

# STONE FRUIT THINNING WITH SOYBEAN OIL

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## ABSTRACT

Over the past six years, several researchers from around the world and in the U.S. have reported that the use of vegetable oils can successfully delay bloom in cold climates and promote fruit thinning with reasonable success. Reports in the literature indicate that soybean oil can induce fruit thinning by building up CO<sub>2</sub> levels in the flower buds, which allows only the strongest flower buds to survive. The result is excellent flower thinning with improved fruit size. Soybean oil is non-toxic to humans and the environment and is exempt from EPA registration. Evaluation of soybean oil at rates of 4%, 6%, 8%, and 10% were applied on three dates (January 1, January 30; February 17, 2004). The effect on flower bud thinning was compared to non-sprayed but hand thinned control trees. Extensive bud counts and shoot measurements were made prior to spraying; then, additional blossom and fruit counts were made. The results of this trial showed no significant differences in percent set, nor in the number of flowers which set per centimeter of shoot length, and no significant difference in the number of large fruits from any of the soybean spray treatments. The timing of the sprays had no impact on fruit set. The rates tested, which work well in other states, had no effect under California conditions. This indicates that further study at higher rates is necessary.

## OBJECTIVE

To evaluate the effects of soybean oil on fruit bud survival and its potential as a fruit-thinning agent. The full range of rates used in other U.S. states was bracketed, as was the timing of the sprays to determine if the same rates and timings could benefit California fresh fruit and cling peach growers.

## MATERIALS AND METHODS

This study was conducted at the University of California's Kearney Agricultural Center in Parlier, California. A uniform four-year-old Rich Lady peach block was selected for this study. The trees were planted 6 feet apart with 16 feet between rows and were trained to a perpendicular V. The experimental design utilized a randomized complete block design with six replications of two tree plots for each of the five treatments applied at three different times in January and February of 2004. Twenty shoots were flagged in each of the two tree plots for each treatment and for each of the three spray dates. Ten shoots were flagged (five per scaffold) in the tops of the two trees and ten shoots were flagged (five per scaffold) in the bottom of the two tree plots. A total of 1,800 shoots were flagged; then, the buds were counted on each shoot and the shoot length was measured and recorded prior to the spray applications.

Rates of 4%, 6%, 8%, and 10% soybean oil were applied on January 1, January 30, and February 17, 2004 with a commercial 500 gallon AIR-O-FAN GB-36R sprayer. One percent Latron B 1956 was added to

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each soybean oil spray solution. Six replications of unsprayed and hand thinned two tree plots served as controls for each of the three spray dates.

Bud counts were made on all 1,800 shoots from February 10-13, 2004. The shoot lengths were measured and recorded at the same time. Following bloom and fruit set the same 1,800 shoots were re-evaluated. All fruits were counted and the number of large fruits were counted and recorded separately from the total fruit count. This counting was performed over a three-day period from April 1 to April 3, 2004.

### RESULTS AND DISCUSSION

The effect of the soybean sprays on the total percent fruit-set is shown in Table 1. There was no significant difference among any of the treatments on any of the three spray dates. There was no significant difference in the number of blossoms per centimeter of shoot length following the spray treatments, as shown in Table 2. Table 3 shows that there were no significant differences in the number of large fruit that set following any of the spray treatments. Soybean oil sprays have worked well in many states at rates of 6% and 8%, with 1% Latron B 1956 added. Our trial bracketed these rates with solutions that range from 4% to 10%, with the 1% Latron B 1956 added. The three spray dates also went on before and after the timing used by other researchers.

In separate non-replicated observational trials on peach and on plum, rates of soybean oil were applied at rates of 15%, 25%, 35%, 50%, and 100% plus 1% Latron B 1956 on March 3, 2004, well after the normal dormant spray timing (January-February). The peach trial evaluated individual "hangers" sprayed with each rate above and showed that higher rates did indeed reduce fruit set, but also showed considerable variation in flower bud damage. The peaches were showing some pink tip at the time of application. At rates of 15%-25% many of the flower buds died on some shoots but other shoots treated with the same spray showed little effect. Soybean solutions of 50% and 100% killed most of the flowers and some shoots. Rates of 25% to 35% may have potential for peach thinning and need to be further evaluated.

The plums were sprayed on March 3, 2004 when there was some white showing but the buds were still closed. At rates of 15% there was some petal burning and at 25% there were some dead flowers. At rates of 50% and 100% severe bud death occurred and some shoot tips died back.

Fuji and Granny Smith apples were also sprayed with rates of 15%, 25%, 35%, 50%, and 100% soybean oil plus 1% Latron B1956. The buds were not yet swollen on the apples. At the 15% rate nothing appeared to happen. At 25% the buds were slow to push out and at 35% they were slower to push out. At 50% there was some bud push, but at 100% there was no bud push at all.

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**Table 1. Percent Fruit-Set Which Developed on Soybean Oil Treated Rich Lady Peach Trees Sprayed on Three Dates (January 1, January 30, February 17, 2004) with Four Concentrations of Soybean Oil and Wetting Agent.**

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Spray Date and Treatment

Percent Fruit Set

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**Sprays Applied on January 1, 2004**

4% Soybean Oil plus 1% Latron B 1956	84% a
6% Soybean Oil plus 1% Latron B 1956	86% a
8% Soybean Oil plus 1% Latron B 1956	83% a
10% Soybean Oil plus 1% Latron B 1956	86% a

**Sprays Applied on January 30, 2004**

4% Soybean Oil plus 1% Latron B 1956	87% a
6% Soybean Oil plus 1% Latron B 1956	85% a
8% Soybean Oil plus 1% Latron B 1956	84% a
10% Soybean Oil plus 1% Latron B 1956	83% a

**Sprays Applied on January 17, 2004**

4% Soybean Oil plus 1% Latron B 1956	88% a
6% Soybean Oil plus 1% Latron B 1956	87% a
8% Soybean Oil plus 1% Latron B 1956	87% a
10% Soybean Oil plus 1% Latron B 1956	88% a

Hand Thinned Control	82% a
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Mean Separation by Dunan's Multiple Range Test LSD .05  
Values followed by similar letters are not statistically different from each other.

**Table 2. Number of Blossoms Per Centimeter of Shoot Length Which Developed on Soybean Oil Treated Rich Lady Peach Trees Sprayed on Three Dates (January 1, January 30, February 17, 2004) with Four Concentrations of Soybean Oil and Wetting Agent.**

<u>Spray Date and Treatment</u>	<u>Average Number of Blossoms Per Centimeter of Shoot Length</u>
<b>Sprays Applied on January 1, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	0.29% a
6% Soybean Oil plus 1% Latron B 1956	0.26% a
8% Soybean Oil plus 1% Latron B 1956	0.29% a
10% Soybean Oil plus 1% Latron B 1956	0.26% a
<b>Sprays Applied on January 30, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	0.29% a
6% Soybean Oil plus 1% Latron B 1956	0.26% a
8% Soybean Oil plus 1% Latron B 1956	0.25% a
10% Soybean Oil plus 1% Latron B 1956	0.29% a
<b>Sprays Applied on January 17, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	0.33% a
6% Soybean Oil plus 1% Latron B 1956	0.25% a
8% Soybean Oil plus 1% Latron B 1956	0.28% a
10% Soybean Oil plus 1% Latron B 1956	0.25% a
Hand Thinned Control	0.31% a

Mean Separation by Dunan's Multiple Range Test LSD .05

Values followed by similar letters are not statistically different from each other.

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**Table 3. Percent of Large Fruit to Set on Rich Lady Peach Trees Sprayed on Three Dates (January 1, January 30, February 17, 2004) with Four Concentrations of Soybean Oil and Wetting Agent.**

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<u>Spray Date and Treatment</u>	<u>Average Number of Large Fruit Per Centimeter of Shoot Length</u>
<b>Sprays Applied on January 1, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	62.0% a
6% Soybean Oil plus 1% Latron B 1956	67.6% a
8% Soybean Oil plus 1% Latron B 1956	61.6% a
10% Soybean Oil plus 1% Latron B 1956	62.4% a
<b>Sprays Applied on January 30, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	60.9% a
6% Soybean Oil plus 1% Latron B 1956	64.3% a
8% Soybean Oil plus 1% Latron B 1956	63.8% a
10% Soybean Oil plus 1% Latron B 1956	61.4% a
<b>Sprays Applied on January 17, 2004</b>	
4% Soybean Oil plus 1% Latron B 1956	61.4% a
6% Soybean Oil plus 1% Latron B 1956	63.3% a
8% Soybean Oil plus 1% Latron B 1956	62.1% a
10% Soybean Oil plus 1% Latron B 1956	65.5% a
Hand Thinned Control	57.6% a

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Mean Separation by Dunan's Multiple Range Test LSD .05

Values followed by similar letters are not statistically different from each other.