

Surround[®]

Crop Protectant

Five-Year UC Study Demonstrates Surround[®] Crop Protectant Benefits in Almonds

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A multi-faceted, multi-year study of the use of Surround Crop protectant on almonds in Madera County has led researchers to delve deeper into the potential benefits Surround may offer in the area of overall plant health, moderating the impact of bud failure and improving water utilization.

Preliminary findings in 2001 led to the multi-year study, which began in 2002 and continues through 2008. In 2001, researchers examined the effects Surround had on a 15-year block of Carmel, Nonpareil and Sonora trees. The Nonpareil and Sonora varieties did not appear affected by Surround; however, researchers found that return bloom, nut set and yields the following year in the treated Carmel trees appeared to exceed levels measured in the non-treated trees. (The Carmel trees in this block were exhibiting symptoms of severe bud failure.)

Could Surround have moderated the effects of bud failure? The objective of this study was to determine if, in fact, this was the case.

Study Design

A block of newly planted Carmel and Nonpareil trees was established in 2002 and an experimental design instituted to determine if Surround treatments could:

1. Reduce heat stress and the onset of bud failure;
2. Improve tree water status and lower canopy temperatures; and,
3. Improve overall plant growth measured by tree circumference, current season shoot growth and yield.

Results (through 2007):

- **Shoot Growth** – In three out of five seasons, the Surround-treated trees had significantly more current season shoot growth when compared to non-treated trees.
- **Tree Circumference** – In three out of five seasons, Surround-treated trees had significant increases in trunk circumference versus non-treated trees.
- **Water Stress** – For the high heat stress months of June through September, Surround-treated trees exhibited less water stress, as measured by mid-day leaf stem water potential, on average in two out of four months over a five-year period.
- **Bud Failure** – Beginning in the fourth year of this study (2006), bud failure began to appear in the Carmel variety. In 2005, 2006 and 2007 less bud failure was observed on Surround-treated Nonpareil trees, but differences were not significant. In 2007, less bud failure was observed on the Surround-treated Carmel trees (statistical significance $P \leq 0.09$). The study will continue in 2008.
- **Yield** – In 2004 and 2005, almonds were counted on 60 trees treated with Surround and 60 control trees that were not. In 2005, significantly more almonds were present on the Surround-treated trees. In 2007, there was no difference in yield between Surround-treated Nonpareil tree rows when compared to non-treated; however, the Carmel-treated rows had significantly greater yield when compared to the non-treated ($P \leq 0.05$).

Summary Statement – Surround provided positive benefits to overall tree health and may provide yield improvements to almond trees affected with bud failure.

For a copy of this report and specific nut product information sheets, e-mail us at novasource@tkinet.com.



RECOMMENDATION FOR NUT CROPS

Volume: For 20-foot trees it is best to use 200 gallons per acre. Large trees like walnut and pecan can require up to 300 gallons per acre.

Concentration: Use 25 to 50 lbs per 100 gallons of water.

For Tree Nuts, such as almond, beech nut, Brazil nut, butternut, chestnut, cashew, filbert, hickory nut, macadamia nut, pecan, walnut and pistachio.

Problem	Lbs/Acre	Application Instruction
Sunburn and heat stress	50-75	Apply to sunburn-prone trees before conditions leading to sunburn occur. Provide thorough coverage with one to two full rate applications 7 days apart. Depending upon the length of the high heat period, three to four applications in total often are needed. Good coverage on small to medium size trees is best achieved at rates of 75 lbs in 100 to 200 gallons per acre to achieve near-drip coverage. Make subsequent applications at half to full rates to maintain even coverage throughout the high heat period.

Application Tips

- Avoid foliage run-off. Apply the spray volume that will achieve near-drip coverage.
- Best results usually achieved at 50 lbs per 100 gallons.
- Surfactants may improve spreading.
- Consult the specimen label for instructions on aerial application.
- See Surround spray guide for more information on effective application techniques.

Important: Always read the label before buying and follow label instructions when using this product.

The use of Surround® WP in agricultural crop protection applications is covered by US Patents 6,027,740; 6,069,112; 6,110,867 and 6,156,327.

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Failure to strictly follow label directions may cause injury to crops, animals, man or the environment. Tessenderlo Kerley, Inc. (TKI) warrants that the product conforms to the chemical description on the label and is reasonably fit for the purpose referred to in the directions for use when properly applied in normal weather conditions. TKI makes no other warranty or representation of any kind, express or implied, concerning the product, including no implied warranty of merchantability or fitness for any particular purpose. The exclusive remedy against TKI for any cause of action relating to the handling or use of the product is a claim for actual out-of-pocket damages, and in no event shall TKI be liable for special, indirect, incidental or consequential damages or expense of any nature, including, but not limited to, loss of profits or income, whether or not based on the negligence of TKI, breach of warranty, strict liability in tort, or any other cause of action. TKI and the seller offer the product, and the buyer and users accept it, subject to the foregoing conditions of sale and limitations of warranty, liability and remedies.

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