Improved Guidelines

- IPM resources are more grower friendly
- Year-round IPM
  - Seasonal approach to what needs to be done and when
  - Integrated view of managing all the major pests of a crop
- WaterTox to help growers meet Clean Water Act standards
- More reliable pest management for California growers
  - New products
  - Pesticide resistance
  - Better treatment guidelines
  - More reliance on natural controls
Why?

- Environmental issues
  - NRCS, EQIP, and IPM
  - Water and air quality issues
  - Best Management Practices
- Promote less-toxic pesticides and nonchemical approaches
- A more useful planning tool for growers and PCAs
- Web site offers comprehensive information, on demand
  - Photo galleries, sampling forms, and pesticide database help mitigate water quality issues
Addressing Water Quality Issues

- Cultural practices and nonchemical alternatives
- Monitoring guidelines and treatment thresholds to help farmers eliminate unnecessary pesticide use
- If pesticides are needed, guidelines help farmers to determine their risks to water quality from:
  - Leaching
  - Solution runoff
  - Adsorbed runoff
- Information about long-term fish and human toxicity
- Compare Pest Management Guideline pesticides
WaterTox Data Source

- WIN-PST: database from NRCS
- UC IPM’s WaterTox database compares risk for all pesticides recommended in the Pest Management Guidelines based on:
  - Risk of runoff and leaching on a high-risk soil
  - Long-term pesticide toxicity to humans and fish
  - Impact of management (application amount, method, rate), irrigation efficiency, probability of rainfall, and residue management

Select less-toxic materials to reduce long-term hazards to fish and humans
How to manage pests

*Manage and identify insects, mites, diseases, nematodes, weeds*

- landscapes, gardens, and turf
- homes, structures, people, and pets
- agriculture and floriculture *(Pest Management Guidelines)*

*Use tools to help make decisions*

- weather data and products
- degree-days
- interactive tools and models

**Educational resources**

- Publications and other materials
- Workshops and events
- Educational programs
- Pesticide safety, training, and use

**Research and IPM**
How to Manage Pests

Peach

**Year-Round IPM Program**—tells you what you should be doing throughout the year in an overall IPM program. Includes Year-Round IPM Program Annual Checklist.

- Dormant/Delayed Dormant
- Bloom Season
- Fruit Development
- Harvest
- Postharvest

**UC IPM Pest Management Guidelines**—University of California's official guidelines for pest monitoring techniques, pesticides, and nonpesticide alternatives for managing pests in agriculture, floriculture, and commercial turf. More

- **General Information**
  - Dormant Shoot Sampling (3/06)
  - Pheromone Traps (3/06)
  - Early Season Monitoring (3/06)
  - Shoot Strike Monitoring (3/06)
  - Fruit Sampling (3/06)
  - Relative Impact of the Timing of Pesticide Applications on Natural Enemies (3/06)
  - Relative Toxicities of Insecticides and Miticides Used in Peaches to Natural Enemies and Honey Bees (3/06)
  - General Properties of Fungicides Used in Peaches (3/06)
  - Most Effective Treatment Timing for Key Diseases (3/06)

- **Insects and Mites**
  - Black Peach Aphid (3/06)
  - Brown Mite (3/06)
  - European Fruit Lecanium (3/06)
  - European Red Mite (3/06)
  - Fruittree Leafroller (3/06)
  - Katydid (3/06)
  - Obligued Band Leafroller (3/06)
  - Omnivorous Leafroller (3/06)
  - Oriental Fruit Moth (3/06)
  - Pacific Flatheaded Borer (3/06)
  - Peach Silver Mite (3/06)
  - Peach Twig Borer (3/06)
  - Peachtree Borer (3/06)
Peach Year-Round IPM Program

These practices are recommended for a monitoring-based IPM program that reduces water quality problems related to pesticide use. Links take you to information on how to monitor, forms to use, and management practices. Track your progress through the year with the annual checklist form (230KB, PDF).

Water quality becomes impaired when pesticides move offsite and into water. Each time a pesticide application is considered, review the Pesticide Application Checklist at the bottom of this page to learn how to minimize water quality problems. This program covers the major pests of peach; information on additional pests is included in the Peach Pest Management Guideline.

| Print annual IPM checklist (230KB, PDF) | Peach Pest Management Guidelines | Forms |

Dormant/Delayed-dormant season activities
Bloom season activities
Fruit development period activities

Harvest activities
Postharvest activities
Pesticide application checklist

Dormant/Delayed-dormant season activities (leaf fall to bud swell)

Why is this season important in an IPM program?
Special issues of concern related to water quality: dormant sprays, drift, and rain runoff.

What should you be doing during this period?
Prune trees, removing and destroying:
• Mummy fruit to reduce brown spot
• Shot hole-infested twigs
Apply fungicide treatments** and:
• Shot hole
• Peach leaf curl
Manage orchard floor vegetation:
• Survey weeds and complete the weed map
• Manage weeds in rows with tractor
• In tree middles, let resident weeds grow
Take dormant shoot sample to:
• Complete monitoring form
• Treat** if needed according to the Pech Pest Management Guideline

Bloom season activities (green tip to petal fall)

Why is this season important in an IPM program?
Special issues of concern related to water quality: runoff and drift.

What should you be doing during this period?
Put out pheromone traps for:
• Oriental fruit moth (February 15–March 30)
• Omnivorous leafroller (San Joaquin Valley, March–May)
• San Jose scale (February 25–September 15)
• Check traps and keep records of captures
If using mating disruption for oriental fruit moth, wait until the end of May.

Fruit development period activities (petal fall)

Why is this period important in an IPM program?
Special issues of concern related to water quality: runoff and drift.

What should you be doing during this period?
Put up pheromone traps for: 
**Pesticide application checklist**

Before a pesticide application is made and when planning for possible applications in an IPM program, review and complete this checklist to minimize water quality and other problems.

- Follow each practice in the year-round IPM Program.
- Identify target pest, treatment threshold, trigger, or justification for treatment.
- Consider nonchemical alternatives.
- Identify important natural enemies that might be impacted by pesticide application.
- Choose a pesticide from the UC IPM Pest Management Guidelines for the target pest, considering impact on natural enemies and consulting the UC IPM Watertox Database for water quality concerns. Select an alternative chemical or nonchemical treatment when risk is high.
- Consider chemical class if pesticide resistance is an issue.
- Identify sensitive areas (for example, waterways or riparian areas) surrounding your application site.
- Identify practices or mitigation measures to be used to reduce pesticide movement off-site.
- Choose sprayers and application methods that minimize off-site movement.
- Review and follow pesticide handling, storage, and disposal guidelines.
- After an application is made, record application date, product used, rate, and location of application. Follow up to confirm that treatment was effective.
Peach

Dormant Shoot Sampling
(Reviewed 3/06, updated 3/06)

In this Guideline:
- How to sample
- Treatment decision table
- Publication
- Glossary

Dormant shoot sampling is used to determine the need for a dormant treatment for the control of San Jose scale, European fruit lecanium, and mite eggs (brown mite and European red mite).

HOW TO SAMPLE (View photos for identification)
- Take a sample between late November and mid-January.
- Randomly select 20 trees from each varietal block in the orchard.
- Choose 5 shoots randomly from the inside of each tree's canopy near the main scaffolds for a total of 100 shoots.
- Clip off a 3-inch section of the shoot that contains both 1- and 2-year old wood.
- Using a hand lens or binocular microscope, examine the section of the shoot and note the presence or absence of scales and parasitized scales and mite eggs on the dormant shoot sampling form (100KB, PDF). It is not necessary to count the number of individual insects or mite eggs present, just identify the pest and record whether it is present or not.
- Note if scales have been parasitized. A parasitized scale can be distinguished from a live scale by a small hole in the top of the scale covering. Parasitized European fruit lecanium scales turn black. If a large number of scales have been parasitized, minimize the use of insecticides during...
<table>
<thead>
<tr>
<th>Pest</th>
<th>Identification tip</th>
<th>Photos</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>San Jose scale</strong></td>
<td>Nymphs (healthy)&lt;br&gt;The four round, dark scales in the center are the black cap stage, the most common overwintering form. The earlier white cap stage is to left.</td>
<td><img src="image1" alt="San Jose scale" /> <img src="image2" alt="San Jose scale" /></td>
</tr>
<tr>
<td></td>
<td>(parasitized)&lt;br&gt;Scales parasitized the previous season will have a round hole in them where the adult parasite emerged.</td>
<td></td>
</tr>
<tr>
<td><strong>European fruit lecanium</strong></td>
<td>Nymphs (healthy)&lt;br&gt;Look for legless, immobile yellow insects on twigs. Older nymphs may have brown markings and a distinct center ridge.</td>
<td><img src="image3" alt="European fruit lecanium nymphs" /> <img src="image4" alt="European fruit lecanium nymphs" /></td>
</tr>
<tr>
<td></td>
<td>(parasitized)&lt;br&gt;Parasitized lecanium scales, such as the one in the center here, turn black.</td>
<td></td>
</tr>
</tbody>
</table>
Directions: 1. Clip off 5 shoots from each of 20 trees for a total of 100 shoots. Choose these shoots randomly from the inside of the tree canopies near the main scaffold. Clip off a 3-inch section of the shoot that contains both 1- and 2-year old wood.
2. Using a hand lens or microscope, examine the shoots and note the presence (+) or absence (-) of scales and parasitized scales, along with mite eggs. You don’t need to count the individual insects or mite eggs, just identify the pest and record whether it is present. Compare the results to the treatment guidelines on page...

Grower/Orchard __________________________ Date ___________

<table>
<thead>
<tr>
<th>Spur number</th>
<th>SJS</th>
<th>EFL</th>
<th>Mite eggs</th>
<th>Spur number</th>
<th>SJS</th>
<th>EFL</th>
<th>Mite eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>32</td>
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<tr>
<td>3</td>
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</tr>
<tr>
<td>4</td>
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</tbody>
</table>

Dormant Treatment Decision Table

<table>
<thead>
<tr>
<th>Pest</th>
<th>Treatment threshold (% infested spurs)</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Jose scale</td>
<td>Harvested before June 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harvested after June 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below 20%</td>
<td>Below 5%</td>
</tr>
<tr>
<td></td>
<td>20-60%</td>
<td>5-10%</td>
</tr>
<tr>
<td></td>
<td>Over 60%</td>
<td>Over 10%</td>
</tr>
<tr>
<td>European fruit lecanium</td>
<td>24% and below</td>
<td>No spray</td>
</tr>
<tr>
<td></td>
<td>Over 24%</td>
<td>Oil spray</td>
</tr>
<tr>
<td>Mites: overwintering eggs</td>
<td>Below 20%</td>
<td>No spray</td>
</tr>
<tr>
<td></td>
<td>20% and over</td>
<td>Oil only</td>
</tr>
</tbody>
</table>

¹Using oil at the 4-6 gal rate will help prevent development of resistance to the IGR. If oil is used at the 2 gal rate, do not use the IGR in consecutive years to prevent resistance development.
Peach
San Jose Scale
Scientific name: *Diaspidiotus (Quadraspisotus) perniciosus*
(Reviewed 3/06, updated 3/06)

In this Guideline:
- Description of the pest
- Damage
- Management
- Publication
- Glossary

DESCRIPTION OF THE PEST
Female San Jose scale invades the new plant and begins feeding and laying eggs in the plant tissue. The adult scales covering turns black (black scale).

San Jose scales overwinter as adult females. Adult females may also settle on leaves and stems at times before becoming active. After the first molt in the spring, which yellowish, winged adult females remains under its shell, which transparent. After mating, females produce eggs. Females begin hatching in late spring and develop into five generations per year.

DAMAGE
San Jose scales cause injury on leaves, stems, and fruit. The scales cover the plant tissue and can reduce the plant’s ability to photosynthesize, leading to stunted growth and decreased fruit size.

The following materials are listed in order of usefulness in an IPM program, taking into account the efficacy, impact on natural enemies and honey bees, and impact of the timing on beneficials.

When choosing a pesticide, also consider information relating to environmental impact and economic factors.

Note: If San Jose scale is a problem in the orchard, use a high-volume (dilute) application or more per acre for best coverage.

DORMANT (Preferred timing)
A. NARROW RANGE OIL #1
   (Superior, Supreme)  —  1.5 gal
   MODE OF ACTION: Contact insecticide, including smothering and barrier effects.
   COMMENTS: Apply in a dilute application, using a total of 6–8 gallons of oil/acre. Provide 80% control; use for light to moderate infestations. Apply before late January when most scales are in black cap stage. An option for orchards where bloom sprays of *Bacillus thuringiensis* are planned for control of caterpillars and no broad-spectrum pesticides are used in the spring.
### Peach: San Jose Scale

Comparison among pesticides included in [UC IPM Pest Management Guideline](#) when applied under these general conditions:

#### Site conditions
- soil highly susceptible to pesticide movement
- low probability of rainfall expected within 7-10 days of pesticide application
- low-efficiency irrigation expected within 7-10 days of pesticide application
- no residue management

#### Application conditions
- application to more than 50% of the field (M)
- surface applied (S)
- application rate more than 1/4 pound Al per acre (Q)

⚠ Application rate, method, and site conditions may not be typical for this crop. To change these conditions to match your own, see below.

<table>
<thead>
<tr>
<th>Delete</th>
<th>Active ingredient (AI) (Sample trade name)</th>
<th>Application conditions</th>
<th>Potential Pesticide Hazard on High-Risk Soils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Change^?</td>
<td>Fish (Long-term)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaching</td>
</tr>
<tr>
<td></td>
<td>Buprofezin (Centaur)</td>
<td>M-S-Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbaryl (Sevin)</td>
<td>M-S-Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diazinon</td>
<td>M-S-Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Narrow range oil (Superior)</td>
<td>M-S-Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pyriproxyfen (Esteem)</td>
<td>M-S-Q</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Columns and rows are marked for clarity.
**Change site conditions**
1. Change site conditions below.
2. Click Change button.

These settings affect all pesticides in the table.

- **Rainfall**: low probability ○ high probability
- **Irrigation**: none ○ high efficiency ○ low efficiency

- **Residue management**: well-established (3-5 years) without a soil crust (≥ 30% residue)

---

^**Change application conditions**
1. Click "change" button under "application conditions" for a pesticide.
2. Change application conditions below.
3. Click Change/Delete button above.

**What area is being treated?** More information
- (M) applied to more than 50% of the field ○ (B) applied to less than 50% of the field

**How much pesticide comes in contact with soil?** More information
- (S) surface applied ○ (F) foliar applied ○ (I) soil incorporated

**What is the application rate?** More information
- (Q) more than 1/4 pound Al per acre
- (L) less than or equal to 1/4 pound Al per acre but at least 1/10 pound Al per acre
- (U) less than 1/10 pound Al per acre
## Pesticide Active Ingredient Rating Report, Based on WIN-PST

**Crop:** Peach  
**Pest:** San Jose Scale  
**UC IPM Pest Management Guideline:** 602300711  
(Report generated on [date not visible])

<table>
<thead>
<tr>
<th>Active Ingredient Common Name</th>
<th>Solubility in Water (ppm)</th>
<th>Soil Half-Life (days)</th>
<th>KOC (mL/g)</th>
<th>Human Toxicity (ppb)</th>
<th>Fish Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buprofezin</td>
<td>0.38200</td>
<td>38</td>
<td>3450</td>
<td>7 HA*</td>
<td>63</td>
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<tr>
<td>Sample product: Centaur</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>PC_CODE: 275100</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbaryl</td>
<td>120</td>
<td>10</td>
<td>300</td>
<td>15 CHCL*</td>
<td>27</td>
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<tr>
<td>Sample product: Sevin</td>
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<td></td>
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<td>PC_CODE: 056801</td>
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<tr>
<td>Diazinon</td>
<td>60</td>
<td>40</td>
<td>1000</td>
<td>0.6 HA</td>
<td>0.092</td>
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<td>PC_CODE: 057801</td>
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<td></td>
</tr>
<tr>
<td>Narrow range oil (Not included in WIN-PST)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sample product: Superior</td>
<td></td>
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</tr>
<tr>
<td>Pyriproxyfen</td>
<td>0.36700</td>
<td>10</td>
<td>16785</td>
<td>2450 HA*</td>
<td>5.3674</td>
</tr>
<tr>
<td>Sample product: Esteem</td>
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</tr>
</tbody>
</table>

**Notes:**
- **X** -- extra high
- **H** -- high
- **I** -- intermediate
- **L** -- low
- **V** -- very low
Issues

- WaterTox
  - Soils
  - Acute hazard
  - Risk to *Daphnia*
- Pesticide selection
  - Air quality
  - Pesticide resistance
  - Impact on natural enemies
For more information, visit our Web site at www.ipm.ucdavis.edu