread of the fungus appreciably while at 1000 ppm growth was completely checked.

Your editor,
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