Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A & M COLLEGE

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Thinking about Carnation Diseases - 1954-1955

by Ralph Baker

With the advent of cooperative production of disease-free planting stock on a large scale, the Colorado carnation industry has taken a step which has had wide implications. The machinery has been set up which can almost completely eliminate some diseases that have plagued the trade so much in the past. Further, the grower who unexpectedly runs into trouble now has an emergency source of propagative material. As with any change, however, new concepts and practices have to be put into effect and unexpected problems have been and are certain to be encountered. It is the purpose of this article to review some of the problems encountered this past year with their possible solutions, and to restate a few of the critical cultural and disease control factors in the light of this new type of operation.

Vascular Diseases

Historically, the program for producing disease-free stock originated because of the need for controlling the vascular pathogens: viz, the Fusarium and bacterial wilts. By now it has become an established principle that diseased plants do not always exhibit symptoms and thus may be used by the unsuspecting propagator with catastrophic results.

Figure 1 illustrates the present channels through which disease-free plant material passes before being introduced into commercial production.

Vascular parasites are eliminated by culturing for these organisms and eradicating plants which are thus discovered to be carrying pathogens, keeping only the disease-free plants for foundation stock. As it is impossible to supply all the demands for cuttings derived from such stock in a large operation, production is increased on producing mother blocks. Before cuttings are propagated from the foundation stock, however, they are rechecked for disease organisms by means of the Vial Technique developed by Dr. James Tammen of the Florida State Plant Board.

Basically, this is a culturing technique which allows individual cuttings to be easily and rapidly indexed. Thus to insure disease-free stock, both the original foundation plants and the cuttings derived from them for producing mother blocks are cultured. In addition each selection of every variety in the foundation stock is flowered in a separate operation to detect degenerate mutations and disease.

A glance at Figure 1 will illustrate that a minimum of three years is required before propagative material can be supplied to the grower in quantity from the original foundation stock. An obvious disadvantage is immediately apparent in that should any disease be introduced into the mother blocks during this period it could be widely and rapidly dispersed.

Thus the question arises, what can the grower do to insure that this situation does not occur?

First of all it is scarcely necessary to mention that no one should accept plant material in which symptoms of disease are evident. Further, even though clear cut symptoms are not apparent, it is sound practice to reject any material which is obviously lacking in vigor. Once clean plants are introduced into an operation, every care should be exercised to see that they are kept free of disease This means stringent sanitation practices and eradication. If a mother block system is to be employed, each delivery should be planted separately, as disease often seems to be limited to certain varieties or propagative lots. On long benches spacers can be utilized to separate each lot. Thus if disease develops in one variety spread can be prevented by merely pulling that division and resteaming.

Stem Rot

The most important disease losses occurring in the Denver area this year continue to be those incited by Fusarium roseum f. cerealis. It has become more apparent that a cultured cutting program will not control this disease. The reason for this is obvious as a result of research indicating that carry-over of inoculum is principally by means of spores borne on the cutting. At first thought it might be assumed that elimination of the organism from the cuttings could be readily accomplished by methods comparable to seed treatment, however, this has not been the case. It is apparent that the control of this disease at present does not exist in the form of any single shot-gun cultural practice.

The control of the stem rot pathogen does not exist in the form of any single shotgun cultural practice.

Pre-Propagative Treatment

The first question that comes to mind is: If the inoculum is borne on the cuttings, how does it get there and what can I do to eliminate it?

In this regard evidence so far accumulated has been largely observational. Certainly excessive splashing while watering can carry spores from the soil to the cuttings. Further, spore traps in the Denver area have yielded cultures of Fusarium sp. (not Fusarium roseum) which presumably were introduced by inoculum carried on dust particles. A third possibility, which might prove to be an important factor, concerns the possibility of actual growth of the pathogen on the outside of the stem.

Should the latter assumption prove valid, several practices are certainly in order. In mother block operations especially, the plants should be grown so as to produce cuttings as high as possible. Second year stock should not be used as a source of propagative material..

Again, mulches which have a high water holding capacity (e.g., peat) and thus would tend to raise the humidity in the microclimate about the plants should not be used. Correspondingly, the relative humidity in the greenhouse should be kept below the condensation level.

Fungicides to lower the inoculation potential on mother blocks have been tested in the laboratory and used in commercial operations. Current recommendations involve spraying periodically with either Captan or Manzate at dosages prescribed by the manufacturers.

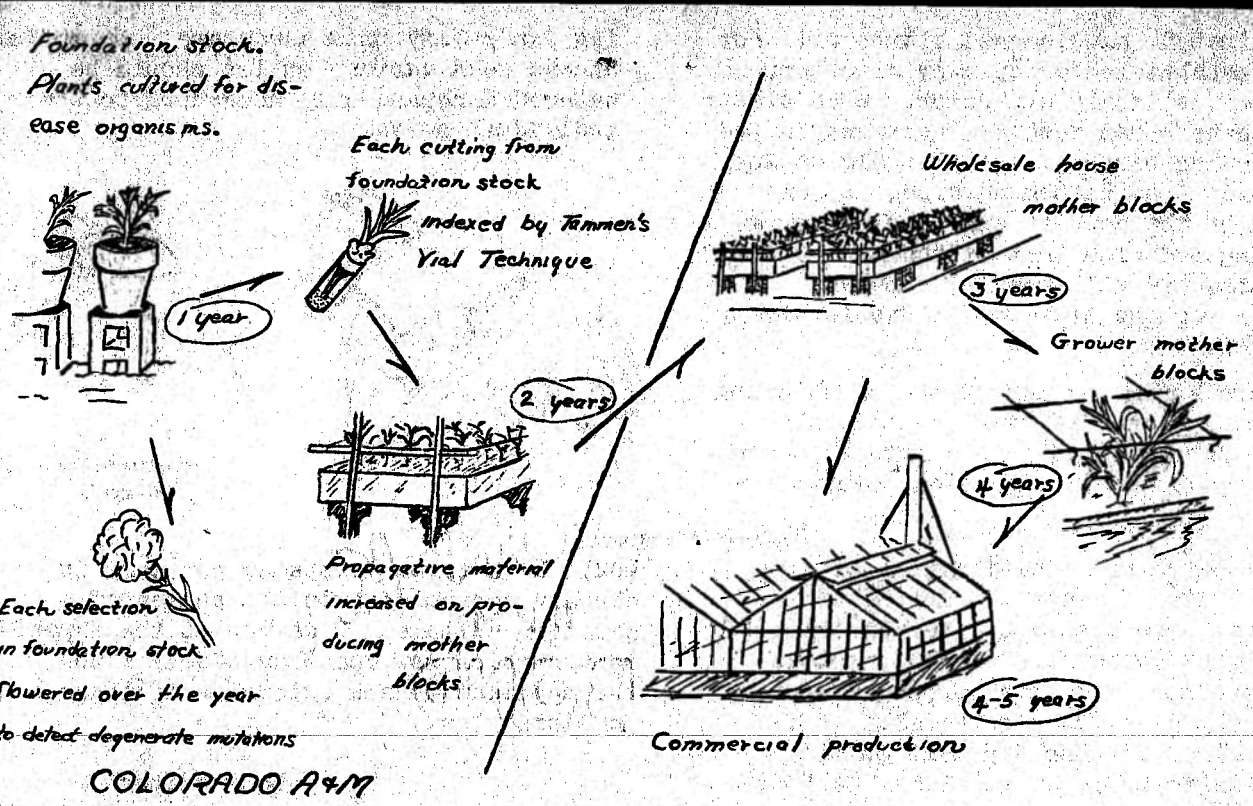

Figure 1.--Present channels through which disease-free plant material passes before being introduced into commercial production.

The Propagative Operation

That the application of fungicides to mother blocks has been an effective control measure in many instances this past year is beyond doubt. Just as certain, however, is the fact that this treatment alone cannot completely eliminate the stem rot pathogen from the cuttings. Thus it is essential that proper cultural practices be applied in the ensuing propagative period.

The propagative operation is frequently carried out in a portion of the range where excessive drafts are present.

Protection for the broken end of the cutting can be assured by the addition of Captan or Manzate to the rooting hormone used at the rate of 1 part per thousand. Of greatest importance, however, is the application of water during the rooting period. Overwatering at this stage can spell disaster. Of frequent occurrence is the case in which the propagative operation is carried out in a portion of the range where excessive drafts are present thus leading to the necessity of too frequent waterings and excessive dessication. A small isolated east-west greenhouse with north light especially designed for propagation is highly desirable in such cases.

This phase of carnation culture is undergoing a major change at present due to the introduction of modified propagative procedures. Recommendations involving these modifications will have to await tests now being conducted at the experiment station.

Post-propagative Treatment

It has been demonstrated repeatedly that under proper cultural conditions clean rooted cuttings are highly resistant to the stem rot pathogen. Should the organism be introduced even in small concentration in the propagative period, however, complications can result.

As cuttings are taken from the propagative bed, attention should be given to stems with small brown or red lesions near the base. These should be eliminated. In spite of the most careful roguing, however, not all of the infected plants can be removed. Later in the nurse bed more can

be eliminated, as diseased plants will not become established as quickly as others and appear slightly off-color. Such plants in nurse beds can recover, be transplanted to producing benches, and then die at any time conditions become adverse. A comparison of the cost of such a plant in a producing bed with that of the same plant in a nurse bed will readily show why critical roguing of young plants is highly desirable.

Here again the importance of watering procedures cannot be over emphasized. Even though the plants in a nurse bed are highly resistant to infection, overwatering can nulify this advantage. In mother blocks each variety or lot should be watered independently according to their individual needs.

Overwatering can spell disaster

Future Prospects

Research and modifications of some of the cultural practices during the past year have opened up the possibilities of new approaches to old problems. The introduction of mist propagation has apparently given us a remarkably efficient method for the application of chemicals to propagative stock. A knowledge of the means of carry-over and host relationship of the stem rot organism has shown us the point at which control measures can be effectively applied. It is also readily apparent that the development and use of a soil mixture which cannot be overwatered would be a tremendous step not only in disease control but in all phases of canation culture. Research at the experiment station now concerns itself with the application and extension of these possibilities.

Your editor

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