Controlling Height Of Tomato Transplants With Low Phosphorus

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A low phosphorus (P) fertilizer program is one alternative to chemical plant growth regulators growers can use to control the height of many plants in the greenhouse. Some general information about using low P to control growth is available (McAvoy, 1998) but specific "how-to" instructions are not. In earlier *Floral Notes* articles I discussed the effects of low P on bedding plants and poinsettias (Cox, D.A. 1999a, 1999b). In the case of bedding plants the number of doses of low P fertilizer and the growth medium were both important factors in determining the degree of growth control achieved using this method. Tomatoes are much more sensitive to low P and growth medium type compared to the flower species so they must be handled a little differently.

In recent years "phosphorous starvation" has been promoted as a way of controlling the growth of bedding plants. If carefully managed, a mild to moderate phosphorus (P) deficiency will result in a desirable reduction in growth and no foliar symptoms of P deficiency.

Several low P analysis water-soluble fertilizers (e.g., Peter's 20-0-20, 20-1-20 and 20-2-20) are available to use for controlling growth. A potential challenge is to avoid too much growth inhibition and/or the appearance of deficiency symptoms by using too little P. Timing of the low P period is also important because, like chemical plant growth regulators, nutrient deficiencies have their greatest effects on growth early in the crop cycle during the period of rapid vegetative growth. How can a low P fertilization program be used to control the growth of tomato bedding plants?

How the plants were grown

Seeds of 'Marglobe' tomato were sown in 144-cell plug trays. Six-week old seedlings were transplanted to 804 tray inserts filled with Fafard 3B, Metro Mix 360, or a "2:1:1" soilless mix. The 2:1:1 mix consisted of sphagnum peat moss, perlite, and vermiculite (2:1:1, by volume) to which I added 5 lbs./cu. yd. of dolomitic limestone, but no starter charge or other fertilizer material.

Plants in each growth medium were divided into four groups to receive fertilizer treatments. The control group received 20-10-20 and another got 20-0-20 twice a week from start to finish. A third group got 20-0-20 four times (over two weeks) starting at transplanting and then 20-10-20 to finish. The fourth groupgotr 20-0-20 six times (over three weeks) and then 20-10-20. The fertilizer rate was 150 ppm N in all treatments.

Seeds were sown in late January and the plants finished in late March. Plant growth - height and shoot fresh weight - were measured at the end, five weeks after transplanting.

Results

Low P treatment and growth medium both had significant effects on the height of tomato (Figure 1). Tomato plants in all three mixes receiving any of he low P treatments were shorter than those fertilized continuously with 20-10-20. Shoot fresh weight paralleled plant height. These results are contrary to what I found with petunias, Impatiens, French marigold, and African marigold; only plants growing in the 2:1:1 low P mix were affected by low P to the extent that differences in growth were visually apparent.

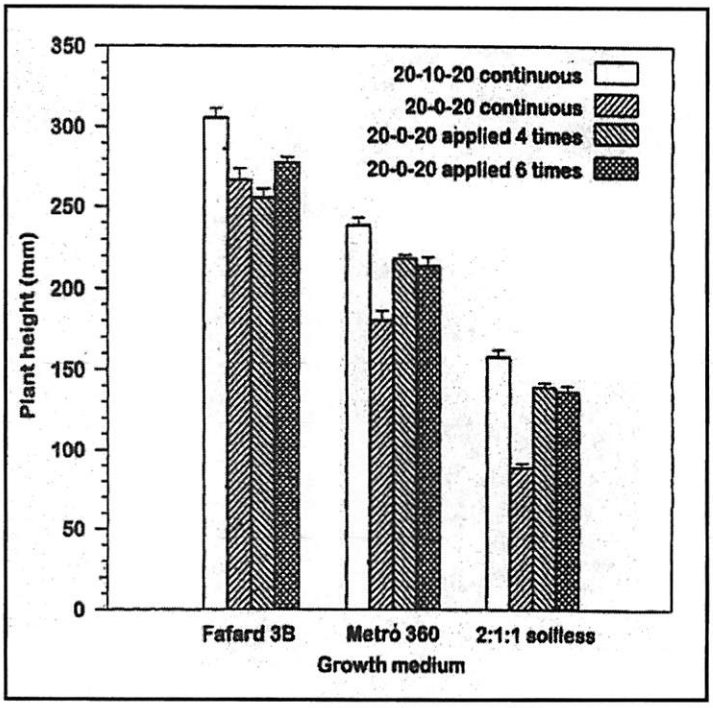

Figure 1. Effects of growth medium and phosphorus fertilization on the height of 'Marglobe' tomato (1 inch =25.4 mm).

Plants receiving 20-0-20 continuously, start to finish, displayed P deficiency symptoms (purple coloration of the leaves and stems) in all three mixes. Symptoms were very minimal or absent when 20-0-20 was applied 4 or 6 times and then 20-10-20.

Growth medium, apart from P treatment, had a significant affect on tomato growth. Plants were largest in Fafard 3B and smallest in the 2:1:1 mix with Metro Mix 360 plants being intermediate in size. Plants grown in the 2:1:1 mix were too small regardless of P treatment. Growth differences between mixes were not as pronounced with petunia and other flowers (Cox, D.A. 1999a) Perhaps the starting P level and particularly EC (salts level) explain the response of tomato to growth medium (Table 1).

Recommendations

Tomatoes in paks appear to be quite sensitive to low P during greenhouse production. For this reason, contrary to my findings with flowering bedding plants (Cox, D.A. 1999a), I recommend using a commercial soilless mix like Fafard 3B containing a significant fertilizer starter charge

Table 1. Phosphorus and EC levels in growth media at planting by the SME method

GrowthMedium	P level (ppm)	EC (ds/m)
Fafard 3B	37	1.85
Metro Mix 360	3	2.58
2:1:1 soilless	5	0.36

rather than a specially prepared low P mix. Plants should be fertilized with 150 ppm N from 20-0-20 four or six times over the first three weeks after transplanting to paks and then with 20-10-20 or another high P fertilizer to finish. ***Plants must receive fertilizer at least twice a week throughout the crop.*** This will result in desirable height reduction and no P or other nutrient deficiency symptoms. Continuous fertilization with 20-0-20 is not recommended for tomato because it may result in too short plants and/or the development of severe P deficiency symptoms. Commercial tomato growers should run a trail comparing tomato yields produced from low P transplants versus yields from transplants produced using standard greenhouse fertilization to determine if there is any effect of low P on early productivity.

Acknowledgment

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References

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