Phosphoric Acid and Monocalcium Phosphate Compared as Sources of Phosphorus for Carnations

by

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Crude phosphoric acid, a relatively recent agricultural source of phosphorus, may be substituted pound for pound for monocalcium or treble superphosphate as a source of phosphorus for carnations. Slight increases in yield from plants receiving phosphoric acid were not statistically significant and were probably due to slight injury caused by adding monocalcium phosphate directly to the medium. The quality of growth as measured by weight per inch of stem was not significantly different between two levels of phosphorus from the two sources.

Messing (2) found that low phosphorus was more detrimental to young carnations than to older ones. High levels of phosphorus increased the yield of flowers slightly the first year but the differences largely disappeared the second year. Holley (1) found 2 to 5ppm phosphorus (Spurway) in the soil at planting time would maintain a healthy crop for at least a year. Yield or grade of carnations was not affected by considerably higher levels of phosphorus in the soil.

Rooted cuttings of Pink Sim carnation were planted in 10-inch pots of volcanic scoria and supplied with two levels of phosphorus from 52% crude phosphoric acid, and two levels of phosphorus from monocalcium phosphate, from March, 1959 to May, 1960. There were three pots of three plants in each phosphorus treatment. Monocalcium phosphate is normally used in complete nutrient solutions at approximately 0.5 grams per gallon. This amount supplies one millequivalent of H_2PO_4 per liter. Although it contains somewhat less phosphorus, 52% phosphoric acid was added at the same rate for purposes of comparing the two sources. A second set of comparisons were made between 1.25 grams/gallon from each of the sources. Due to its relative insolubility, monocalcium phosphate was added to the scoria each time a 50-gallon bottle of solution was started. The acid was incorporated in the complete nutrient solution which contained per 50 gallons:

calcium nitrate	175 grams
sodium nitrate	6 "
potassium chloride	55 "
magnesium sulfate	50 "
boric acid	0.32 "
zinc sulfate	0.03 "
copper sulfate	0.03 "
iron sulfate	0.56 "
manganese sulfate	0.13 "

The weight of flower and stem in grams and the length in inches were recorded for all flowers produced. All abnormal flowers were noted. Yield, mean weight, mean length, and a weight to length ratio are included in table 1. A carnation of good grade should have a minimum weight to length ratio of 1.00.

Slight injury followed the second application of monocalcium phosphate, probably because the scoria was dry at the time of application. This injury is believed to be the cause for the 7 to 19 percent decrease in yield. However, these de-

Table 1. The effects of 2 sources of phosphorus on Pink Sim carnation.

Source of phosphorus	Grams/gallon applied	Yield	Mean length in inches	Mean weight in grams	Weight/ length
Monocalcium phosphate	0.50	199	27.3	32.6	1.19
	1.25	180	29.2	34.7	1.19
Phosphoric acid 52%	0.50	215	26.1	30.9	1.18
	1.25	221	27.3	30.9	1.13

creases were not uniform from pot to pot and were not significant when analyzed statistically.

Crude phosphoric acid was equal or better than monocalcium phosphate when used at 0.5 grams per gallon of nutrient solution. Increasing this amount by 2½ times gave no increase in yield or quality of stem and flower. The number of abnormal flowers was very low and was not affected by source or level of phosphorus feeding.

Since phosphoric acid is liquid it is well adapted to the treatment of irrigation water and for liquid feeding. Treble superphosphate is most easily added before planting, or as top dressing to older plants. Where phosphoric acid is available at an economical price, 1 to 1 1/4 pounds per 1000 gallons of irrigation water should be adequate for most greenhouse crops.

Literature Cited

(1). Holley, W. D. Carnations are not sensitive to different soil phosphorus levels. Colo. Flow. Gro. Bul. 70. August 1955.

(2). Messing, J. The visual symptoms of some mineral deficiencies on perpetual flowering carnations. Carnation Craft 32. July-August 1955.