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USE OF MEFLUIDIDE AS A CHEMICAL PEACH THINNING AGENT

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INTRODUCTION

Peach thinning is an expensive, time consuming orchard operation, but one which must be undertaken to prevent tree overproduction and to insure adequate fruit quality. Hand thinning is considered the most satisfactory method for adjusting cropload and obtaining uniform fruit distribution. Mechanical tree shaking saves time and expense, but obtaining the optimum number and distribution of fruit on the tree is difficult. Chemical thinning would have advantages over both methods if consistently adequate yields could be obtained with no sacrifice in fruit quality or tree longevity. No chemical thinning agent is currently labeled for use on peaches.

Mefluidide (N-[2,4-dimethyl-5[[(trifluoromethyl)sulfonyl]amino] phenyl]acetamide) is a recently introduced plant growth regulator which blocks gibberellin biosynthesis and retards vegetative growth of several plant species. Little or no published information is available regarding its potential use as a chemical peach thinner. This study was conducted to determine the effects of mefluidide on fruit thinning, yield, and quality of 'Sentinel' peaches.

MATERIALS AND METHODS

Mefluidide was applied to non-irrigated, 18-year-old 'Sentinel' peach trees at the Texas A&M Fruit Research Station at Montague, Texas. Concentrations of 0, 750, and 1,500 ppm were applied in 1983 at pink bud (March 14), full bloom (March 22), and 6-mm ovule length stage (May 9) in a 3 x 3 factorial randomized block experiment with three replications of single tree plots. The 6-mm ovule length stage was determined by selecting 10 representative fruit from each tree and slicing longitudinally to expose the greatest ovule length.

Sprays containing 0.1% X-77 surfactant were applied to the point of drip using a 4-gallon hand sprayer. Control trees were not sprayed or hand thinned. Ambient temperatures ranged between 10 and 13°C at each application, and wind movement was minimal.

At harvest, fruit were sorted into two size categories: less than 2 1/4 in., and 2 1/4 in. and larger. Fruit weights were recorded, and samples consisting of 10 representative fruit from each tree in the large size category were collected. Firmness was determined using a Magness-Taylor pressure tester, equipped with a 5/16 in. tip, on the pared blush and non-blush side of each fruit. The samples were then frozen in polyethylene bags for later determination of soluble solids and acidity.

RESULTS AND DISCUSSION

Mefluidide at 750 and 1,500 ppm greatly reduced yield of fruit in the small (less than 2 1/4 in. diameter) size category and increased production of marketable fruit (2 1/4 in. and larger) compared to unthinned controls (Table 1). Increasing the concentration of mefluidide from 750 to 1,500 ppm was of little benefit. Yields of all trees used in this study were low because of a combination of advanced tree age and poor pollination conditions in 1983.

Mefluidide had no significant effect on percentage of soluble solids or fruit firmness but tended to increase titratable acidity (Table 1). The increase in fruit acidity, combined with a trend toward increased fruit firmness, indicates a possible delay in fruit maturation with mefluidide application.

Application time had little effect on production of small (less than 2 1/4 in. diameter) fruit or total yield (Table 1). However, sprays applied at the 6-mm ovule length stage resulted in slightly increased production of the larger fruit. Use of a chemical thinning agent at advanced stages of fruit development (i.e., 6-mm ovule length stage) has another advantage in that it allows the thinning severity to be adjusted to variations in natural fruit set.

Fruit quality was not greatly affected by time of application (Table 1). However, fruit acidity tended to be highest when sprays were applied at the pink bud stage. The increase in acidity, again indicating a possible delay in fruit maturation, could be partially due to the 2- week delay in vegetative bud development when 750 or 1,500 ppm mefluidide was applied at pink bud. No phytotoxicity was evident with application of 750 ppm at any time of application. Some leaf distortion was noted when 1,500 ppm was applied at the 6-mm ovule length stage.

The thinning effect of pink bud applications appeared to be through prevention of flower bud development. The time of bloom was not generally affected by pink bud applications even though vegetative bud break was delayed. It is uncertain from this study if mefluidide thins randomly or whether those fruit with weak metabolic sink capacity and poor developmental potential are preferentially removed. The latter would be most ideal and may be the case, since large reductions in small, underdeveloped fruit occurred at both concentrations of mefluidide. Work will be continued to determine effects on tree longevity, optimum rates and timing of applications, and mode of mefluidide action. To date, mefluidide is not cleared for commercial peach production.

Table 1. Main effects of mefluidide concentration and time of application on yield and quality of 'Sentinel' peaches - 1983.

Main effects	Yield (lbs/tree) <2 1/4 in.	Yield (lbs/tree) >2 1/4 in.	Yield (lbs/tree) Total	Soluble solids (%)	Tit. acidity (%)	Firmness (lbs) Blush	Firmness (lbs) Non-blush
Concentration (ppm)							
0	101.7b*	15.0b	116.7b	10.3a	0.58a	13.8a	16.5a
750	39.0a	24.1a	63.1a	10.7a	0.66ab	17.3a	19.1a
1,500	21.8a	23.7a	45.4a	10.2a	0.70b	16.0a	18.4a
Application time							
Pink bud	50.7a	15.9b	66.6a	10.8a	0.70b	16.9a	19.3a
Full bloom	62.0a	22.8ab	84.8a	10.3a	0.58a	15.4a	17.2a
6-mm ovule	49.8a	24.1a	73.9a	10.2a	0.65ab	14.8a	17.5a

*Means separation within columns and main effects by Duncan's multiple-range test, 5%.