Chemical Blossom Thinning of Peaches and Nectarines
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Project Leader: R. Scott Johnson
Cooperators: Harry Andris, Kevin Day, Steve Southwick, Robert Cochran
Location: Kearney Ag. Center, Department of Pomology, University of California, Davis

RESULTS AND DISCUSSION

Introduction

Three chemical blossom thinners, Armothin, Endothall, and Wilthin, were evaluated on 3 peach and nectarine varieties. The materials were applied at 3 rates and at 2 different times during the bloom period. Armothin, at a rate of 3 gals/l00 gals water, consistently thinned about 50% of the flowers. Although there was some phytotoxicity and yields were reduced in some cases, this material appears to have some promise as a thinning aid. Endothall was not very effective as a flower thinner and also caused severe phytotoxicity at the highest rate (2 pints/100 gals). Wilthin was only tested on 1 variety and showed thinning activity at the highest rate (1 gal/100 gals) with no phytotoxicity. Further testing of this material is needed.

Fruit thinning is one of the most expensive cultural practices for stone fruit. A chemical thinning agent to cut down on hand thinning would be a valuable and economical tool. Many materials have been evaluated over the past several decades but none have been consistent enough to encourage widespread use. Recently, several new materials have been introduced which appear to have some promise. The objective of this study was to evaluate these materials.

Materials and Methods

Table 1 shows the materials used and the recommended rates (x) from the companies. For each material, three rates (1/2X, 1X, 2X) were applied based on these recommended rates. Treatments were made on two different dates on each of three varieties (Table 2). The goal was to apply the first treatment at 30-60% bloom and the second at 80-100% bloom. Since the early spray on Mayglo was missed, it was applied on the same date as the late spray but to trees that did not have as many blossoms open. Endothall and Armothin were applied to all three varieties but Wilthin only to Summer Lady peach.

Treatments were made by handgun at a rate of 200 gals/acre. Single tree reps were used with four reps per treatment. Measurements were made of shoot length, flower number and fruit number or six shoots per tree. Follow-up hand thinning was performed on all trees. At harvest, total weight and fruit number per tree were recorded for each pick. Also, 20 fruit samples per tree were analyzed for firmness and percent soluble solids content. Standard ANOVA procedures were followed with treatment separation determined by Duncan's Multiple Range Test at the 5% level.

Conclusions

Of the three materials tested, Armothin appeared to have the most consistent response among varieties and application dates. The recommended rate (1X) reduced the flower number to about half the level of the control in almost all cases (Table 3). The one exception was the late spray to Summer Lady. However, an unexpected rain fell shortly after application on this date and

probably washed off the thinning materials. None of the materials responded as well on this date as they had previously.

Because of this unexpected rain, the Wilthin material could only be evaluated on the early spray to Summer Lady. This is insufficient data to draw firm conclusions but taken together with similar trials elsewhere, it appears the recommended rate is too low. The company will probably revise that rate for future trials.

Endothall did not show much of a thinning effect at the recommended rate (Table 3). Only the early spray to Summer Lady significantly reduced the number of f1owers. The double rate (2X) was often effective but the amount of phytotoxicity to the tree was a major problem. For Spring Bright, where there was substantial leaf area at the time of application, Endothall caused severe phytotoxicity, killing many shoots back to the scaffold. On the other hand, Summer Lady which had very few leaves that had emerged at the time of application, showed only minor phytotoxicity. It may be that Endothall can only be used on those varieties where the flower buds come out well ahead of the vegetative buds.

The problem of phytotoxicity is also a concern with Armothin even at the recommended rate. Summer Lady showed no obvious symptoms but the other two varieties were generally weaker-looking with more yellow leaves compared to the unsprayed controls. There was also some shoot dieback of weaker shoots. The trees did not look as healthy as the controls for at least several weeks after treatment. If a grower uses this material, he must learn to live with these symptoms on his trees. By harvest, the trees looked healthy with no apparent long term negative effects of the treatments.

Even though these materials showed a thinning response, it was not always uniform across the tree. On some shoots, no fruit developed, while other shoots were loaded with fruit. As the hand thinners went through the field removing all but a set number of fruit per shoot, this led to reduced fruit numbers and thus yields in some treatments (Table 4). Maintaining yields in these cases may just be a matter of training thinning crews to compensate for those shoots with no fruit by leaving more on other shoots. Even though the thinning chemical removed about half the fruit on the tree, theoretically there should still be enough for normal crop loads and yield.

Postharvest analyses showed no detrimental effects of the treatments on firmness, soluble solids content (data not shown) or fruit size (Table 5). In some cases there was a trend towards smaller sizes which may be related to the "set back" of the tree when they were sprayed. In future research, this will have to be examined carefully to make sure it is not a problem.

In conclusion, even though these chemical blossom thinners may cause some mild phytotoxicity and increase the potential for reduced yield, they still could be useful as a tool to supplement hand thinning. Armothin was the most consistent among the varieties and the timings used in this experiment. Endothall and Wilthin still need more research to see if increased rates are needed and if different varieties respond the same.

Table 1. Materials used in blossom thinning trials on peaches and nectarines.

Material	Company	Recommended Rate	Chemical Family
Endothall (TD-2337-2)	Elf Atochem	1.0 pint/100 gals. (.13%)	Dicarboxylic acid
Armothin	AKZO-NOBEL	3.0 gals/100 gals. (3%)	Fatty acid amine polymer
Wilthin	Entek Corp.	2.0 quarts/100 gals. (.5%)	Desiccant sulfcarbamide

Table 2. Dates and percent bloom at time of application of blossom thinning materials.

	Early Application		Late Application	
Variety	Date	% Bloom	Date	% Bloom
Mayglo Nectarine	2/14	75	2/14	90
Spring Bright Nectarine	2/23	40	2/28	80
Summer Lady Peach	3/8	30	3/11	90

Table 3. The effect of 3 different blossom thinning materials on percent set in peaches and nectarines. The same letter after values in a column indicate no significant difference (p = .05).

Treatment	% Set (% of control)					
	Mayglo Nectarine		Spring Bright Nectarine		Summer Lady Peach	
Unsprayed Control	.78 a	(100)	.87 a	(100)	.94 a	(100)
Endothall - Early - 1/2X	.79 a	(101)	.85 ab	(98)	.86 abc	(91)
Endothall - Early - 1X	.57 abc	(73)	.78 abc	(90)	.68 bcde	(92)
Endothall - Early - 2X	.66 ab	(85)	.43 e	(49)	.66 cde	(70)
Endothall - Late - 1/2X	.73 a	(93)	.99 a	(114)	.87 ab	(93)
Endothall - Late - 1X	.70 a	(90)	.85 ab	(98)	.81 abcd	(86)
Endothall - Late - 2X	.38 cd	(49)	.59 bcde	(68)	.77 abcd	(82)
Armothin - Early - 1/2X	.32 d	(41)	.72 abed	(83)	.79 abcd	(84)
Armothin - Early - 1X	.40 cd	(51)	.46 de	(53)	.52 e	(55)
Armothin - Early - 2X	.26d	(33)	.15 f	(17)	.12 f	(13)
Armothin - Late - 1/2X	.45 bcd	(58)	.73 abc	(84)	.83 abcd	(88)
Armothin - Late - 1X	.37 cd	(47)	.53 cde	(61)	.81 abcd	(86)
Armothin - Late - 2X	.25 d	(32)	.46 de	(53)	.69 bcde	(73)
Wilthin - Early - 1/2X					.85 abc	(90)
Wilthin - Early - 1X					.76 abcd	(81)
Wilthin - Earlv - 2X					.65 de	(69)
Wilthin - Late - 1/2X					.83 abcd	(88)
Wilthin - Late - 1X					.83 abcd	(88)
Wilthin - Late - 2X					.86 ab	(91)
Significance	.05		.05		.05	

Table 4. The effect of 3 different blossom thinning materials on yield in peaches and nectarines. The same letter after values in a column indicate no significant difference (p = .05).

	Yield (kg/tree)		
Treatment	Mayglo Nectarine	Spring Bright Nectarine	Summer Lady Peach
Unsprayed Control	13.7 abc	40.5 a	31.6 abc
Endothall - Early - 1/2X	12.9 bc	36.1 abc	36.9 ab
Endothall - Early - 1X	12.5 bc	35.1 abc	31.9 abc
Endothall - Early - 2X	13.8 ab	23.6 cde	35.1 abc
Endothall - Late - 1/2X	16.4 a	36.9 ab	36.2 abc
Endothall - Late - 1X	13.9 ab	34.6 abc	42.7 a
Endothall - Late - 2X	10.4 cd	36.0 abc	34.9 abc
Armothin - Early - 1/2X	7.6 de	37.2 ab	30.9 bc
Armothin - Early - 1X	10.4 cd	28.2 abcd	25.3 c
Armothin - Early - 2X	7.6 de	14.9 e	11.9 d
Armothin - Late - 1/2X	10.7 bed	37.6 ab	31.1 bc
Armothin - Late - 1X	10.5 cd	26.5 bcde	28.8 bc
Armothin - Late - 2X	6.8 e	21.8 de	37.3 ab
Wilthin - Early - 1/2X			26.1 bc
Wilthin - Early - 1X			35.7 abc
Wilthin - Earlv - 2X			33.5 abc
Wilthin - Late - 1/2X			32.3 abe
Wilthin - Late - 1X			34.8 abc
Wilthin - Late - 2X			32.0 abc
Significance	.05	.05	.05

Table 5. The effect of 3 different blossom thinning materials on fruit weight in peaches and nectarines. There were no significant differences.

	Fruit Weight (g)		
Treatment	Mayglo Nectarine	Spring Bright Nectarine	Summer Lady Peach
Unsprayed Control	119.5	139.4	161.4
Endothall - Early - 1/2X	113.7	141.3	149.3
Endothall - Early - 1X	117.7	133.8	153.2
Endothall - Early - 2X	I 15.5	132.1	149.2
Endothall - Late - 1/2X	121.1	141.1	150.4
Endothall - Late - 1X	119.5	134.4	163.6
Endothall - Late - 2X	111.3	150.7	162.8
Armothin - Early - 1/2X	106.8	142.7	164.0
Armothin - Early - 1X	114.8	147.5	170.4
Armothin - Early - 2X	113.1	149.4	169.3
Armothin - Late - 1/2X	114.5	150.7	162.4
Armothin - Late - 1X	109.5	148.7	169.3
Armothin - Late - 2X	105.3	145.7	168.9
Wilthin - Early - 1/2X			151.5
Wilthin - Early - 1X			167.4
Wilthin - Earlv - 2X			163.4
Wilthin - Late - 1/2X			164.6
Wilthin - Late - 1X			160.1
Wilthin - Late - 2X			159.0
Significance	NS	NS	NS