

Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A AND M COLLEGE

Ray App, Secretary, 4434 Lowell Blvd.,
Denver, Colo.

Bulletin 76

February 1956

Control of *Fusarium* Stem Rot With Cutting Dips

by Ralph Baker

A recent summary¹ of the latest information concerning *Fusarium* stem rot has underscored 2 important considerations with regard to the control of this disease. First, carnation (of the Sim varieties) are susceptible in the propagative operation and immediately thereafter. As steam pasteurization of the nurse bed is a common practice, it is likely that the period of danger can be confined to the propagative stage only. Secondly, a primary means of carry-over is by means of spores borne on the cuttings. Because of this the usual sanitation practices are not the complete answer to this problem; further, the use of cultured cuttings in no way eliminates the pathogen.

One facet of the problem of controlling *Fusarium* stem rot may be centered about the elimination of the spores from the cuttings. Current recommendations in this regard involve periodic sprays with Captan or Manzate while the cuttings are still on the motherplant. Observations and reports have indicated that under this treatment the inoculation potential is suppressed substantially but not completely. Another method of eliminating inoculum from cuttings could be by means of fungicidal cutting dips. It is the purpose of this paper to present the results of exploratory work along this line.

The practice of using cutting dips has been frowned upon in the past. While a fungicide may control one type of pathogen,

it may be ineffective against another. This of course means some organisms may be transferred in a dip from diseased material to clean cuttings in the same solution. Thus a dip should be all inclusive e.g., effective against all pathogens.

Experimental

Cuttings were inoculated by immersion in a spore suspension of *Fusarium roseum* f. *cerealis* for 5 seconds. The suspension contained 100,000 macrospores/ml. The cuttings were dried and then dipped for 5 minutes in the test solution. Agrimycin 100 at the rate of 200 ppm. was incorporated to check bacteria in any dip which had fungicidal properties only. The cuttings were rooted under mist after treatment.

¹ Baker, Ralph. 1955. Thinking about carnation diseases -- 1954-1955. Colorado Flower Growers Bulletin 68.

IN THIS ISSUE

Carnation Cutting Dips

Gleanings from Texas Short Course

Preliminary tests indicated that zineb (4:1000) and tannic acid (5% solution) were ineffective in controlling *Fusarium* stem rot. Intermediate control was achieved with Captan (1:1000) and Hyamine 2389 (1:500). A solution of 10% chlorox in cold water (no Agrimycin 100 added) containing a trace of detergent was almost completely effective. Relative disease ratings in this test were made at the end of the rooting period.

On the basis of this preliminary test a larger test was set up in which the cuttings were transferred to flats after rooting. Disease ratings were made after the plants had been in the flats 50 days. Treatments contained 12 cuttings each, replicated 3 times. The results are summarized in Table 1.

Table 1.--Disease resulting after treating cuttings with various dips.

It is quite evident that the only effective treatment was the 10% chlorox dip.

The Chlorox Dip

While the 10% chlorox dip was capable of almost completely controlling the stem rot organism, some phytotoxicity resulted. The rooted cuttings did not recover quickly from the shock of transplanting. The leaves of these plants lost their bloom and the first terminal shoot was somewhat aborted. Thus it seemed desirable to test the minimum strength of chlorox solution necessary for elimination of the pathogen.

Accordingly, a test was set up comparing chlorox dips at 1%, 5%, and 10% concentration. Disease ratings were made at the end of the rooting period (17 days). The results recorded in Table 2, indicated that a 5% chlorox dip was effective in controlling the disease.

Figure 1 compares the relative growth of the chlorox-treated plants with the uninoculated checks 20 days after transplanting to flats. The 5% treatment was slightly phytotoxic when compared with the control but much less so than the 10% treatment. The 1% treatment was not effective in controlling the disease.

Dip treatment	Concentration	Number of plants dead at termination of experiment ¹	Mean disease rating (0-5) ²
Mathieson 1084	50 ppm	35	5.
Mathieson 1084	100 ppm	34	4.9
K MnO ₄	1:1000	31	4.8
Captan	1:1000	24	4.2
Hyamine 2389	1:500	29	4.1
Chlorox	10%	0	.6
Inoculated Control		35	5.
Uninoculated Control		0	.1

¹ Total number of plants each treatment = 36. Disease ratings taken 50 days after rooted cuttings transplanted to flats.

² Disease index ratings 0 (no symptoms) 5 (plant dead at termination of experiment)

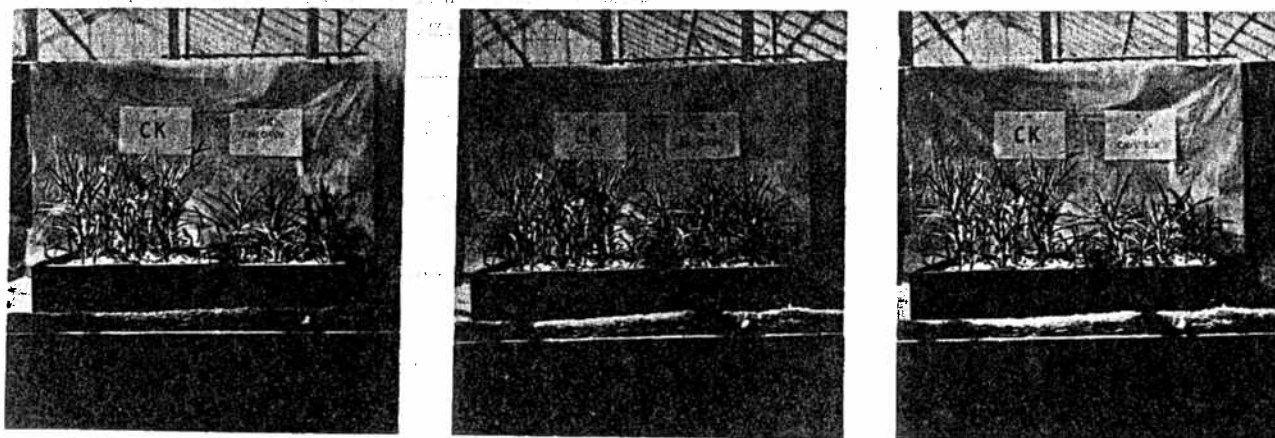


Figure 1.--Comparison of the growth of chlorox treated cuttings with the uninoculated control 20 days after transplanting to flats.

Table 2.--Disease resulting after treating cuttings with dips containing various concentrations of chlorox. Each treatment contained 36 cuttings.

Concentration of chlorox	Average height of lesions from base of cutting in mm.	Number of cuttings with lesions	Mean rooting index (0-3) ¹
10%	nil	1	3
5%	nil	1	2.9
1%	10.	22	1.5
Inoculated control	18	36	.2
Uninoculated control	0	0	3.

¹ Rooting index: 0, none; 1, poor; 2, good; 3, excellent.

Significance of results

While chlorox dips appeared to control Fusarium stem rot of carnations to a considerable degree, some phytotoxicity was observed as a result of the treatment. Thus the value of such a technique may be confined to the following categories:

1. Specialized disease-free stock programs. It is evident that complete disease control must take into account any inoculum borne on the cuttings. Accordingly, in specialized programs it may be possible for the operators to exercise the extreme care necessary after the shock of treatment.
2. In research. It is not desirable in critical experiments for cuttings to be periodically sprayed with Captan before use (as, for example, in the dip trials reported in this paper). Neither is it desirable for a high percentage of cuttings in uninoculated controls to be diseased. Thus the only method now known for obtaining stem rot-free cuttings without periodic fungicidal

sprays is by means of a chlorox dip coupled with strict sanitation practices thereafter. Cuttings used in research at Colorado A & M are produced from mother plants which were so treated.

3. Commercial operations. It is conceivable that in an emergency certain operators who are willing to exercise great care in the propagative and nurse bed stages of culture may wish to control an epidemic of Fusarium stem rot with chlorox dips. Some growers have used a 10% dip successfully; others have not had great success. There is evidence that timing is slowed up somewhat. Certainly cuttings are more susceptible to many disease organisms if reinfestation occurs.

The 5% chlorox dip has not been used commercially. Due to the decreased phytotoxicity of this solution in comparison with the 10% dip, greater success may be achieved. Small preliminary trials are highly desirable before any large-scale dip program is initiated.

Gleanings from the Texas Short Course-1956

Robert Jaska, Ag. Engr. working at the Texas Agr. Exp. Sta.

Most desirable air velocity--100 to 200 feet per minute.

It is possible to have too much water

flowing through the cooling pad. If film too heavy, static pressure increased and less air moved by fans.

Change water once in a while to get rid of accumulated salts.

Power requirement-- 3700 cfm, 1/3 HP fan requires 500-600 watts.

Steve Ray of Furrow's, Guthrie, Okla.

Their cost of installing cooling on 45M square feet and operating the first year was \$6000. They made \$9000 more in crop the first year. Two to two and one-third cents per foot per year was cost for five months operation. Add to this depreciation on equipment (depreciate over five years and replace pads once a year) and total cost of cooling is near six cents per square foot per year. Cost of all metal installation should be around 20 cents per square foot.

Bert Oram, Lexington, Kentucky, retail florist
---"Records control your business. Without records it controls you. Accountants should

be paid to tell you how to make more money-- not what you have or have not made. If they do not tell you the mistakes you are making in your business, they are not really doing you much good."

D. C. Kiplinger of Ohio State University on small pot plants--They grow 6 per sq. ft. in winter, 4 per ft. in summer. They use the best soil mix they can make and feed the plants from the start. 3½-inch plastic pots made by the Union Products, Inc., Leominster, Mass., have been very satisfactory for these small pot plants. Cost of these pots is just over three cents and they are much lighter than clay pots. Better varieties of mums for small plants are Bonnaffon, Queen of Pinks, Delaware, Portrait, Wilson's White.

*Your editor,
W D Holley*

COLORADO STATE FLOWER GROWERS ASSOCIATION

OFFICE OF EDITOR

W. D. HOLLEY

Colorado A and M College
Fort Collins, Colorado

FIRST CLASS