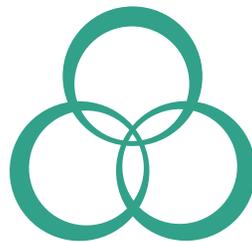


# ■ F i e l d T r i a l R e p o r t ■

## **Surround: Processed-Kaolin Particle Film on Almond**

Dr. Brent Holtz, UC Farm Advisor, Madera



**NovaSource Advisory  
Council**

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2008

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Study Description:	<b>Surround: Processed-Kaolin Particle Flm on Almond</b>
Reference Number:	Holtz Surround Almond CA 2008.doc
Researcher:	Dr. Brent Holtz, UC Farm Advisor, Madera
Location :	George Andrews Farms, Madera, CA
Year:	2008
Trial Quality (Excellent, Good, Fair, Poor):	Good

Product(s):	Surround WP
Rate(s):	Surround 25 lb/100 gal
Adjuvant(s):	
Rate(s):	

Crop(s):	Almond
Variety:	Carmel; Nonpareil
Pest(s):	
Quality:	
Summary:	<p>From 2002-2008 four applications of Kaolin (25 lbs/100 gallons water) were made each season to Carmel and Nonpareil trees planted in January 2002 in order to examine if Kaolin could reduce heat stress and the onset of bud failure.</p> <p>In 2008, significantly less bud failure was observed on the Surround-treated Carmel trees.</p> <p>In 2005-2008 we observed less bud failure on Surround-treated Nonpareil trees, but differences were not significant.</p> <p>In 2008 the Carmel treated rows had significantly greater yield when compared to the non-treated. In 2008, the Surround-treated Nonpareil tree rows also had significantly greater yield when compared to untreated.</p>

## Processed-Kaolin Particle Film on Almond

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Surround, a white clay-like processed-Kaolin particle film, can easily be dissolved into suspension and sprayed onto trees. Several research reports have been published in the Journal of the American Society for Horticultural Science and HortTechnology describing how this reflective film can reduce heat stress, reduce solar injury, increase leaf carbon assimilation, and reduce canopy temperatures on a number of crops in several countries (1, 2, 3). In 2001 processed-Kaolin particle film was applied to 15-year-old Nonpareil, Sonora and Carmel almond trees in a preliminary experiment. Three in-season applications of Kaolin appeared to result in more return bloom, nut set and yield on Carmel trees in 2002 when compared to non-sprayed Carmel trees (4). The Carmel trees in this orchard were showing symptoms of severe bud failure. The Sonora and Nonpareil varieties appeared unaffected by the Kaolin. Record hot temperatures were experienced in the San Joaquin Valley in May 2001 and above normal temperatures at this time have been shown to worsen the severity of bud failure on Carmel.

From 2002-2008 four applications of Kaolin (25 lbs/100 gallons water) were made each season to Carmel and Nonpareil trees planted in January 2002 in order to examine if Kaolin could reduce heat stress and the onset of bud failure. We also examined the effect of Kaolin on tree water status (mid-day leaf stem water potential), canopy temperatures, growth (tree circumference and current season shoot growth) and yield. An almond orchard in Madera with 16 Carmel and Nonpareil rows was divided into a replicated design where eight rows of each variety received four Kaolin applications each year while the eight other rows did not.

In 2003-2005 Surround-treated trees had significantly more current season shoot growth when compared to non-treated trees. In 2002 and 2006 there were no significant differences in current season shoot growth between Surround treated and untreated trees (figure 1). We did not examine current season shoot growth in 2007 and 2008. In 2005-2007 a significant increase in trunk circumference was observed in Surround-treated trees (figure 2). No difference in trunk circumference was observed in 2003 and 2004.

Figure 1: Current Season Shoot Growth

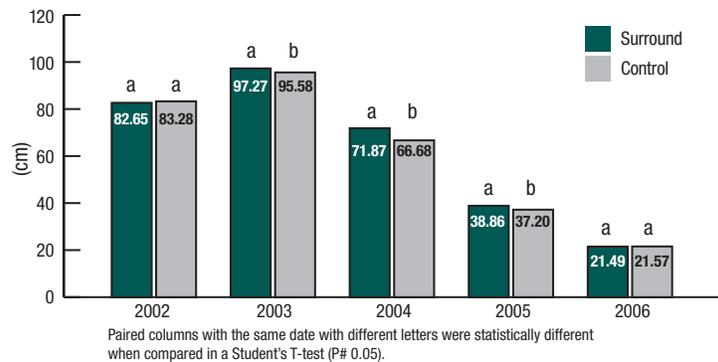
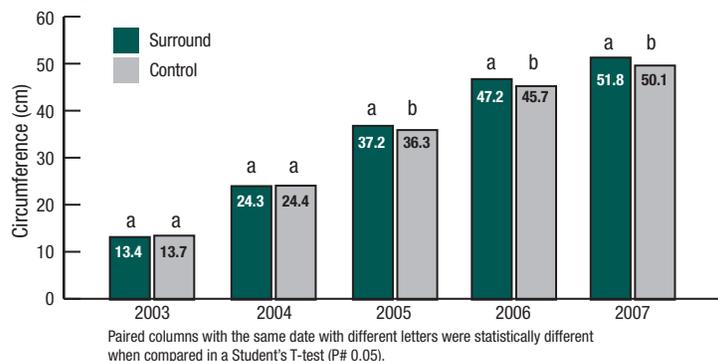
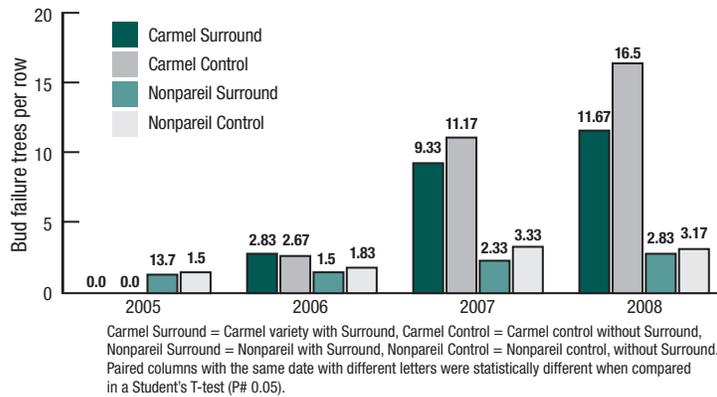


Figure 2: Tree Circumference



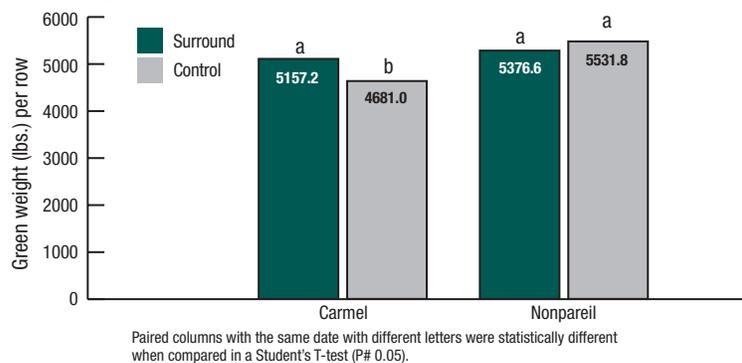
In 2005 no bud failure was observed on Carmel trees in either treatment (7). In 2006 we observed bud failure in the Carmel variety but treatment differences were not significant. In 2007 we observed less ( $P \leq 0.09$ ) bud failure on the Surround-treated Carmel trees (10). In 2008 we observed significantly less ( $P \leq 0.02$ ) bud failure on the Surround-treated Carmel trees (figure 3). In 2005-2008 we observed less bud failure on Surround-treated Nonpareil trees, but differences were not significant (figure 3).

**Figure 3: Surround on Bud Failure**

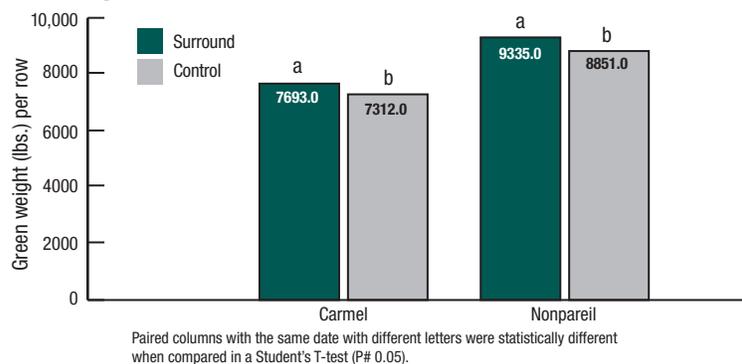


In 2004 and 2005 we counted fruit on 60 trees that received Surround and 60 control trees that did not. In 2005 we found significantly more fruit on the Surround treated trees (7). In 2007 the Carmel treated rows had significantly ( $P \leq 0.01$ ) greater yield when compared to the non-treated (figure 4). There was no difference in yield between Surround-treated Nonpareil tree rows when compared to untreated. In 2008 the Carmel treated rows had significantly ( $P \leq 0.02$ ) greater yield when compared to the non-treated (figure 5), and the Surround-treated Nonpareil tree rows also had significantly ( $P \leq 0.04$ ) more yield when compared to untreated. We will repeat applications of Kaolin in 2009 in order to further investigate the effect of Surround on heat stress and bud failure in both Carmel and Nonpareil almond varieties.

**Figure 4: 2007 Surround Trial**



**Figure 5: 2008 Surround Trial**



Acknowledgement: The project would not have been possible without the cooperation of George Andrews Farms in Madera, CA, and the support of the Almond Board of California.

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