



Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A AND M COLLEGE

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Control of Fusarium Stem Rot of Carnations with Fungicidal Cutting Dips by L. J. Petersen

The basis for experimentation with fungicides as carnation cutting dips is founded on this postulate: cuttings carrying Fusarium roseum f. cerealis may not be detected and eliminated (discarded) by established "culturing" procedures. (1) Therefore, the possibility exists that spores may be carried over on infested cuttings. These spores may become a source of inoculum for infection of cuttings in the propagative stage. With this in mind and also cognizant of the fact that steaming of propagative beds is regularly practiced, the problem is theoretically narrowed to elimination of spores from the cutting. Suitable cutting dips provide a means of accomplishing this objective. Further evidence in favor of treating cuttings in the pre-propagative stage is that healthy, rooted carnation cuttings may become resistant to attack by Fusarium roseum soon after planting in the nursery bed. (2)

In view of this, the conclusion that fungicides used as a dip can be an effective control measure is beyond doubt. However, a dip fungicide in order to be effective should have the following properties: (1) must be bactericidal as well as fungicidal, i.e., effective against all potentially harmful pathogens, (2) must not be phytotoxic, (3) should be reasonably safe to handle and preferably, inexpensive to use. It is the purpose of this paper to present the results of experimental work designed to find a fungicide with these

properties. Clorox proved to be too phytotoxic at concentrations effective in eliminating the pathogen consequently its use has been limited (3). Furthermore, in practice, clorox was not 100% effective as a dip material when large numbers of cuttings were treated.

Experimental procedure and results

A spore suspension of Fusarium roseum f. cerealis containing 100,000 macrospores/ml. was prepared. The cuttings were inoculated by immersion in this suspension for 5 seconds. The cuttings were then dried and dipped for 5 minutes in the test solution. Rooting hormone was applied and the cuttings rooted under mist.

Rimocidin, Catechol, 3 different quinones and Pano-drench 4 were screened by laboratory assays. Only 2 of these, Rimocidin and Pano-drench 4 were effective in inhibiting growth of F. roseum. Greenhouse tests were then initiated on cuttings of Red Sim and Miller's Yellow carnations. Treatments consisted of 12 cuttings per variety with each treatment replicated 3 times. A total of 72 cuttings was used per treatment plus appropriate inoculated and non-inoculated controls. The results are summarized in Table I.

From a study of the results it was obvious that only the Pano-drench 4 treatment was effective.

Table I.--Amount of disease resulting after dipping 2 varieties of carnation cuttings infested with Fusarium roseum f. cerealis for 5 minutes in various fungicidal solutions.^{a/}

| Treatment | Concentration of dip solution | No. of plants with disease symptoms at termination of experiment | | Mean length of lesion in millimeters | |
|--------------------------------|-------------------------------|------------------------------------------------------------------|---------|--------------------------------------|-------------|
| | | Miller's Yellow | Red Sim | Miller's Yellow | Red Sim |
| Rimocidin | 1000 PPM | 36 | 36 | 30 | 33 |
| Pano-drench 4 Inoculated check | 1:50 (.6% active) | 1 | 2 | less than 1 | less than 1 |
| Non-inoculated check | | 36 | 36 | 38 | 38 |
| Non-inoculated check | | 2 | 1 | less than 1 | less than 1 |

^{a/} Disease readings made 16 days after transplanting rooted cuttings into the nursery bed. A total of 36 cuttings of each variety per treatment were used.

In another trial, a dilution of panogen Experimental Material #13849 at 1 ml/6 liters of water was tried. This corresponds to the manufacturer's recommendation for Pano-drench 4 of 1 tsp/3

gallons water as a soil drench. The results as set forth in Table II indicate that this solution is effective in eliminating the inoculum on the cuttings.

Table II.--Results of test in which infested carnation cuttings were dipped for 5 minutes in a solution of Panogen Experimental Material Code No. 13849 at the rate of 2.66 ppm active ingredient. ^{a/}

| Treatment | No. of cuttings with symptoms ^{b/} | | Average length of lesions in millimeters ^{2/} | |
|-------------------------------------|---------------------------------------------|-----------------|--------------------------------------------------------|-----------------|
| | Red Sim | Miller's Yellow | Red Sim | Miller's Yellow |
| Panogen Experimental Material 13849 | 0 | 0 | 0 | 0 |
| Non-inoculated control | 0 | - | 0 | - |
| Inoculated control | 36 | 33 | 38 | 33 |

^{a/} Panogen Experimental Material 13849 contains the same active ingredient as Pano-drench 4 and is being tested as a dip material. This concentration is the same as that recommended for Pano-drench 4 when used as a soil drench, approximately 1 tsp./3 gallons of water.

^{b/} Readings taken at the end of the propagative period. A total of 36 cuttings in 3 replications per variety in each treatment were utilized.

Recommendations

Laboratory tests have demonstrated that Pano-drench 4 at the rate of 2.63 ppm active ingredient (approximately 1 tsp/3 gal.) was also effective in completely inhibiting the growth of the bacterial wilt organism (Pseudomonas caryophylli). This, coupled with its effectiveness in eliminating F. roseum f. cerealis from cuttings indicates that it may have considerable promise as a dip material.

Subsequent tests have indicated, however that leaf tissue is injured and rooting is

inhibited when cuttings are stored after treatment with Pano-drench 4. Thus it is essential that CUTTINGS SHOULD NOT BE STORED AFTER THE DIP TREATMENT.

The material was not phytotoxic if cuttings were stuck immediately after the dip treatment.

Some precautions should be used in handling the Panogen compounds. Theoretically Pano-drench 4 is toxic to humans at an intake of approximately 7 oz. by the average man.

While ordinary safety precautions are probably adequate, it is recommended that persons using the material should wear rubber gloves. If material is splashed on the skin it should be scrubbed off with soap and water.

Literature cited

1. Baker, Ralph. 1955. Thinking about carnation diseases. Colo. Flo. Gro. Assoc. Bul. 68.

2. Baker, Ralph. 1955. Resistance of carnations to Fusarium stem rot in the nurse bed. Colo. Flo. Gro. Assoc. Bul. 73.
3. Baker, Ralph. 1956. Control of Fusarium Stem Rot with Cutting Dips. Colo. Flo. Gro. Assoc. Bul. 76.

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