A COMPARISON OF THE METHODS USED IN CULTURING CARNATIONS

by

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A number of recent publications have described the technique of culturing carnations in order to produce pathogen-free stock (3, 4). This technique has been used at Colorado State University (C.S.U.) since 1955 and has successfully led to the control of the vascular wilt disease of carnation. The C.S.U. method of culturing differs, however, in at least one respect from that described in the literature. Therefore tests were initiated to determine whether there were any differences in the efficacy of the method reported in the literature and the modification used at Colorado State University.

The method reported in the literature is as follows: Each cutting is placed in a test tube containing 1:9 solution of commercial Clorox plus 0.10-0.25% Dreft so that the lower internode is covered. After 5 minutes, the cutting is placed on absorbent paper toweling and the basal 1/2 in. is cut off with a sterilized razor blade and discarded. Thin slices (1 mm) of the stem are cut off from the basal portion of the cutting and placed in nutrient broth. The test tubes containing the slices in broth are incubated at room temperature while the cutting is stored. Ten to 14 days later the broth is inspected and if it is cloudy or contains mycelium the cutting is eliminated. The cutting is retained if no growth of organisms is apparent in the broth.

The method used at C.S.U. is similar except that rather large (3-5 mm) sections are cut from the base of the cutting and surface sterilized in Clorox solution. After 5 minutes the sections are placed directly in the broth.

It is known (1) that organisms in the vascular system of carnations may be present at one area of the stem but not at another. Thus the C.S.U. method samples a larger section of the base of the cutting and thus might detect areas of infection not picked up by the other method. Alternately, in the C.S.U. method any organism within the stem section would have to penetrate dead Clorox-treated tissue in order to reach the broth. Thus both of these methods may have advantages and disadvantages. The experiment described below was designed to test the merits of these techniques.

Table 1.--Number of tubes infested with P. caryophylli using the modification of the culturing technique employed at C.S.U. (A) and that currently described in the literature (B).

Experiment Number	Dilutions of bacteria used to inoculate cuttings											
	1:0		1:10		1:100		1:1000		1:10,000		Control	
	A	B	A	B	A	B	A	B	A	B	A	B
1	3[a]	5	0	2	1	3	0	0	0	0	0	0
2	2	0	0	0	0	0	1	0	0	0	0	0
3	7	5	5	2	0	2	0	0	1	0	0	0
4	3	2	5	4	0	1	0	0	1	2	0	0
5			4	3	1	0	0	1	4	2	0	0

[a] Sections of 10 cuttings were cultured for each dilution by means of each method.

The cells from a vigorous 3-4 day old culture of Pseudomonas caryophylli[1], incitant of bacterial wilt of carnation, were suspended in sterile water. This suspension was diluted at 1:10, 1:100, 1:1000, and 1:10,000. Cuttings were placed in these suspensions and also a sterile water control. After 1 to 3 hours these cuttings were cultured according to the 2 methods previously described.

In each experiment 10 cuttings were cultured by each method from each of the suspensions. Thus 120 cuttings were cultured in each experiment. Experiments were repeated so that there was a total of 5 in all.

The results are recorded in Table 1. There apparently was very little difference in the number of isolates of P. caryophylli obtained by either method. The total number of isolates detected in the broth by the method described in the literature was 34; the C.S.U. modifica-

[1] The original culture of P. caryophylli was kindly supplied by Dr. Robert Dickey, Department of Plant Pathology, Cornell University, Ithaca, New York

tion detected 38. Neither method consistently yielded more isolates than the other.

Probably all the cuttings inoculated by the method described were not infected (2). Thus the data should be interpreted only as a measure of the relative efficiency of the 2 methods.

From these experiments it is concluded that there is little difference between the 2 methods with regard to their ability to detect the presence of P. caryophylli in carnation tissue. The modification used at C.S.U., however, eliminates some time-consuming steps. Also there were fewer tubes containing contaminants (organisms other than those pathogenic to carnations) when this method was used. There was a total of 116 contaminated tubes, when the C.S.U. modification was used and 141 when the other method was employed. Thus in practice the former technique would appear to have a number of practical advantages.

Abstracts of papers presented at the recent American Society for Horticultural Science meetings at Oklahoma State University.

Chemical Control of Plant Growth

Lindstrom, R. S. and N. E. Tolbert, Mich. State Univ. Effect of CCC and related compounds on chrysanthemums and poinsettias. The action of 2-chloroethyl trimethylammonium chloride (CCC), 2-bromoethyl trimethylammonium bromide (BCB), and allyltrimethylammonium bromide (AMAB) was tested on the growth and flowering of chrysanthemum and poinsettia. The chemicals were most effective when applied as a soil drench or mixed directly with the soil. All chemicals were effective when 100 ml. of 10^{-2}M solution was poured on the soil of a 4-inch pot. A 5 X 10^{-2}M solution produced more severe effects. The most characteristic growth alteration was the development of very short plants with thick stems. The number of leaves was not altered nor was there a substantial change in the number of days to flowering. The leaves of chrysanthemums were darker green and thicker than on untreated plants. The weight of treated plants was not severely reduced by these treatments. Less wilting during growth and improved keeping quality of the plants after flowering was observed. Application of gibberellin prior to flowering of treated chrysanthemums produced a more satisfactory floral inflorescence. Phosphon treatments of chrysanthemums were effective at lower concentrations than CCC. With many other plants, CCC at similar concentrations was more effective than phosphon.

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Stuart, Neil W. and H. M. Cathey, USDA, Beltsville, Md. Comparison of the growth-retarding activity of phosphon and CCC for certain ornamental plants. Phosphon (2,4 Dichlorobenzyl tributyl phosphonium chloride) and CCC retarded stem elongation of many ornamental plants when applied as a soil amendment at potting or as a soil drench to small plants. Phosphon induced the development of chlorotic patterns on sprayed leaves unless combined with antagonizing agents such as sodium potassium chlorophyllin or the monocalcium salt of polymerized aryl alkyl sulfonic acids. CCC was relatively inactive when applied as a foliar spray. Applied as a soil drench, CCC retarded the growth of poinsettia, hydrangea, and Ligustrum, while phosphon stunted or killed these plants. Equal amounts of both compounds retarded the growth of Coleus equally. Phosphon was considerably more active than CCC in retarding growth of chrysanthemum, salvia, and lilium. Phosphon stimulated and CCC retarded growth of Fatshedera lizei.

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Payne, R. N. and S. C. Wiggans, Okla. State Univ. The effects of Phosphon on the growth and development of several lily varieties. Bulbs of five varieties of Lilium longiflorum (Ace, Croft, Erabu, Georgia, and Giganteum) were potted in soil mixture of equal parts of soil, peat moss, manure, and sand. Phosphon-D dust formulation containing 10% active ingredient was incorporated in the soil mix at rates of 0, 50, 100, and 200 grams per cu. ft. of soil mix. Plants of each variety and treatment were forced at 50° and 60° F. In general, plant height and above ground dry weight decreased as the concentration of phosphon was increased. There was little difference in flower and bud numbers or in flower dry weight between treatments within varieties. Better quality plants developed in the 50° treatment although they were delayed in maturity. Pronounced phy-

totoxicity occurred, particularly at the higher concentration. There were marked differences between varieties in response to phosphon.

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pH, Phosphorus and Lily Scorch

Davidson, O. Wesley, Rutgers Univ. Leaf scorch of Croft lilies as influenced by soil pH and phosphorus supply. A series of experiments was conducted with Croft lily bulbs grown under known conditions (by courtesy of the Oregon Experiment Station), as well as under unknown conditions (commercial sources), with respect to West Coast soil pH and phosphorus supplies. Subsequently, these bulbs were greenhouse-grown under specific soil pH and phosphorus treatments. The results showed that plants forced in soils low in phosphorus did not develop significant foliar scorch in any soil treatment. In the presence of available soil phosphorus, however, the intensity of foliar scorch increased, both as pH values decreased below 6, and as the phosphorus supply increased at pH values below 6. On the other hand, abnormally heavy applications of phosphorus did not induce scorch in soils maintained at pH values above 6.5. Bulbs which had been produced on well-limed and well-phosphated soils showed no apparent symptoms of insufficient phosphorus when this nutrient was not supplied during the forcing season. Bulbs which had been produced on acid soils supplied with phosphorus, or on well-limed soils not supplied with phosphorus, showed mild symptoms of insufficient phosphorus when forced in soils not fertilized with this nutrient.

Literature Cited

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2. Jenkin, J. E. E. 1956. A study of methods for the detection of vascular wilt pathogens in cuttings of carnation (Dianthus caryophyllus). M. S. Thesis, Cornell University, Ithaca, New York. 65 p.

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4. Tammen, J., R. R. Baker, and W. D. Holley. 1956. Development and production of pathogen-free propagative material for ornamental plants. V. Control of carnation diseases through the cultured-cutting technique. Plant Disease Reptr. Suppl. 238:72-76.

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