California Tree Fruit Agreement
2005 Annual Research Report

STONE FRUIT THINNING WITH SOYBEAN OIL AND OTHER PRODUCTS

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ABSTRACT

Spring Bright nectarine and Lodel peach were sprayed with various concentrations of soybean oil, cottonseed oil, and wetting agents in an attempt to reduce fruit set. Fruit set was significantly reduced with most spray solutions from 87.2% down to 6.3% in the most severe thinning treatment. Some treatments reduced the fruit set with little effect on buds and shoots, while other treatments were very damaging to the buds and shoots resulting in delayed bud push to bud and shoot death. Cottonseed oil appeared to produce less severe foliage and shoot damage than did the soybean oil at the same rates. The addition of Ethrel® dramatically increased the thinning effect of the soybean oil, but severely injured the shoots and buds. Tergitol® applied at 1% produced some thinning while Tergitol at 3% dramatically reduced the set with some minor shoot damage.

INTRODUCTION

Over the past five years, many reports have addressed the use of soybean oil to reduce fruit set in peach. During the 2004 season, an extensive study was developed which bracketed above and below the concentrations of soybean oil sprays used by other researchers that had reported success with this material, and spray timings were applied from January 1 to February 15, 2004. Our research in 2004 showed no benefit from any of these treatments when applied in the dormant season in the Central Valley of California. After reviewing the temperatures in California versus the temperatures on the east coast, it was decided to modify our 2005 spray timings to begin after the buds were beginning to swell. By applying the spray treatments after the beginning of bud swell (at the point of first pink showing) the treatments were effective at reducing fruit set, but some also caused shoot and bud injury. Fruit set ranged from 87.2% to 6.3% based on the different treatments.

METHODS

A block of Spring Bright nectarines with an outside row of Lodel peach located at the Kearney Agricultural Center in Parlier, California was divided into a randomized complete block statistical design containing five replications of twelve treatments. Some spray treatments were applied on February 1, others were applied on February 15, and others were sprayed on February 1, 8, 15, and then two treatments were sprayed at full bloom on February 23, 2005. Prior to the beginning of the spray treatments, twenty shoots were flagged (10 high in the canopy and 10 low in the canopy) and numbered. The length of each of these 1,200 shoots was measured, and the number of buds on each shoot was recorded. Prior to the thinning sprays on February 23, 2005, the flower buds were counted. On the day following the bloom sprays, February 24, 2005, observations on blossom damage were recorded. Spray treatments were applied with a backpack

Echo Mist Blower at a rate of 100 gallons per acre. A fruit set count was made once the fruit had reached an observable size and fruit set was complete.

The treatments in this trial were:

1. Unsprayed control
2. 10% soybean oil + 10% Latron B 1956 applied February 1
3. 10% soybean oil + 10% Latron B 1956 applied February 1, 8, 15
4. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1
5. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1, 8, 15
6. 20% soybean oil + 10% Latron B 1956 applied February 1
7. 20% soybean oil + 10% Latron B 1956 applied February 15
8. 20% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1
9. 10% organic oil adjuvant (cottonseed oil) applied February 15
10. 20% organic oil adjuvant (cottonseed oil) applied February 15
11. Tergitol 1% applied full bloom February 23, 2005
12. Tergitol 3% applied full bloom February 23, 2005

Results and Discussion

Several of the treatments reduced fruit set as shown in Table 1, but some treatments caused modest to severe shoot damage. Most of the damage was concentrated in the lower portion of the tree as a result of the mist blowers' inability to force the dense solutions equally both high and low in the canopy. A greater amount of solution was applied to the lower canopy, where most of the damage occurred. In future evaluations, a commercial application may prove less damaging, but this was not an option for this test because of the small plot sizes.

Flower counts were made for both the upper ten shoots per tree and the lower ten shoots per tree. Table 2 shows that the average number of flowers per centimeter of shoot length (combining both the upper and lower 20 shoots) was not significantly different prior to the spray applications. The percent fruit set on the upper ten shoots per tree and the lower ten shoots per tree was counted and analyzed separately (both had significant reductions in fruit set), but only the combined average percent fruit set is reported in Table 1.

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Table 1. Average Percent Fruit Set, 2005

Treatment	Percent Fruit Set
1. 20% soybean oil + 10% Latron B 1956 + applied February 1	87.2 a
2. 10% soybean oil + 10% Latron B 1956 applied February 1	84.8 ab
3. Unsprayed control	83.4 ab
4. Tergitol 1% applied full bloom February 23,2005	80.7 abc
5. 20% soybean oil + 10% Latron B 1956 applied February 1	69.7 bcd
6. 10% organic oil adjuvant (cottonseed oil) applied February 15	65.3 cd
7. 20% organic oil adjuvant (cottonseed oil) applied February 15	58.6 de
8. 10% soybean oil + 10% Latron B 1956 applied February 1, 8, 15	53.7 def
9. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1	42.9 efg
10. 20% soybean oil + 10% Latron B 1956 applied February 15	39.5 fg
11. Tergitol 3% applied full bloom February 23, 2005	29.9 g
12. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1, 8, 15	6.3 h

Mean Separation by Duncan's Multiple Range Test LSD .05
Values followed by similar letters are not statistically different from each other

Table 2. Average Number of Flowers Per Centimeter of Shoot Length, 2005

Treatment Branch Length	Flowers/cm
1. 20% organic oil adjuvant (cottonseed oil) applied February 15	0.25 a
2. 10% organic oil adjuvant (cottonseed oil) applied February 15	0.25 a
3. Unsprayed control	0.24 a
4. Tergitol 3% applied full bloom February 23, 2005	0.23 a
5. 20% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1	0.22 a
6. 20% soybean oil + 10% Latron B 1956 + applied February 1	0.21 a
7. 10% soybean oil + 10% Latron B 1956 applied February 1, 8, 15	0.21 a
8. 10% soybean oil + 10% Latron B 1956 applied February 1	0.21 a
9. Tergitol 1% applied full bloom February 23, 2005	0.19 a
10. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1	0.19 a
11. 20% soybean oil + 10% Latron B 1956 applied February 15	0.17 a
12. 10% soybean oil + 10% Latron B 1956 + 100 ppm Ethrel® applied February 1, 8, 15	0.15 a

Mean Separation by Duncan's Multiple Range Test LSD .05
Values followed by similar letters are not statistically different from each other

The average fruit set from these treatments ranged from 87% down to 6%. Some treatments thinned well but resulted in excessive shoot damage. An example of this is Tergitol applied at 1% showed little thinning (80.7% set) with no shoot or leaf injury, but 3% Tergitol reduced fruit set to 29.9% with some shoot injury. A 2% solution may produce good thinning with little injury and should be evaluated next season. Cottonseed oil is inexpensive and appeared to produce less delayed shoot development than did the soybean oil treatments at the same rates. In our test, a 10% cottonseed oil solution applied on February 15 reduced set to 65.3%, while a 20% solution on that date reduced set to 58.6%. A combined spray of 20% followed by a 10% cottonseed oil spray or two 10% solution sprays may prove beneficial and should be tested in the future. Combining Ethrel® with soybean oil dramatically enhanced the thinning effect but produced severe shoot damage. Soybean oil applied three times at 10% reduced set to 53.7% but produced slow and weak growth of shoots. The products and rates tested in 2005 have given us an indication that thinning to desirable levels may be possible in the future.