Applied Advancements for Improving Yield and Quality of Tree fruit and Nut Crops
Managing Soil Applied Potassium on Low CEC Soils

The Impact of Early Bee Removal on Pollination and Yield of Almond

The Impacts on Pollination of Sprays Applied During Bloom
Untreated Check

SOP 450 lbs/A annually

KTS 8 gal/A (Postharvest; Mar/Apr/May/Jun)

Kalibrate 3 gal/A (Postharvest; Mar/Apr/May/Jun)
Almond Potassium Sources Yield - 2016

Means followed by the same letter are not significantly different DMR 0.10

- UTC: 1855 lbs, Increase b
- SOP: 2346 lbs, Increase a 26.5%
- Kalibrate: 2059 lbs, Increase b 11.0%
- KTS: 1899 lbs, Increase b 2.4%
Potassium on Almond Trial
Leaf % K    7/11/17

% K

UTC  Kalibrate  KTS  SOP
1.12  1.45     1.45  1.95
REMOVING HONEY BEES FROM THE ORCHARD

University of California recommends bee removal when 90% of the flowers on the latest blooming variety are at petal fall. After this point, no pollination is taking place, and bees that forage outside the orchard (up to 4 miles), seeking alternate food sources and water, will have a higher risk of coming in contact with insecticide-treated crops.

After blossoms open, they release pollen for about four days. When temperatures are above 55°F, pollen is released when the anthers split open, or dehisce. This happens in progression over this period, with not all anthers opening at once. Typically, the pollen that is released each day is collected by bees by mid-afternoon. The pollen-receiving structure, the stigma surface, is receptive to fertilization for about five days after a blossom opens. However, fertilization is most successful when pollination occurs during the first few days that a flower is open.

Bees, both pollen and nectar collectors, concentrate on recently opened blooms. In one study, about 90% of all bee visitations were confined to flowers that have pollen. With adequate weather and bee activity, essentially all pollen will be collected from individual flowers within about four days after they have opened. Conforming to this, past work shows that during favorable pollination weather, almond flowers remain receptive to cross-pollination up to about four to five days after opening. Cooler weather, below 55–60°F, will lengthen the period of pollen collection and flower receptivity, and will delay petal fall.
Counted Buds on 15 Butte and 15 Padre Trees

at 90% Petalfall (3/31/10)

Counted nut set (5/25/10)

Average Set on Butte = 56.4%

Average Set on Padre = 64.1%
Assumptions:
110 trees/A
Average production: 2400 lbs/A
Average Butte/Padre Count Per Ounce: 40
2400 lbs/A = 13,964 nuts per tree
Avg. % Set 35% = 39,897 blossoms per tree.
If bees removed after 90% bloom completed, there are still 3,990 blossoms potentially unpollinated.
If 60% of these set = 2394 extra nuts per tree = 263,340 nuts/A = 411 lbs/A
2017 Counted Buds on 23 Padre trees at 90% Petalfall (3/14/17)

Counted nut set (5/9/17)

Average Set on Padre = 23.7%
Assumptions:
110 trees/A
Average production: 2400 lbs/A
Average Padre Count Per Ounce: 40
2400 lbs/A = 13,964 nuts per tree
Padre Bloom Avg. % Set 35% = 39,897 blossoms per tree.
If bees removed after 90% bloom completed, there are still 3,990 blossoms potentially unpollinated.
If 23.7% of these set = 945 extra nuts per tree = 104,019 nuts/A = 163 lbs/A
Applying Sprays During Almond Bloom
Considerations:

• Bees
• Disease Management
• Nutrition
• Pollination and Phytotoxicity
Direct
Indirect
Synergistic
Options:

Do not spray during bloom period.

Do not use materials with known toxicities to bees.

Spray when bees are not active (late in day or at night)

Efficacy and logistics.
## ALMOND: TREATMENT TIMING

Note: Not all indicated timings may be necessary for disease control.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Dormant</th>
<th>Bloom</th>
<th>Petal fall</th>
<th>Spring¹</th>
<th>Summer</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Pink bud</td>
<td>Full bloom</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Spring²</td>
<td></td>
</tr>
<tr>
<td>Alternaria</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>+++</td>
</tr>
<tr>
<td>Anthracnose²</td>
<td>----</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Bacterial spot</td>
<td>+</td>
<td>‘---’</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Brown rot</td>
<td>----</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>----</td>
</tr>
<tr>
<td>Green fruit rot</td>
<td>----</td>
<td>----</td>
<td>+++</td>
<td>++</td>
<td>----</td>
</tr>
<tr>
<td>Hull rot³</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>+++</td>
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<tr>
<td>Leaf blight</td>
<td>----</td>
<td>----</td>
<td>+++</td>
<td>++</td>
<td>----</td>
</tr>
<tr>
<td>Scab³</td>
<td>++</td>
<td>---</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
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<tr>
<td>Shot hole⁴</td>
<td>+⁵</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Rust</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>+++</td>
<td>+++</td>
</tr>
</tbody>
</table>

**Rating:** +++ = most effective, ++ = moderately effective, + = least effective, and ---- = ineffective

¹ Spring: 2 weeks to 5 weeks
² Anthracnose: ++ = 3 to 4 weeks, +++ = 1 to 2 weeks
³ Scab: +++ = 1 to 2 weeks, ++++ = 0 to 1 week
⁴ Shot hole: +++ = 1 to 2 weeks, ++++ = 0 to 1 week
⁵ Hull rot: +++ = 1 to 2 weeks, ++++ = 0 to 1 week
⁶ Rust: +++ = 1 to 2 weeks, ++++ = 0 to 1 week
Other Considerations: Bacterial Infections

The Influence of Spray Adjuvants on Exacerbation of Citrus Bacterial Spot

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ABSTRACT


The effect of adjuvants on the spread of Xanthomonas axonopodis pv. citri and applied to nursery trees of citrus (Citrus spp.) in misting or in simulated windblown rain was studied. Commercial adjuvants tested included a penetrant-surfactant, the penetrant or surfactant component of the penetrant-surfactant alone, an antitranspirant, a surfactant, or 1 of 3 formulations of a spreader-binder. Individual rows were treated with the adjuvants or water alone as a control. Bacterial dispersal gradients in all rows were similar and extended the entire 7 m of the nursery rows. Disease incidence, number of lesions per plant, and lesion diameters were determined at selected assay points in each row 28 days after treatment. The penetrant-surfactant and its surfactant component significantly increased the total number of lesions per plant and mean lesion diameters compared to the water control. The disease gradients observed were accompanied by the penetrant-surfactant and its surfactant component in the water control. The penetrant component of the penetrant-surfactant, the antitranspirant, and two spreader-binder adjuvants did not significantly affect the disease gradient compared to the water control. Lesion sizes and numbers were also increased by a surfactant product and the surfactant component of the penetrant-surfactant, but not by the penetrant component of the penetrant-surfactant, the antitranspirant, or the three spreader-binder formulations. These results suggest that surfactants which induce stomatal flooding may enhance infection and exacerbate citrus bacterial epidemics.

Promotion of Bacterial Infection of Leaves by an Organosilicone Surfactant: Implications for Biological Weed Control

Article: June 1992 with 14 Readers
DOI: 10.1094/PDIS-76-12-1938034

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3rd J. J. Shaw

Role of Adjuvants in Bacterial Diseases of Onions

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Potential Phytotoxicity to Pollination Process
Direct toxicities

Synergistic toxicities

Incompatible combinations

Too much stuff!
Direct Toxicities

Zn

Boron

Non-buffered phosphites
Synergistic Toxicities

- Sulfur
- Captan
- Chlorothalonil
- Omite
- Oil

Low pH foliars + Copper or Zinc
Incompatible Combinations

- Sulfur on apricots
- Azoxystrobin on apples
- Malathion on certain cherry varieties
Too much stuff!!

Calcium
Insecticide
Humic Acid
Miticide
Adjuvant
Buffer
Phosphite
Fungicide
Seaweed
Zinc
Thank You!

Pomology Consulting
Turlock, California