Chemical Blossom Thinning of Peaches and Nectarines
1997 CTFA Report

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Chemical thinning of apples has become a standard cultural practice. However, peaches and nectarines have proven to be much more difficult to chemically thin. Dozens of materials have been tested over the last few decades but none have been consistent enough for commercial use. Recently, two blossom chemical thinners, Armothin and Wilthin, have shown enough promise for the companies to pursue full registration on them. This report covers the second year evaluation of these materials. Mist blower trials were continued for a second year but the emphasis in 1997 was on airblast applications to blocks of about an acre each. Also, low biuret urea, a standard fertilizer material, was added to the mist blower trials since there are two scientific articles showing its effectiveness in peach.

Procedure

The three materials used in these experiments are shown in Table 1. The recommended rates from the companies are 1.5 to 3.0% for Armothin and 0.5 to 1.0% for Wilthin. Higher rates were included in the mist blower experiments to test the potential for overthinning. Treatments were made when the trees reached 50 to 90% bloom (Table 2). For the airblast trials the sprayer was calibrated to deliver 100 gallons/acre for Armothin and 200 gallons/acre for Wilthin as per company recommendations. The company protocols also called for tank mixing 1.5 lbs. Rovral/100 gallons with the Armothin and 1 quart Regulaid/200 gallons with the Wilthin.

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

Material	Company	Chemical Family
Armothin	AKZO-NOBEL	Fatty acid amine polymer
Wilthin	Entek Corp.	Dessicant sulfcarbamide
Urea	Various Fertilizer Companies	Fertilizer

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

Variety	Date	% Bloom	Application Method
Mayglo Nectarine	1/31	70	Mist blower
Spring Bright Nectarine	2/24	85	Mist blower
O'Henry Peach	3/5	50	Mist blower
Crown Princess Peach	3/4	85	Airblast sprayer
Sparkling June Nectarine	3/4	65	Airblast sprayer
Loadel Peach	3/7	90	Airblast sprayer
O'Henry Peach	3/7	90	Airblast sprayer

For the mist blower trials, the equivalent of about 100 gallons/acre was applied to each tree. Single tree reps were used with four reps per treatment. Measurements were made of shoot length, flower number and fruit number on eight 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. For statistical analysis standard ANOVA procedures were followed with treatment separation determined by Duncan's Multiple Range Test at the 5% level. In the airblast trials, treatments were applied to solid blocks with no replication so standard statistical procedures would not apply. However, measurements were still made on five shoots on each of six trees per treatment to get some idea of thinning effectiveness. Thinning crews were also timed in a portion of each block and yield estimates were obtained from box or bin counts.

Results and Discussion

Mist Blower Trials. The results with the mist blower were not very encouraging since there was substantial variation from one variety to another (Table 3). Mayglo showed extreme overthinning with all three materials. The highest rates caused extensive shoot dieback and even the lowest rates caused complete fruit removal on many shoots. Reasonable yields were obtained on trees receiving the lowest rates of Wilthin and urea by foregoing hand thinning (Table 4). However, fruit size and fruit quality were both poor. It is perplexing why Mayglo showed such an extreme response when the same block responded much less in 1996. Perhaps the earliness of the season (trees were in bloom on January 31), stresses on the tree (high rainfall in January) or interaction with other chemicals caused the effect. This block will be treated again in 1998 to see if any consistencies emerge.

The other two varieties (Spring Bright and O'Henry) showed much less response to the thinning chemicals (Table 3). Urea did not appear to thin at all and Wilthin showed no statistical thinning response even at a rate 50% higher than recommended by the company. Armothin showed a strong thinning response with Spring Bright and a trend with O'Henry. These results are similar to those obtained in 1996. In general, Armothin at the 3% rate has been successful at removing about half the fruit on the tree.

Airblast Trials. Only Armothin at 2% and Wilthin at 1% were used in these trials. In contrast to the mist blower experiments, Wilthin tended to overthin at the 1% rate (Table 5). Both Crown Princess peach and O'Henry peach were overthinned to the point of

noticeably reducing yield. The other two varieties (Sparkling June and Loadel) responded much better with an overall reduction in fruit of about 50%. Even though there were sections of trees significantly overthinned and others barely thinned, we felt the overall crop load was about right. Therefore, no hand thinning was performed on these trees. At harvest, there were more small and deformed (doubles etc.) fruit on these trees but marketable yield was about equal to the controls.

Armothin gave results more consistent with the mist blower trials. Even though a rather conservative rate of 2% was established by the company, there was still reasonable thinning on a couple of the varieties (Table 5). Sparkling June and Loadel showed only slight thinning and no differences in hand thinning time were observed. Therefore, chemical thinning with Armothin on these varieties was uneconomical. Crown Princess is a variety that shouldn't have been chemically thinned in the first place. Due to low fruit set and high doubling, any thinning was too much.

Table 3. The effect of 3 different blossom thinning materials applied with a mist blower on percent set in peaches and nectarines. Shaded values are significantly different from the control (p =.05).

	% Set (% of Control)					
Treatment	**Mayglo**		**Spring Bright**		**O'Henry**	
Control	27.3 a	(100)	29.4 a	(100)	56.6 ab	(100)
Armothin - 1.5%	3.2 bc	(12)	25.6 ab	(87)	50.7 ab	(90)
Armothin - 3.0%	0 d	(0)	14.7 bc	(50)	42.9 ab	(76)
Armothin -4.5%	0 d	(0)	6.0 c	(20)	36.1 b	(64)
Wilthin -.5%	8.9 b	(33)	36.5 a	(124)	61.9 a	(109)
Wilthin -1.0%	6.4 bc	(23)	24.7 ab	(84)	51.7 ab	(91)
Wilthin -1.5%	1.2 cd	(4)	34.0 a	(116)	49.3 ab	(87)
Urea -2%	-		34.4 a	(117)	-	
Urea -4%	-		31.4 a	(107)	57.8 ab	(102)
Urea -6%	-		36.2 a	(123)	-	
Urea -8%	1.7 cd	(6)	-		48.5 ab	(86)
Urea -12%	.4 cd	(1)	-		63.5 a	(112)
Urea -16%	0.0 d	(0)	-		-	

Table 4. The effect of 3 different blossom thinning materials applied with a mist blower on yield in peaches and nectarines. Shaded values are significantly different from the control (p=.05).

	Yield/kg/tree					
Treatment	**Mayglo**		**Spring Bright**		**O'Henry**	
Control	15.3 a	(100)	49.8 a	(100)	38.0 a	(100)
Armothin - 1.5%	6.6 c	43	43.4 ab	(87)	44.9 a	(118)
Armothin - 3.0%	5.3 c	(35)	33.6 bc	(67)	43.0 a	(113)
Armothin - 4.5%	3.0 c	(20)	22.5 c	(45)	37.3 a	(98)
Wilthin - .5%	14.6 a	(95)	48.3 ab	(97)	44.0 a	(116)
Wilthin - 1.0%	11.0 ab	(72)	53.9 a	(108)	43.3 a	(114)
Wilthin - 1.5%	7.2 bc	(47)	44.4 ab	(89)	39.3 a	(103)
Urea - 2%	-		56.4 a	(113)	-	
Urea - 4%	-		53.5 a	(107)	44.9 a	(118)
Urea - 6%	-		55.9 a	(112)	-	
Urea - 8%	11.4 ab	(75)	-		42.2 a	(111)
Urea - 12%	5.3 c	(35)	-		45.0 a	(118)
Urea - 16%	3.9 c	(25)	-		-	

The application of Armothin to O'Henry peach could be considered a definite success. The fruit load was reduced to 62% of the control (Table 5) which decreased hand thinning time to 72% of the control (30 hours less per acre). Total yield per acre was not affected but average fruit size was increased by the Armothin treatment (27% vs 17% of size 48/50 and larger). Therefore, the chemical thinning treatment both decreased inputs and improved fruit quality.

Table 5. The effect of 2 different thinning materials applied with an airblast sprayer on percent set in peaches and nectarines.

	% Set (% of Control)							
Treatment	Crown Princess		Sparkling June		Loadel		O'Henry	
Control	40.8	(100)	13.6	(100)	60.6	(100)	64.8	(100)
Armothin - 2%	25.5	(63)	10.9	(80)	54.3	(90)	40.4	(62)
Wilthin - 1%	8.1	(19)	8.3	(61)	31.3	(52)	5.2	(8)

Conclusions

Several of the chemical thinning experiments conducted in 1997 were successful and give rise to hope for these materials. However, there were still many problems and continued research is needed. The main issues that still need to be addressed are as follows:

1. The danger of overthinning. Wilthin had a tendency to overthin in the airblast trials which hopefully is just a rate problem. Reduced rates will be evaluated in 1998. The problem with all materials overthinning Mayglo in 1997 is still unexplained. Work will continue with Mayglo in 1998 to see if this is a variety specific problem.

2. The phytotoxic response of peach and nectarine trees to both Armothin and Wilthin. In all these experiments, whenever a significant thinning response was measured (and sometimes even with no thinning response) substantial phytotoxicity occurred. This included leaf necrosis, shoot dieback, shoot gumming and weakened looking trees for several weeks after treatment. This appeared to set back early season varieties and cause a reduction in fruit size. Later season varieties had more time to recover. Therefore, the emphasis in 1998 will be on heavy setting, late maturing varieties.

3. The different response of different varieties. The limited work conducted so far suggests two varieties may respond differently to the same treatment. If this is the case, research will never be able to evaluate the hundreds of varieties grown in California. Instead, individual growers will need to work out treatments for each separate field. Hopefully this research will provide growers with general guidelines that will help them get started in the right direction.

The materials currently being evaluated for chemical thinning in peaches and nectarines are still not perfect. However, they appear to be an improvement over many of the materials of the past. With continued research, they will hopefully reach commercial acceptance in California.