2025 Louisiana Fruit and Nuts Insect Pest Management Guide

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Should the registration of an insecticide or certain uses of an insecticide be canceled by federal or state agencies, suggestions thus affected herein are no longer applicable. Use of products in this guide does not constitute a guarantee or warranty of the products named and does not signify that these products are approved to the exclusion of comparable products.

Cover photo of Asian citrus psyllid adult by David Hall, USDA-ARS, Bugwood.org
Back photos of adult leaf-footed bug and leaf-footed nymph by Raj Singh, LSU AgCenter

Introduction

The Insect Pest Management Guide is issued annually by the LSU AgCenter. Each edition supersedes guides for all prior years. Visit www.LSUAgCenter.com for the latest information. Call 225-578-1634 with questions about insects and arthropods and their management of them. You may also contact your county agent.

Insecticide recommendations and rates of application listed in this guide are in conformance with U.S. Environmental Protection Agency registrations and U.S. Food and Drug Administration tolerances.

Users of this guide should still read the label on the insecticide container and follow the directions and precautions on the label carefully when using the insecticides recommended in this guide.

Some insecticides registered by the U.S. Environmental Protection Agency are not included in this guide for a variety of reasons, such as their hazardous nature, lack of availability, inefficient control of pests, or higher costs for use.

Restricted Use Pesticides

Some of the pesticides or certain uses of pesticides in this publication may be classified for restricted use. The labels of those pesticides with restricted uses will contain information regarding these restrictions. Be sure to read all labels thoroughly. It is illegal to use any pesticide in a manner that is inconsistent with the label directions. Information on pesticide applicator certification programs may be obtained from the LSU AgCenter.

General Information for Users of This Guide

The following pest control recommendations are based on research conducted by LSU AgCenter faculty members in its Louisiana Agricultural Experiment Station and Louisiana Cooperative Extension Service in cooperation with the U.S. Department of Agriculture.

Pest control recommendations made by LSU AgCenter faculty are based on materials for which there is specific information regarding effectiveness under Louisiana conditions, residues that will remain on the crop at harvest, phytotoxicity, and effects on beneficial predators, parasites, honeybees, fish, and other wildlife. In addition, environmental effects, particularly as each pesticide relates to water, are strongly considered. Recommended chemicals also must be registered and labeled for use by both the Environmental Protection Agency and the Louisiana Department of Agriculture and Forestry.

New materials and formulations will be included in the recommendations only after they have been properly registered, have proven effective, and have shown the registered use will not result in a residue that exceeds the legal tolerance when applied as directed under Louisiana conditions.

These suggestions for pest control are based on the best information available for each pesticide listed. If followed carefully, they should result in satisfactory control and should not leave residues that exceed the tolerance established for any chemical on a particular crop. To avoid excessive residues on the harvested crop, follow directions carefully with respect to dosage levels, the number of applications, and the minimum interval between application and harvest. Always be sure to observe the waiting period for re-entry into the field after a pesticide application if such a period is stated on the label. Also, wear any protective clothing or devices specified on the label for applying pesticides or entry into a treated field.

The grower is responsible for residues on his or her crop as well as for problems caused by drift from the grower's property to other properties or crops.

General Precautions

All pesticides are poisonous and should always be used with caution. The following suggestions for using and handling pesticides will help minimize the likelihood of injury to humans, animals, and crops from exposure to the chemicals.

1. Always read all the label's precautionary directions before using pesticides and follow those directions exactly. Notice warnings and cautions before opening the containers. Repeat the process every time no matter how often you use a pesticide or how familiar you think you are with the directions. Apply the pesticide only in amounts and at times specified.
2. Keep pesticides out of reach of children, pets, irresponsible individuals, and livestock. Pesticides should be stored outside the house, away from food and feed, and under lock and key.
3. Always store pesticides in their original containers and keep containers tightly closed. Never keep pesticides in anything but the original containers with legible labels.
4. Never smoke or eat while applying pesticides.
5. Avoid inhaling sprays or dust. When directed on the label, wear protective clothing and an approved mask.
6. Should pesticides be accidentally spilled on the skin or clothing, remove contaminated clothing immediately and wash the contaminated skin thoroughly.
7. Bathe and put on clean clothing after spraying or dusting. If it is not possible to bathe, wash hands and face thoroughly and change clothes. Also, wear fresh clothing each day.
8. Cover food and water containers when treating in or around livestock or pet areas. Do not contaminate fishponds, streams, or lakes.
9. Do not reuse pesticide containers for any purpose.
10. Observe label directions and follow recommendations to keep the residue on edible portions of plants within the limits permitted by law.
11. If symptoms of illness occur during or shortly after dusting or spraying, call a physician or get yourself or the affected person to a hospital immediately. Also, bring a label from the container of pesticide that was used to the doctor or hospital.
12. Do not use the mouth to siphon liquids from containers or blow out clogged lines, nozzles, etc.

13. Do not spray with leaking hoses or connections.
14. Do not work in the drift of a spray or dust.
15. Confine pesticides to the property being treated. Avoid drift to adjacent properties by stopping treatment if weather conditions become unfavorable.
16. Do not apply pesticides over waterways or canals, and do not apply them to a field while it is being irrigated or if water runs off a field.
17. If laborers are working in crops with heavy foliage, such as cotton, tomatoes, peaches, citrus, etc., that have been treated with highly toxic compounds, be sure the recommended interval between the treatment and entrance into the treated area is observed. These workers should follow the same precautions given to applicators regarding clothing changes, wearing protective clothing, eating, smoking, and bathing. If a worker becomes ill while working under these conditions, call a physician immediately.

Insecticide/Acaricide Resistance Management

The insecticides recommended in this publication are important components of an integrated pest management plan. If the insecticides are not used properly, or if they are used repeatedly over time, there is a possibility that resistance to those insecticides will develop.

It is the responsibility of the producer or pesticide applicator to conserve the use of insecticides. It is important that insecticides with different mode-of-action classifications be rotated during a season. An insecticide's mode of action defines how a specific pesticide kills an insect or mite. Repeated use of pesticides with the same mode of action often will result in the development of resistance to the entire class of insecticides.

Resistance to insecticides may be defined as "a heritable change in the sensitivity of a pest population that is reflected in the repeated failure of a product to achieve the expected level of control when used according to the label recommendations for that pest species," according to the Insecticide Resistance Action Committee. Once an insect population becomes resistant to a class of insecticides, the entire class can no longer be used to manage the target insect.

While using this pest control guide, please be sure to refer to the IRAC MoA (mode of action) classifications in the final table in this publication. Be sure to keep records of the insecticides you use during the season to control pests in your crop. We encourage you to practice pesticide stewardship and rotate insecticides used during the season based on the mode-of-action classifications.

Pesticide Drift

Pesticide drift is by far the most important cause of illegal residues on forage crops. No pesticide can be applied by either aerial or ground equipment without some drift occurring. Drift can be kept to a minimum (and therefore the contamination of forage crops reduced) if certain precautions are observed. Those precautions involve the selection of the pesticide, method of application, type of formulation (dust, spray, or granular), timing of treatment, wind direction and velocity, and distance between the point of application, and the nearest forage crop downwind.

Pesticides Hazardous to Honeybees and Other Beneficial Insects

Many pesticides are highly toxic to honeybees and other beneficial insects. Farmers, beekeepers, and the pest control industry should cooperate closely to keep losses of beneficial insects to a minimum.

Certain pesticides are more toxic than others to these insects. Therefore, whenever possible, use the least toxic material.

When bees are present, the safest time and method of application of pesticides should be employed. Avoid the drift of pesticides onto bee colonies or nearby crops and weeds in bloom. Do not contaminate bee drinking water.

New label statements to protect bees have been added to some labels (neonicotinoids in particular). Read and follow these statements.

Wildlife Hazards

To protect fish and other wildlife, do not apply pesticides over canals or streams, and do not allow drainage from treated fields to enter waterways immediately after application.

Pesticide Phytotoxicity

Certain chemicals may cause plant injury if used at the wrong stage of plant development or when the temperature is too high. The injury also may result when excessive dosage rates, wrong formulations, or incompatible pesticide combinations are applied. To avoid plant injury, follow recommendations precisely.

Buffers/Water pH

Water pH is a critical factor in the effectiveness of most insecticides. Since most insecticides are acid-formers, it is critical that your water pH be acidic to prevent chemical breakdown, known as hydrolysis.

The optimum pH is between 5.5 and 6.5. The best way to correct a high water pH is with a buffer because it will establish the pH so it will not fluctuate with changes in temperatures.

The water pH can be measured using a swimming pool test kit, litmus paper, or a pH meter. Use what will work best for you. Water pH is affected by temperature, sunlight, rainfall, drought, and many other factors and is seldom the same from one spray to the next. Thus, check the water pH before each spray.

Several buffers are on the market that are about equal in efficiency. Use the one available to you. You should test the effectiveness of the buffer by using 1 to 2 ounces per 50 gallons of water and then mixing and rechecking the pH. Whatever is dissolved in the water will determine how much buffer you may need. The label may say one quart, but you may need less or occasionally more.

Check each time and start with about 2 ounces per 50 gallons of water. Then add 1 ounce at a time until the correct pH is reached. Too much of a buffer will cause the water to be too acidic, which can be phytotoxic to your plants.

Buffers help to enhance the initial knockdown of your spray and give you better residual effects. That will, in the long term, reduce the number of sprays you make. Reducing the number of sprays will reduce the development of pest tolerance, harm to the environment, effects on beneficial insects (saving beneficials), and costs while also helping you to produce a good crop.

Oils as Pesticides

Oil may be used to control many pest populations of insects and mites. They may be used alone or in combination with insecticides or miticides. Oils may be used year-round simply by varying the rates for the seasons.

Examples include dormant oil, Volck oil, Superior oil, Sun Spray Ultra Fine oil, and others. Some oils can be used on a wide variety of crops such as fruits, vegetables, ornamentals, trees, flowers, and foliage plants. Others may be limited. Follow the label for proper control.

Predators and Parasites

The use of beneficial insects or predators to control pest populations is a natural phenomenon. Parasites and predators usually build up once a pest or host becomes established. In some cases, these naturally occurring controls effectively maintain pest numbers below economic thresholds.

As pest density increases, it initiates the development of the “beneficials.” Beneficial insects, however, can be purchased to supplement the natural beneficials and enhance control, thereby reducing the need for pesticide use. Beneficials always should be purchased in either the egg or immature stage to help ensure the desired control. Some adults can fly off to other areas.

Some beneficials can become a nuisance if numbers become too dense. Such a problem developed in areas with the Asian lady beetle. Another example is the small braconid wasp that will infest catalpa worms when released to control hornworms in vegetables and tobacco.

Restricted Entry Intervals (REIs)

Read the agricultural use requirements on the label very carefully to determine the restricted entry interval for a particular use of an insecticide. The restricted entry intervals may vary for different uses of the same insecticide. ALWAYS READ THE LABEL!

In Case of Poisoning

Louisiana (Nationwide) Toll-Free Poison Center
800-222-1222

24-Hour-a-Day Service
National Pesticide Information Center
800-858-7378
(800-858-PEST)
Monday-Friday, 8 a.m.-12 p.m. (Pacific Time)
www.npic.orst.edu

Pesticide Spills and Hazardous Material Cleanup
855-452-5323

Read the Pesticide Label for Your Area/Use

Louisiana State Arthropod Museum Insect and Spider Identification Services

See https://www.lsu.edu/lmnh/lsam.php for information.

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Disclaimer Statement

The pesticides recommended in this publication were registered for prescribed uses at the time of publication. Pesticide registrations are reviewed continuously. When the registration for a recommended pesticide is canceled, the LSU AgCenter no longer recommends that pesticide.

Uses of brand or trade names in this publication are for clarity and information. Such use does not imply approval of the product to the exclusion of others that may be of similar suitable composition, and it does not guarantee or warrant the standard of any given product. The lists of products provided in this publication are not intended to cover all available products.

All insecticides must be used as instructed on their labels. Most insecticides are registered for insects on particular commodities. It is a violation of federal law to use any insecticide for an insect or commodity for which it is not labeled.

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Fruit and Nuts – Commercial Uses

Apple Spray Schedule

Dormant (apply in December or January)

Table 1. San Jose scale (when present)

Materials/ Insecticides	To Make 50 Gallons	Precautions
Oil emulsion 3% actual oil in diluted spray.	Follow the recommendations of the manufacturer for mixing.	Use 2 applications 7-10 days apart prior to bud break with no time limit.
Imidan (Phosmet) 70W	0.5-1.28 pounds	PHI=14 days; highly toxic to bees. Do not use in home gardens. Not to exceed 5.125 pounds A.I./acre.
Esteem 35WP (Pyriproxyfen)	0.5-0.62 ounce or (= 4-5 ounces/acre)	• PHI=45 days; limit to 2 applications per season. • Allow 14 days between applications. Apply at delayed dormant thru pink. For delayed dormant, mix with oil emulsion at the recommended manufacturer's rate. Must be timed to coincide with crawler emergence.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	PHI=21 days; do not apply more than 0.1 pound A.I./acre/season.

Calyx (apply when three-fourths of petals have fallen)

Table 2. Catfacing insects

Materials/ Insecticides	To Make 50 Gallons	Precautions
Imidan (Phosmet) 70W	0.5-1.28 pounds	See above information on Imidan.

Table 3. Leafrollers, scales, leafhoppers

Materials/ Insecticides	To Make 50 Gallons	Precautions
SpinTor 2SC (Spinosad –mixture of Spinosyn A and D)	0.62-1.25 fluid ounce	PHI=7 days. Not labeled to control scales.

Table 4. Thrips

Materials/ Insecticides	To Make 50 Gallons	Precautions
Carbaryl 50% WP (Sevin) follow label in other Carbaryl (Sevin) formulations	0.5-1.0 pound	PHI=3 days; highly toxic to bees; avoid during periods of full bloom until 30 days after full bloom. Allow 14 days between sprays. Use higher rate of Carbaryl 50WP for apple maggot, leafrollers, wooly apple aphid, plum curculio. Carbaryl might promote mite infestations.
Pounce (Permethrin) 3.2EC	1.25 fluid ounce (=10 fluid ounce/acre)	Do not apply after petal fall. Follow label.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	PHI=21 days; do not apply more than 0.1 lb A.I./acre/season.

Table 5. Aphids (not wooly apple aphid)

Materials/ Insecticides	To Make 50 Gallons	Precautions
Provado 1.6F (Imidacloprid)	1.0-2.0 fluid ounce	PHI=7 days; apply post-bloom only.

Table 6. Leafhoppers

Materials/ Insecticides	To Make 50 Gallons	Precautions
Provado 1.6F (Imidacloprid)	0.5-1.0 fluid ounce	Provado is highly toxic to bees and aquatic invertebrates. Toxic to wildlife. Allow 10 or more days between applications. Do not apply more than 40 fluid ounce per acre per year.
Mustang Max (Zeta-cypermethrin)	0.21-0.32 fluid ounce	PHI=14 days; allow 7 days between applications.

Table 7. Mites

Materials/ Insecticides	To Make 50 Gallons	Precautions
Nexter (Pyridaben)	5.2-10.67 ounces/acre	PHI=25 days; Do not make more than one application per season. Apply at the beginning of mite infestations.
Savey 50DF (Hexythiazox)	3.0-6.0 ounces/acre	PHI=28 days; limit to 1 application per year. Apply at the beginning of mite infestations.

Apply cover sprays at 10- to 14-day intervals

Warning: Re-entry time for a worker entering treated areas should be strictly observed. Read the label for this information.
Note: Chemical should be applied at a rate of 200-300 gallons/acre for adequate coverage with the material.

Citrus Spray Schedule

<u>Note</u>: Selection of proper materials and timing of application are of primary importance for effective control of insects and diseases of citrus. The rate of pesticide product per 100 gallons used in this guide is based on a volume of 400 gallons/acre of diluted spray.

Prebloom: Jan. 15-Feb. 15
Satsuma, Grapefruit, Temple, Valencia, Lemon, Tangelo, Tangerine

Table 1. Spider mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Nexter 75WP (Pyridaben)	6.6 ounces (one water-soluble packet/acre)	See label.	See label.	PHI = Seven days; do not make more than two applications/year. Allow 30 days between treatments at the lowest labeled rate. Higher rates require longer intervals. Highly toxic to bees, fish, and aquatic invertebrates. Read label.

Table 2. Rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Micromite 80WGS (Diflubenzuron) + 97% petroleum-based oil	6¼ fluid ounces (two water-soluble packet/acre)	See label.	See label.	Micromite 80WGS: PHI = 21 days; do not mix with boron products. Use sufficient water to ensure coverage. Applications may be repeated no less than 90 days apart. Active on eggs and nymphal stages but not on adult rust mites. Results are visible three to 10 days after application.
Sulfur	See label.	See label.	See label.	Limit sulfur applications to one per season where supplemental rust mite control is needed. Do not mix with oils and/or do not apply within three weeks of oil applications to avoid fruit burn. Some sulfur formulations should not be combined with spreaders/stickers. Follow the labeled rate. Do not use more than 6 lb/100 gallons.

Table 3. Asian citrus psyllid

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Danitol 2.4EC (Fenpropathrin) + Horticultural oil	16-21 fluid ounces + 5 pints	See label.	See label.	Use for control of overwintering adults. Do not apply if harvesting fruit. PHI = 1 day (Danitol); do not exceed 2 2/3 pints of Danitol per season. Sulfur may cause irritation to eyes. Avoid contact with eyes, skin, and, clothing. To avoid foliage/fruit burn, do not apply sulfur products when hot temperatures (above 90 F) are expected within three days of spraying. **NOTE:** Lime sulfur use – do not use this material on tangerine trees during late winter and early spring.

Postbloom: All citrus (satsumas - when 75% petals have fallen, other oranges - when pea size.)

Table 4. Scales, thrips

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Malathion 57EC (Malathion)	5-7½ pints	1¾ pints	2 teaspoons	Malathion: PHI = Seven days; Malathion is highly toxic to honeybees. Do not apply during full bloom. Nutritional mixtures should not be used in combination with oil sprays.
Malathion 8F (Malathion)	6 pints	1½ pints	1½ teaspoons	

Table 5. Scales, mealybugs, whiteflies, citrus, blackflies, Asian citrus psyllids

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Supracide 2E (Methidathion)		½-2 pints	½-2 teaspoons	PHI = 14 days; make no more than 2 applications per season. Allow 45-day intervals between sprays; highly toxic to bees; do not apply during full bloom. In lemons do not apply more than once if tank-mixed with oil. PHI = 5 days; do not apply more than 20 quarts/acre/crop.
Supracide 2E Plus (Methidathion)		1-2 pints	1-2 teaspoons	Follow label.
Sevin XLR plus (Carbaryl)	1.5 quarts	See label.	See label.	

Table 6. Scales, whiteflies, cirtus blackflies, spider mites, rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Esteem 0.86 EC (Pyriproxyfen) + 1% Superior oil	16 fluid ounces	See label.	See label.	PHI = 1 day; use sufficient water to ensure enough coverage. Apply when scales are at crawler (young) stage; maximum 2 applications/season; allow 21 days between sprays.
Nexter 75WP (Pyridaben)	6.6 ounces (1 water-soluble packet/acre)	See label.	See label.	See preceding remarks on Nexter.
Vendex 50WP (Fenbutatin-oxide) +	2-3 pounds (2-3 water-soluble packets/acre)	8-12 ounces	1-1½ teaspoons	PHI = 7 days; apply when daily temperatures at application average above 70 F and when mite populations are beginning to build for best performance. Complete coverage is needed for optimum control. Limit to 2 applications/year at 60-day intervals. Do not use Vendex on tangerines, tangelos, Reed grapefruit or Webb red blush grapefruit.
Latron CS 7	See label	1 quart	See label.	

Table 7. Thrips

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
SpinTor 2SC (Spinosad)	6 fluid ounces	See label.	See label.	PHI = 1 day; do not spray more than 29 fluid ounces/acre/crop or more than 2 applications/year. For best results, add emulsified crop oil (follow label).

80% Petal Fall: All Citrus

Table 8. Rust mites, broad mites, bud mites, two-spotted spider mites, citrus thrips

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Agri-mek 0.15 EC (Abamectin) +	5-20 fluid ounces	1¼-5 ounces	¼ teaspoon	PHI = 7 days; always apply with a minimum of 0.20% horticultural (not dormant) spray oil. Allow 30 days between treatments. Do not apply more than 40 fluid ounces/acre/season; highly toxic to honeybees. For best results use a minimum of 500 gallons/acre of spray and no less than 0.5% oil for citrus bud mites; 100-150 gallons/acre spray for citrus leafminers; 100-250 gallons/acre spray for citrus thrips and adjust the rate of product/acre accordingly. Use caution when applying oils, read the label and do not spray when temperatures exceed 85 F.
Ultra fine oil	10-20 fluid ounce	2½-5 ounces	¼ teaspoon	

Table 9. Rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Micromite 80WGS (Diflubenzuron) + 97% petroleum-based oil	6¼ fluid ounces (two water-soluble packet/acre)	See label.	See label.	PHI = 21 days; do not mix with boron products. Use sufficient water to ensure coverage. Applications may be repeated no less than 90 days apart; active on eggs and nymphal stages but not on adult rust mites; results visible 3-10 days after application.

Table 10. Leafminers

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Assail 70WP (Acetamiprid)	2 ounces	See label.	See label.	PHI = 7 days; toxic to bees exposed to direct treatment.

Table 11. Leafminers, thrips

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Spintor 2SC (Spinosad)	6 fluid ounces	See label.	See label.	PHI = 1 day; do not spray more than 29 fluid ounces/acre/crop or more than 2 applications/year. For best results add emulsified crop oil (follow label).

Table 12. Aphids, citrus thrips, Asian citrus psyllid

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Admire Pro 4F (Imidacloprid)	3.5-7.0 fluid ounces	See label.	See label.	Admire Pro: PHI = 0 days; do not apply during bloom or 10 days prior to bloom; limit to 20 ounces/acre/application and 40 ounces/acre/year; allow at least 10 days between applications. Limit 14.0 fluid ounces/acre per crop season.
Admire 2F (soil-applied systemic) (Imidacloprid)	16-32 fluid ounces (or 1/8 fluid ounce/tree)	See label.	See label.	Admire 2F: PHI = 0 days; intended for containerized trees and young trees (4 ft-6 ft height); apply as soil drench. For best results apply prior to the onset of infestations. See label for soil application options.

April: All Citrus

Table 13. Fire ants

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Extinguish IGR (Methoprene)	1-1½ pounds	3-5 tablespoons/mound	See label.	Apply when ants are actively foraging.

June 15-July 15: All Citrus

Table 14. Thrips, leafminers

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
SpinTor 2SC (Spinosad)	6 fluid ounces	See label.	See label.	See the above preceding remarks on SpinTor.
Agri-mek 0.15 EC (Abamectin)	See label.	See label.	See label.	See preceding remarks.
Admire Pro 4F (Imidacloprid)	3.5-7.0 fluid ounces	See label.	See label.	PHI = 0 day; minimum interval between applications-10 days; maximum Admire Pro allowed per crop season – 40.0 fluid ounces/acre (0.5 lb AI/acre). Do not apply during bloom or within 10 days prior to bloom or when bees are actively foraging.

Table 15. Rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Agri-mek 0.15 EC (Abamectin)	5-20 fluid ounces	1¼ -5 ounces	¼ teaspoon	See above preceding remarks on Agri-mek. Rate varies depending on insect/mite control; refer to label.

Table 16. Broad mites, bud mites, two-spotted spider mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Agri-mek 0.15 EC (Abamectin) +Ultra fine oil	5-20 fluid ounces + 10-20 fluid ounces/acre	1¼ -5 ounces + 2½ -5 ounces	¼ teaspoon + ¼ teaspoon	Always use caution when spraying oil and oil combinations; read the label; do not apply when temperatures exceed 85 F; see footnotes.

Table 17. Rust mites. leafminers

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Micromite 80WGS (Diflubenzuron) + 97% petroleum-based oil	6¼ fluid ounces (two water-soluble packet/acre)	See label.	See label.	See previous remarks on Micromite 80WGS.

Table 18. Mites (general)

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Ultra fine oil	See label.	1¼-1¾ gallons	3-4½ tablespoons	Always use caution when spraying oil and oil combinations; read the label. Do not apply when temperatures exceed 85 F; see footnotes.

Table 19. Spider mites, whiteflies, mealybugs, scales, aphids

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Summer oil +	See label.	1-1½ gallons	2½-4 tablespoons	See above for Malathion remarks.
Malathion 57EC (Malathion)	5-7½ pints	1¾ pints	2 teaspoons	

Table 20. Asian citrus psyllid, aphids, scales

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Danitol (Fenpropathrin) +	16-21 1/3 fluid ounces	See label.	See label.	Use for control of overwintering adults; do not apply if harvesting fruit; PHI = 1 day; do not exceed 2 2/3 pints of Danitol/season.
Summer Oil	4-7 pints	1-1 ¾ pints	1-2 teaspoons	

Table 21. Mealybugs, whiteflies, citrus blackflies, black scales

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Supracide 2E (Methidathion)	See label.	½-2 pints	½-2 teaspoons	See preceding remarks on Supracide.

Aug. 14-Sept. 15: All Citrus

Table 22. Aphids

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Admire Pro 4F (Imidacloprid)	3.5-7.0 fluid ounces	See label.	See label.	See above for remarks.

Table 23. Leaf-footed bugs

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Baythroid 2E (Cyfluthrin)	2-2.4 fluid ounces	See label.	See label.	Baythroid 2: PHI = 0 days; coverage of foliage and fruits is necessary for optimal results. Use 2-3 gallons of spray/tree. If multiple applications are needed may make a first spray at 2.4 fluid ounces/acre and 2 additional sprays of 2 fluid ounces/acre at a minimum of 7-day intervals. Maximum amount/season is 6.4 fluid ounces/acre (or 0.10 lb active ingredient/acre/season).

Table 24. Scales, plant bugs

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Malathion 57EC (Malathion)	5-7½ pints	1¾ pints	2 teaspoons	See above for remarks on Malathion.

Table 25. Citrus blackflies, whiteflies, mealybugs, scales, plant bugs

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Ultra fine oils	See label.	1½ gallons	4 tablespoons	Oils may be used with all materials, particularly against whiteflies, mites, and scales; however, read the footnotes for important information.
Supracide2E (Methidathion)	See label.	½-2 pints	½-2 teaspoons	Follow label

Table 26. Spider mites, rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Vendex 50WP (Fenbutatin-oxide) +	2-3 pounds (2-3 water-soluble packets/acre)	8-12 ounces	1-1½ teaspoons	See preceding remarks and temperature requirements for Vendex.
Latron CS 7	See label	1 quart	See label.	Follow label
Nexter 75WP (Pyridaben)	6.6 ounces (1 water-soluble packet/acre)	See label.	See label.	See preceding limitations.

Table 27. Asian citrus psyllid

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Mustang Maxx (Zeta-cyprmethrin)	4.3 fluid ounces	See label.	See label.	PHI = 1 day; apply by ground equipment using sufficient water to obtain full coverage of foliage in a minimum of 20 gallons for concentrate spray or a minimum of 100 gallons for dilute spray. Apply by air in a minimum of 10 gallons/acre. Begin applications drift precautions on this label. Do not apply more than 0.20 lb active ingredient/acre/season. Do not make applications less than 14 days apart.

Oct. 15-Nov. 15: All Citrus

Table 28. Spider mites, rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Vendex 50WP (Fenbutatin-oxide)	2-3 pounds	8-12 ounces	1-1½ teaspoons	Performance of Vendex is reduced when daily temperatures at application average below 70 F. See preceding remarks for additional restrictions.

Table 29. Rust mites

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Sulfur	See label.	See label.	See label.	Sulfur: Apply postharvest only if supplemental rust mite control is needed. See preceding remarks for oil and temperature restrictions.
Agri-mek 0.15EC (Abamectin)	5-20 fluid ounces	1¼ -5 ounces	¼ teaspoon	See details above.

Table 30. Asian citrus psyllid

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Sevin XLR (Carbaryl)	1.5 quarts	See label.	See label.	PHI = 5 days; do not apply more than 20 quarts/acre/crop.

Table 31. Leafminers

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
SpinTor 2SC (Spinosad)	6 fluid ounces	See label.	See label.	Follow label.
Admire Pro (Imidacloprid)	3.5-7.0 fluid ounces	See label.	See label.	

Table 32. Fire ants

Pesticide and Formulation	Rate of Product per Acre	Amount To Use for 100 Gallons	Amount To Use for 1 Gallon	Remarks
Extinguish IGR (Methoprene)	1-1½ pounds/acre	3-5 tablespoons/mound	See label.	Follow label.

Note: Add a spreader sticker or liquid soap to spray the mixture to obtain better coverage especially when emulsifiable concentrates are used. If rust mite control is poor, reduce speed or increase gallonage/acre if using a speed sprayer.

Mite-Resistance Management Plan: Repeated use of the same miticide is documented to result in a rapid buildup of miticide-resistant strains of mites. To reduce the potential risk of developing resistant mite populations, miticides should be alternated as part of a mite-resistance management plan. If more than one application is needed to control heavy and prolonged mite infestations, always alternate products with a different mode of action. Observe the minimum required spray intervals and restrictions on the amount of product and number of applications/area/seasons. Closely monitor mite populations to determine species, infestation levels, and the presence of predatory organisms. Use miticide sprays only when needed.

Caution: Oil emulsion sprays should not be applied to drought-stricken trees when the temperature is above 85 F and humidity less. Oil emulsion sprays applied after Aug. 15 may inhibit solid formation, retard coloring of fruit, and reduce the tolerance of trees to cold. Follow specific instructions on the label of all pesticides.

Warning: Always wear appropriate personal protective equipment when handling and spraying pesticides.

Re-entry times for workers entering groves and/or treated fields should be strictly observed; be sure to check the label for this information.

Diaprepes Root Weevil Management Recommendation

Treat every life stage (egg, larva, adult) with at least one treatment each year. Continue treatment until Diaprepes root weevils are not found for a full year. All adult treatments should be applied in 100-300 GPA water to ensure good coverage of insecticide (unless otherwise directed by the label). Be sure to read and follow all insecticide label instructions. Remember: the label is the law!

Timing of Adult Sprays:

- First spray during peak summer flush – usually late May (scout for adults beginning in April).
- Second spray four weeks later, combined with Micromite 80SG with oil for egg sterilization – usually late June (timing will vary depending on adult emergence).

Chemical Barrier for Larval Suppression:

- Target is larvae that will burrow into the soil after hatching from eggs deposited on leaves.
- Apply about two weeks after peak adult emergence – typically late July.
- Must be applied to soil that is mostly free of vegetation.
- Uniformly apply from the trunk to the dripline of the tree to a moistened soil surface devoid of litter.
- Minimize disturbance of soil beneath the tree to maintain the barrier.
- Brigade should provide about three weeks of activity.

Table 33. Diaprepes Root Weevil

Insecticide	Target	Method of Application	Rate Per Acre	Comments
Micromite 80SG (Diflubenzuron)	Diaprepes root weevil egg	Apply to vegetation.	6.25 ounces + 0.5% oil	Apply when adults are actively depositing eggs. Helps prevent egg hatch (oranges, grapefruit, and tangerines).
Admire Pro 4F (Imidacloprid)	Diaprepes root weevil larva	Irrig sys or apply to pre-wet soil.	14 fluid ounces	Apply when root growth is occurring. Apply to soil; remains effective for up to 4-5 months.
Brigade WSB (Bifenthrin)	Diaprepes root weevil Adult/Larva	Soil barrier	40 ounces	Apply twice per year to coincide with adult emergence. Do not exceed 80 ounce/year. Will control larvae when they burrow into the soil. Will also control adults when they emerge from the soil. Must be applied to soil that is relatively free of debris and vegetation. Avoid disturbing the soil surface after application.
Baythroid 2E (Cyfluthrin)	Diaprepes root weevil Adult	Apply to vegetation.	6.4 ounces	Only a single application may be made per crop season.
Danitol 2.4EC (Fenpropathrin)	Diaprepes root weevil Adult	Apply to vegetation.	16-21 ounces	Citrus trees must be 3 years or older. Do not exceed 21.33 fluid ounces/year.
Kryocide 96 WP or Prokil Cryolite 96 (Cryolite)	Diaprepes root weevil Adult	Apply to vegetation.	8-10 pounds	This slow-acting stomach poison may take several days of warm weather to kill beetles. Do not exceed 90 pounds/acre/season.

Insecticide	Target	Method of Application	Rate Per Acre	Comments
Mustang (Zeta-cypermethrin)	Diaprepes root weevil Adult	Apply to vegetation.	4.3 fluid ounces	Apply by ground equipment using sufficient water to obtain full coverage of foliage in a minimum of 20 gallons for concentrate spray or a minimum of 100 gallons for dilute spray. Apply by air in a minimum of 10 gallons per acre. Begin applications when pest activity is noted. Follow appropriate spray drift precautions.
Orthene 97*[1] (Acephate)	Diaprepes root weevil Adult	Apply to vegetation.	0.5 – 0.75 pound	Apply at 100 gallons water/acre or less.
Sevin 80S[1] (Carbaryl)	Diaprepes root weevil Adult	Apply to vegetation.	5-10 pounds + 0.5% oil	Do not apply during bloom. Do not exceed 25 pounds/acre/ application.
Sevin XLR Plus[1] (Carbaryl)	Diaprepes root weevil Adult	Apply to vegetation.	6 quarts + 0.5% oil	During bloom period, apply from 1 hour after sunset until 2 hours after sunrise.
Micromite 80SG (Diflubenzuron)	Diaprepes root weevil egg	Apply to vegetation.	6.25 ounces + 0.5% oil	Apply when adults are actively depositing eggs. Helps prevent egg hatch (oranges, grapefruit and tangerines).

*Nonbearing citrus only
[1] Be sure to adjust water pH into the range of 5.5 to 6.5.

Fig Spray Schedule

Table 1. Vinegar flies

Material	Rate	Restrictions
Malathion 57 EC (Malathion)	2 quarts plus 1-2 gallons unsulfurized molasses/acre	PHI=3 days; use 300 gallons water/acre. Sanitation: Early harvest and complete fruit removal at harvesting will reduce fruit exposure to flies. Disc under affected hosts to destroy fermented fruit residues.

Table 2. Fig scale

Material	Rate	Restrictions
Volk supreme oil	3 gallons/100 gallons water	Dormant or delayed dormant spray only.

Table 3. Spider mites

Material	Rate	Restrictions
Omite 30WP (Propargite)	6 pounds/acre Two applications	Use only on nonbearing trees and when trees will not bear fruits within 1 year of application.
Omite 6E (Propargite)	2 pints/acre Two applications	Follow label.
Volk supreme oil	3 gallons/100 gallons water	Dormant or delayed dormant spray only.
Sulfur	Follow labeled rate.	Do not mix with oils and/or do not apply within 3 weeks of oil applications to avoid fruit burn. Some sulfur formulations should not be combined with spreader stickers. Sulfur may cause eye and skin irritation. Avoid when hot temperatures (above 90 F) are expected within three days of spraying.

Warning: Re-entry time for workers entering treated areas should be strictly observed. Read the label for this information.

Mayhaw Spray Schedule

Table 1. Aphids (except wooly apple aphid)

Material	Rate	Restrictions
Admire Pro 4F (Imidacloprid)	2.8 fluid ounces/per acre	PHI=7 days; apply postbloom; highly toxic to bees.
Mustang Maxx (Zeta-cyprmethrin)	0.21-0.32 fluid ounce/50 gallons or 1.28 fluid ounces/acre	PHI=14 days; allow 7 days between applications.

Table 2. Leafminers

Material	Rate	Restrictions
SpinTor 2SC (Spinosad)	1.0-2.5 fluid ounces/100 gallons or 4.0-10.0 fluid ounces/acre	PHI=7 days; do not apply more than 29 fluid ounces/acre/year.

Table 3. Leafhoppers

Material	Rate	Restrictions
Admire Pro 4F (Imidacloprid)	1.4-2.8 fluid ounces/per acre	PHI=7 days; apply post-bloom; highly toxic to bees.
Mustang Maxx (Zeta-cyprmethrin)	0.21-0.32 fluid ounce/50 gallons or 1.28 fluid ounces/acre	PHI=14 days; allow 7 days between applications.

Table 4. Aphids, plum curculio

Material	Rate	Restrictions
Actara (Thiamethoxam)	4.5 ounces/acre	PHI=35 days; highly toxic to bees; do not make more than 1 prebloom application.
Mustang Maxx (Zeta-cyprmethrin)	0.21-0.32 fluid ounce/50 gallons or 1.28 fluid ounces/acre	PHI=14 days; allow 7 days between applications.

Table 5. Spider mites

Material	Rate	Restrictions
Savey 50DF (Hexythiazox)	3.0-6.0 ounces/acre	PHI=28 days; apply at the beginning of mite infestations. Savey is not effective against adult mites. Limit to 1 application/year. Do not use in home plantings.

Warning: Re-entry time for workers entering treated areas should be strictly observed. Read the label for this information.

Peaches Spray Schedule

Dormant

Table 1. Dormant

Insect	Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Scales, if present	Oil emulsion, 3% actual oil in diluted spray (follow recommendations of manufacturer).	See label.	Two sprays must be conducted at least 1 week and no more than 10 days apart to be effective. Be sure to cover underside of scaffold with pressure and not from run-off.
Severe scale infestations	Lorsban 4E (Chlorpyrifos)	0.5-1.0 pint	Only 1 application of Lorsban per dormant season (and one postharvest for borer control). Do not apply after delayed dormant stage. Not allowed for in-season use. Use a minimum of 1.5 pints/acre.
	Esteem 35WP (Pyriproxyfen)	4.0-5.0 ounce/acre + 1.5 gallons oil	PHI=14 days; use highest labeled rate under heavy infestations. Limit to 3 Esteem applications per season. Allow 14 days between treatments. Sprays must be timed to coincide with crawler emergence. Pyrethroids such as Ambush, Asana, Proaxis and Pounce are often associated with scale outbreaks.

Pink bud to bloom

Table 2. Catfacing insects (stink bugs, leaf-footed bugs) (at pink to 10% bloom)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Do not apply more than 0.1 lb AI/acre/season; PHI=21 days.
Mustang Max (Zeta-cypermethrin)	0.43-1.3 fluid ounce	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI=14 days.

Petal fall (when 75% of petals have fallen)

Table 3. Curculio

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Imidan 70W (Phosmet)	3/4-1.0 pound	PHI=14 days; do not apply more than 16lb./acre/season.
Ambush 25W (Permethrin)	1.6-4.8 ounces	Use higher rate for curculio control. PHI=14 days; Ambush not to exceed 400 gallons/acre/application.
Mustang Max (Zeta-cypermethrin)	0.43-1.3 fluid ounces	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI-14 days.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Do not apply more than 0.1 pound/ AI/acre/season; PHI=14 days.

Table 4. Catfacing insects (aphids, stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; Highly toxic material; use with caution. Lannate may promote mite infestation. Not for use to control scales.
Lannate SP (Methomyl)	1/4 pound	Follow label
Pounce 3.2 EC (Permethrin)	2.0-6.0 ounces	Pyrethroids such as Ambush, Asana, Mustang Max, Proaxis and Pounce are often associated with scale insect outbreaks.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Follow label.
Mustang Max (Zeta-cypermethrin)	0.43-1.3 fluid ounce	Follow label.

Shuck split or first cover (10-12 days later)

Table 5. Curculio, catfacing insects, aphids, scales

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Same as petal fall	See label.	See above.

Second cover (10-12 days later)

Table 6. Curculio

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Imidan 70W (Phosmet)	3/4-1.0 pound	PHI=14 days. See above for remarks.

Table 7. Catfacing insects (stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Ambush 25W (Permethrin)	1.6-4.8 ounces	PHI=14 days; See remarks above.
Pounce 3.2 EC (Permethrin)	2.0-6.0 ounces	Follow label
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fl. ounce	Do not apply more than 0.1 lb AI/acre/season; PHI=21 days.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fl. ounce	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI=14 days.
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; see notes above for additional remarks.
Lannate SP (Methomyl)	1/4 pound	Follow label.

Third cover (12-15 days later)

Table 8. Curculio, catfacing insects, scales

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Same as second cover spray. (It is recommended to rotate the mode of action).	See label.	See above for additional remarks.

Fourth cover (14-21 days later)

Table 9. Curculio, catfacing insects, scales

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Same as third cover spray. (It is recommended to rotate the mode of action).	See label.	See above for additional remarks.

Fifth cover (one month prior to harvest)

Table 10. Oriental moth, curculio

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Sevin 80S (Carbaryl	0.63-0.94 pounds (= 2½-3¾ pounds/acre)	PHI=3 days; Carbaryl is highly toxic to bees. It tends to increase scales and sometimes mite problems.

Table 11. Catfacing insects (stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Imidan 70W (Phosmet)	3/4-1.0 pound	PHI=14 days; see notes above.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Do not apply more than 0.1 lb AI/acre/season; PHI=21 days.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI=14 days.

Table 12. Oriental moth, catfacing insects

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; see notes above for additional remarks and cautionary statement.

Table 13. Mites

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Savey 50F (Hexythiazox)	3.0-6.0 ounces/acre	PHI=28 days; limit to 1 application per season. Apply during early infestations. Savey is not effective against adult mite populations.

3 weeks prior to harvest

Table 14. Oriental moth, curculio

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Imidan 70W (Phosmet)	3/4-1.0 pound	PHI=14 days; see notes above.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Do not apply more than 0.1 lb AI/acre/season; PHI=21 days.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI=14 days.

Table 15. Oriental moth

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Malathion 57EC (Malathion)	2 pints/acre	PHI=7 days.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	Do not apply more than 0.1 lb AI/acre/season; PHI=21 days.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	Apply as required by scouting. Allow a minimum of 7 days between applications; PHI=14 days.

Table 16. Catfacing insects (stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Sevin 80S (Carbaryl)	0.63-0.94 pound (= 2½-3¾ pounds/acre)	PHI=3 days; Carbaryl is highly toxic to bees. See notes above.
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; see notes above.
Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	PHI=21 days; see notes above.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	PHI=14 days; see notes above.

Table 17. Mites

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Vendex 50 WP (Fenbutatin-oxide)	4.0-8.0 ounces	PHI=14 days; limit to 2 applications/season. Do not apply more than 3 pounds/acre/year.

2 weeks prior to harvest

Table 18. Catfacing insects (stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; see notes above.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	PHI=14 days; see notes above.

Table 19. Oriental moth

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Malathion 57% EC (Malathion)	2 pints/acre	PHI=7 days.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	PHI=14 days; see notes above.

Table 20. Curculio

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Sevin 80S (Carbaryl)	0.63-0.94 pound (= 2½-3¾ pounds/acre)	PHI=3 days; Carbaryl is highly toxic to bees. See notes above.
Mustang Maxx (Zeta-cypermethrin)	0.43-1.3 fluid ounce	PHI=14 days; see notes above.

1 week prior to harvest

Table 21. Catfacing insects (stinkbugs, leaf-footed bugs)

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Sevin 80S (Carbaryl)	0.63-0.94 pounds (= 2½-3¾ pounds/acre)	PHI=3 days; Carbaryl is highly toxic to bees. See notes above.
Lannate LV (Methomyl)	3/4 pint	PHI=4 days; see notes above.

Table 22. Mites

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Nexter (Pyridaben)	See label.	Refer to label for rate for specific species of mites. PHI=7 days; toxic to aquatic organisms; highly toxic to bees. Follow label.

Postharvest trees

Table 23. Scales, leafhoppers, shot hole borers

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Lorsban 4E (Chlorpyrifos)	1/2-1.0 pint	Use as dormant or delayed dormant spray. Limit to 1 application during dormant or delayed dormant (and one postharvest for borer control). Do not use more than 4 pints/acre. As many as three or more generations of scales may occur after harvest. Any of the regular spray materials may be used to alternate during postharvest at the rates used during the season.

April/October

Table 24. Fire ants

Material/Insecticide	Amounts in 100 Gallons of Spray	Minimum Number of Days Before Harvest and Comments
Extinguish IGR (Methoprene)	1-1 1/2 pounds/acre	Apply broadcast over orchard floor in April when ants are actively foraging and prior to cold weather in October. Do not allow contact with fruit. Methoprene (A.I. for Extinguish) is an Insect Growth Regulator and therefore is slow acting. Ant population reductions may be observed 3-4 weeks after initial treatment. Apply on dry soil. Follow label for optimal results.

Trunk Sprays for Peach Tree and Lesser Peach Tree Borer

The thoroughness of coverage is essential for borer control. It is suggested that all growers adopt the practice of spraying the trunk and scaffold limbs each time they spray. This practice will help control the few peach tree borers that emerge early in the season and particularly the lesser peach tree borer.

Effective control of the peach tree borer has been obtained by spraying trunks with Lorsban as listed below.

Table 25. Trunk sprays tree borer

Material	Formulation	Amount/100 Gallons	Time Of Application	Remarks
Lorsban (Chlorpyrifos)	4E	3.0 quarts	Recommended for postharvest use only. Apply as soon after harvest as possible. Use 0.75-1.0 quart of mixture on small trees and 1.5 quarts on larger trees. Best results are obtained closer to peak emergence, between Aug. 2 and Sept. 1. Application may be made early from mid-July on nonbearing trees.	• Apply as a directed, handgun application to lower scaffolds, base and trunk. • Postharvest use only; limit to 1 application per season; toxic to fish. Do not use Lorsban on home plantings.
Lorsban (Chlorpyrifos)	4E	1.5 quarts	This rate should be used only when new plantings are being sprayed or low populations of borers exist.	

Peach Insect Pests

Table 26.

Insect	General Description/Remarks
Armored scale	San Jose scale has an ashy-gray appearance, is slightly convex, and is about the size of a pinhead. White peach scale spreads very rapidly and is distinguished by a cottony mass that is formed over the infested areas. The entire trunk and main branches will be white in a very short time. Common privet is a wild host for the white peach scale which makes this scale abundant all year. The host list is unlimited. Dormant sprays of Lorsban or Esteem plus oil should be used during the dormant season for heavy infestations and once for light infestations. Each season has several generations. It is imperative that each generation be controlled. Several generations occur after harvest, and it is imperative that scale insects be controlled if the trees are to survive.
Soft scale	The terrapin scale is a soft scale about the size of a pencil eraser. The young hatchings settle on the foliage and remain there until the third instar when they migrate back to the stems to mature and overwinter. The regular spray schedule will control these pests if enough water is used to get proper coverage. They are easiest to control when on the foliage. Oil sprays are ineffective on this scale.
White peach scale and West Indian peach scale	White peach attacks the entire tree and can kill trees if uncontrolled. During the growing season, a regular spray program will help to maintain this pest under control. Dormant sprays in the fall or prior to bud break may be applied in commercial production. Two sprays should be applied at 10- to 14-day intervals. COMPLETE COVERAGE IS ESSENTIAL.

Insect	General Description/Remarks
Twig borers	Two types of caterpillars infest peaches: the larvae of the Oriental fruit moth and the peach twig borer. The larvae of the Oriental fruit moth infest both the young twigs and fruits and breed throughout the warm season of the year. The peach twig borer attacks the young growing twigs early in the season soon disappearing.
Plum curculio	The plum curculio is a white legless grub that infests the fruits only. The adult is a brownish weevil about 3/16 inches long. It has two generations a year. The first generation is out about bloom. Those that infest the peaches cause the growing fruit to drop. The second generation occurs some 40 to 50 days later. **Damage:** The curculio causes the fruit to drop during 2 periods, soon after the young fruit sets and just prior to ripening. The first drop is caused by punctures made and worms hatching from eggs laid by overwintered weevils and the second by worms or grubs of the second generation. **Sanitation:** The drops should be picked up twice each week during these 2 periods and destroyed. Picking up and destroying first drops is most important and if thoroughly done will aid materially in ensuring a crop that will be nearly free of worms at harvest time, providing there are no other nearby sources of infestation. Native plums are the most common and important of such sources. Therefore, native plum thickets should be destroyed or fenced in and hogged during the dropping periods. Also, volunteer peach and plum trees should be destroyed or treated along with the producing orchard. **Pruning:** At pruning time, pull and burn all old mummies that carry the brown rot organism over the winter. Also, during the winter, clean and burn weeds and other debris in all areas in and around the orchard such as fence rows, ditch banks, etc. where the adult curculio and other pests may hibernate. These precautions aid in reducing infestations the following season. **Note:** Where chewing or sucking insects are a potential problem, sprays should be made when buds are in the pink stage. Do not apply during blossoming. The effectiveness of the cover sprays may be improved by the addition of a spreader sticker. One should certainly be used when this schedule is followed with plums and nectarines.
Peach tree borer and lesser peach tree borer	Borer tunneling is particularly injurious to young trees. Lesser peach tree borer (LPTB) adults lay eggs from spring to early winter. Most egg-laying from the peach tree borer (PTB) occurs from mid-June to early September. The peach tree borer attacks the crown area of the roots of peach, plum, and related trees. Borer infestations can be detected by the presence of frass and pupal cases protruding from the ground near the trunk (PTB) or scaffold limbs (LPTB). Initiate sprays soon after harvest. Use a hand-gun spray directed to lower scaffolds, vase, and trunk. Direct the spray at the trunk from the crotch at the scaffold limbs to the soil line. Completely wet the trunk and spray enough solution to wet or slightly puddle the spray at the base of the tree. It is essential that the trunk and soil area are wet all around the tree. Older trees may benefit from thorough coverage as some LPTB infestation concentrate in areas where primary scaffolds split.
Rusty brown plum aphid	The rusty brown plum aphid is present each year doing more or less damage to the foliage of plum and young peach trees shortly after they put out leaves. New foliage that is attacked becomes distorted and crumpled. Heavy infestations may injure the terminal buds that will stop growth, kill the blossoms and prevent fruit from setting.
Plant bugs	Several species of plant bugs injure peaches. These include the leaf-footed bug, several species of stinkbugs, and the tarnished plant bug. These insects pierce the green peaches with their beaks and then suck the sap for food. Young peaches, especially those punctured by the larger bugs, may drop. Otherwise, the peaches are usually misshaped, knotty, or catfaced. This damage renders the fruit unmarketable. These insects are usually worse following winter cover crops, and the damage is done when the peaches are small. Plant bugs may also be pests after harvest by feeding on young terminals. This injury or flagging of terminals may appear to be an Oriental fruit moth. If stems are dry and not hollowed out, the damage is from plant bugs.
Shot hole borer	The shot hole borer is a small beetle that attacks peach and related trees boring numerous small holes in the trunks and limbs. Its attack is confined largely to trees that are dying or in low vitality due to attacks of insects, diseases, or other causes. The control and prevention consist of removing all dying trees, pruning infested limbs of other trees, and burning. The control of other insects and diseases, fertilization, and cultivation keep the trees healthy and vigorous. Without proper management of potential habitats for these beetles, they can seriously affect leaf and fruit buds. These beetles overwinter in all forms. If weather conditions are favorable, they can emerge in January or February. At this time, they have only the buds to feed on and they can eat every bud of available trees.

Pear Spray Schedule

Table 1.

Name and Time of Spray	Insect	Materials/ Insecticide	To Make 50 Gallons of Spray	Precautions
Dormant: December or January	San Jose scale	Oil Emulsion, 3% actual oil in diluted spray	Follow manufacturer's recommendation for mixing.	No time limit.
		Admire Pro 4F (Imidacloprid)	2.8 fluid ounces/per acre	PHI=7 days; toxic to bees; allow 10 days between applications. Max=45 fluid ounces/ per acre/per season.
		Esteem (Pyriproxyfen)	13.0-16.0 fluid ounces/acre + oil	PHI=45 days; limit to 2 applications per season. Allow 14 days between Esteem sprays. Complete coverage is essential for control.
Calyx – apply when petal fall is 80%	Catfacing Insects, Leafrollers, Scales	SpinTor 2SC (Spinosad)	0.62-1.25 fluid ounces/50 gallons	PHI=7 days; toxic to aquatic invertebrates; toxic to bees exposed to treatment within 3 hours of spray; not labeled to control scales.
	Leafhoppers, Eastern Tent Caterpillars	Carbaryl (Sevin)	0.5 pound, 50% WP	PHI=3 days; extremely toxic to aquatic invertebrates; highly toxic to bees.
	Leafhoppers	Imidan 70W (Phosmet)	0.5-1.34 pounds A.I./50 gallons	PHI=7 days; do not use Imidan on homegrown trees; extremely toxic to fish; highly toxic to bees.
		Admire Pro 4F (Imidacloprid)	1.4-2.8 fluid ounces/per acre	PHI=7 days; toxic to bees; allow 10 days between applications. Max=45 fluid ounces/per acre/per season.
		Proaxis (Gamma-cyhalothrin)	0.427-0.853 fluid ounce	PHI=21 days; do not apply more than 0.1 lb A.I./acre/season.
		Mustang Maxx (z-cypermethrin)	0.21-0.32 fluid ounce/50 gallons	PHI=14 days; allow 7 days between applications.
Apply in mid- April or when leaves start unfolding	Catfacing Insects, Leafrollers, Scales	Same as above. *Except do not use Proaxis or Mustang Maxx for scales.*	Same as above.	Same as above.
	Eastern Tent Caterpillars, Leafhoppers	Actara (Thiamethoxam)	2.0-2.75 ounces/acre	PHI=14 days; (or 35 days PHI if rates higher that 2.75 ounces/acre are used); allow 10 days between applications; highly toxic to bees. Follow label.
	Mites: European Red Mite, Two-spotted Mite	Savey 50DF (Hexythiazox)	3.0-6.0 ounces/acre	PHI=28 days; limit to 1 application/year. Make applications when mite populations first appear.

Name and Time of Spray	Insect	Materials/ Insecticide	To Make 50 Gallons of Spray	Precautions
Apply in mid-May	Catfacing Insects, Leafrollers, Scales, Leafhoppers, Eastern Tent Caterpillars	Same as above.	Same as above.	Same as above.
	Mites: European Red Mite, Two-spotted Mite, Pear Rust Mite	Vendex 50WF (Fenbutatin-oxide)	1.0-2.0 pounds/acre	PHI=14 days; efficacy of Vendex is reduced at temperatures below 70 F. Limit to 2 applications/season. Make applications when mite populations first appear.
Mid-May to harvest	Catfacing Insects, Leafrollers, Scales, Leafhoppers, Eastern Tent Caterpillars	Same as above.	Sames as above.	Same as above. See limitations of preharvest intervals. Follow label.

Pecan Spray Schedule

Control of insects is essential for profitable pecan production in Louisiana. Commercial pecan producers must be equipped to spray at the proper time with the recommended insecticides. Knowing how to identify the major insect pests of pecans during the growing season is important in determining if an insecticide application is needed and, if so, when it should be applied.

Many generic insecticides are now available. Carefully read the label to make sure the correct active ingredient is being used for the insects or mites being controlled.

When using pesticides, it is very important that they be applied only when needed. The correct insecticide should be used for a given pest, and it should be applied at the correct rate. The pH of the water being used for spraying should be between 5.5 to 6.5 to ensure the optimal efficacy of the insecticide. If the pH of the water does not fall within this range, a buffering agent to adjust should be used to adjust the pH accordingly. The use of a buffering agent will help to maintain the desired pH once insecticides have been added to a solution.

Be sure to follow the directions on the label of the insecticide being used. In addition to what the insecticide can control and the rates to use, the label will provide additional information regarding the use of spray adjuvants, re-entry times following treatment applications, harvest intervals, grazing restrictions, product safety information, and worker protection information.

Table 1. Spray Guide for Control of Pecan Insects and Mite Pests

Insect	Time of Application	Suggested Insecticides and Rates*
Scale insects	Late February until buds first begin to break.	3 gallons of dormant oil/acre. If trees are weak use only 2 gallons/acre.
Pecan phylloxera	Between the time the buds begin to open and approximately ½-¾ inch of new growth begins to appear; use a hand lens or magnifying glass to make sure phylloxera are present. Treat only those trees previously infested and those adjacent to them. If infestation levels are high, 2 insecticide applications may be needed.	Lorsban 4E (chlorpyrifos): .5-2.0 pints/acre Provado 1.6F (imidacloprid): 3.5-7.0 fl. ounces/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Centric 40WG (thiamethoxam): 2.0-2.5 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces/acre Fulfill (pymetrozine): 4.0 fl. ounces/acre Endigo ZC (lambda-cyhalothrin + thiamethoxam): 5.0-6.0 fl. ounces/acre Admire Pro(imidacloprid, foliar application): 1.2-2.4 fl. ounces/acre Movento (spirotetramat): 6.0-9.0 fl. ounces/acre

Insect	Time of Application	Suggested Insecticides and Rates*
Pecan nut casebearer	Begin scouting for casebearer eggs on May 1. If pheromone traps are used to monitor adult activity, they should be in place by the third week of April. Once adults are observed in the traps begin inspecting nut clusters for egg lay. Insecticide applications should be made when egg lay is observed on 1%-3% of the nut clusters. A second application may be necessary if infestation levels are high or emergence and egg lay are prolonged. Continue monitoring adult activity and egg lay after the initial insecticide application to determine if a second application is necessary.	Imidan 70W (phosmet): 2.0-3.0 pounds/acre Confirm 2F (tebufenozide): 8.0-16.0 fl. ounces/acre Intrepid 2F (methoxyfenozide): 4.0-8.0 fl. ounces/acre Spintor 2SC (spinosad): 4.0-10.0 fl. ounces/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Dimilin 2L (diflubenzuron): 8.0-16.0 fl. ounces /acre Ammo 2.5EC (cypermethrin): 3.0-5.0 fl. ounces /acre Entrust (spinosad): 1.25-3.0 ounces/acre** Mustang Maxx (zeta-cypermethrin): 3.2-4.0 fl. ounces /acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces /acre Altacor (chlorantraniliprole): 2.0-4.5 ounces/acre Endigo ZC (lambda-cyhalothrin + thiamethoxam): 5.0-6.0 fl. ounces/acre Voliam Xpress (lambda-cyhalothrin): 6.0-12.0 fl. ounce/acre Proclaim (emamectin benzoate): 3.2-4.8 fl. ounce/acre
Pecan spittlebug	Begin treatments when 5%-10% of nut-bearing terminals are infested. Apply treatments when spittle masses first appear.	Provado 1.6F (imidacloprid): 3.5-7.0 ounces/acre Imidan 70 WSB (phosmet): 1.0-1.5 pounds/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces/acre Voliam Xpress (lambda-cyhalothrin): 6.0-12.0 fl. ounces/acre Admire Pro (imidacloprid, foliar application): 1.2-2.4 fl. ounces/acre Endigo ZC (lambda-cyhalothrin + thiamethoxam): 5.0-6.0 fl. ounces/acre
Hickory shuckworm	Begin treatment applications at half-shell hardening (around August 10-15); 2-3 applications may be needed depending on the severity of the infestation. Insecticide applications should be made 10-14 days apart.	Confirm 2F (tebufenozide): 8.0-16.0 fl. ounces/acre Spintor 2SC (spinosad): 4.0-10.0 fl. ounces/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Intrepid 2F (methoxyfenozide): 4.0-8.0 fl. ounces/acre Mustang Maxx (zeta-cypermethrin): 3.2-4.0 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces /acre Dimilin 2L (diflubenzuron): 8.0-16.0 fl. ounces /acre Imidan 70WSB (phosmet): 2.0-3.0 pounds/acre Entrust (spinosad): 1.25-3.0 fl. ounces/acre Altacor (chlorantraniliprole): 2.0-4.5 ounces/acre Endigo ZC (lambda-cyhalothrin + thiamethoxam): 5.0-6.0 fl. ounces/acre Voliam Xpress (lambda-cyhalothrin): 6.0-12.0 fl. ounces/acre Proclaim (emamectin benzoate): 3.2-4.8 fl. ounces/acre Brigade WSB (bifenthrin): 8.0-32.0 fl. ounces/acre

Insect	Time of Application	Suggested Insecticides and Rates*
Pecan leaf scorch mite	When leaf discoloration (light brown to bronze-colored blotches) begins to appear, use a hand lens or magnifying glass (at least 10X) to inspect the leaves for the presence of mites. Sample 10 compound leaves on 5-10 trees throughout the orchard. Treat when an average of 8 or more mites per compound leaf are found.	Vendex 50WP (fenbutin-oxide): 1.0-2.5 fl. ounces/acre Savey 50DF (hexythiazox): 3.0-6.0 fl. ounces/acre Portal (fenpyroximate): 32.0 fl. ounces/acre Epi-Mek (abamectin): 2.5-5.0 fl. ounces/acre Onager (hexythiazox): 12.0-24.0 fl. ounces/acre
Yellow aphid	Separate treatments for yellow aphids are generally not recommended. If a separate treatment is desired, treat when aphid numbers average 25-30 aphids per compound leaf. Do not treat yellow aphids before July 15. Sample 10 compound leaves on 5-10 trees throughout the orchard.	Provado 1.6 (imidacloprid): 3.5-7.0 fl. ounces/acre Ammo 2.5EC (cypermethrin): 3.0-5.0 fl. ounces/acre Mustang Maxx (zeta-cypermethrin): 3.2-4.0 fl. ounces/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces/acre Centric 40WB (thiamethoxam): 2.0-2.5 fl. ounces/acre Admire Pro ((imidicloprid, foliar application): 1.2-2.4 fl. ounces/acre Movento (spirotetramat): 6.0-9.0 fl. ounces/acre Endigo ZC (lambda-cyhalothrin+thiamethoxam): 5.0-6.0 fl. ounces/acre Assail 30SG (acetamiprid): 2.5-9.6 ounces/acre Fulfill (pymetrozine): 4.0 fl. ounces/acre Brigade WSB (bifenthrin): 8.0-32.0 fl. ounces/acre
Black pecan aphid	Treat when there is an average of one black aphid per compound leaf. Sample 10 leaves on 5-10 trees throughout the orchard.	Ammo 2.5EC (cypermethrin): 3.0-5.0 fl. ounces/acre Imidan 70WSB (phosmet): 2.0 pounds/acre Warrior (lambda-cyhalothrin): 2.56-5.12 fl. ounces/acre Warrior II (lambda-cyhalothrin): 1.28-2.56 fl. ounces/acre Mustang Maxx (zeta-cypermethrin): 3.2-4.0 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces/acre Centric 40WB (thiamethoxam): 2.5 fl. ounces/acre Fulfill (pymetrozine): 4.0 fl. ounces/acre Provado 1.6 (imidicloprid): 8.0 fl. ounces/acre Admire Pro ((imidicloprid), foliar application): 2.8 fl. ounces/acre Dimethoate 4E (dimethoate): 11.0 fl. ounces/acre Endigo ZC (lambda-cyhalothrin+thiamethoxam): 6.0 fl. ounces/acre Brigade WSB (bifenthrin): 8.0-32.0 fl. ounces/acre
Pecan weevil	Treatment applications should begin when nuts enter the dough stage (around Aug. 20), and adult weevils are present; 2 or 3 applications may be needed. Insecticide applications should be made at 7-10-day intervals. The first treatment should be made following rain because this loosens the soil allowing for weevil emergence.	Sevin 80S (carbaryl): 1.5-2.0 pounds/acre Sevin XLR Plus (carbaryl): 2.5 quarts/acre Mustang Maxx (zeta-cypermethrin): 3.2-4.0 fl. ounces/acre Proaxis (gamma-cyhalothrin): 2.56-5.12 fl. ounces/acre Imidan 70WSB (phosmet): 2.0-3.0 pounds/acre

Insect	Time of Application	Suggested Insecticides and Rates*
Fall webworm	Normally, this insect is controlled when treating other insect pests within the orchard. The presence of an occasional colony generally does not warrant treatment. However, if a grower decides an insecticide application is needed, it should be made when colonies are first observed and the larvae are small. The larger the colony, the more difficult it becomes to reach the larvae within the webbing with the Insecticide.	Confirm 2F (tebufenozide): 8.0-16.0 fl. ounces/acre Intrepid 2F (methoxyfenozide): 4.0-8.0 fl. ounces/acre Spintor 2SC (spinosad): 4.0-10.0 fl. ounces/acre Javelin WG (Bacillus thuringiensis): 0.25-4.0 pounds/acre** DiPel FS (Bacillus thuringiensis): 1.0-4.0 pints/acre Sevin 80S (carbaryl): 2.5-6.25 pounds/acre Sevin XLR Plus (carbaryl): 2.0-5.0 quarts/acre Proclaim (emamectin benzoate): 3.2-4.8 ounces/acre

* Rates are expressed in the amount of material to use per acre. If a sprayer is calibrated to deliver 75 gallons per acre, you should add the amount of material listed to every 75 gallons of water. If your sprayer is calibrated to deliver 150 gallons of water per acre, you should add the suggested amount of insecticide to every 150 gallons.
** Certified for use in organic orchards.
Note: When ground equipment is not available, or when inclement weather prevents the use of ground equipment, insecticides can be applied with aircraft. The rates listed are also the rates to use when applying insecticides by air. The amount of finished spray per acre will vary depending on the type of aircraft being used.
Treatment decisions: For information on the use of pheromone traps and a degree day model for making treatment decisions go to http://pecan.ipmpipe.org. Go to the toolbox and click on the section on insect monitoring and control.

Small Fruit Spray Schedule (Grape, Blueberry, and Bramble)

Grape

Table 1. Dormant spray

Insect	Spray Materials in 1 Gallon and Remarks
Scales	**Copper sulfate (bluestone)** – 6 teaspoons; apply after pruning; burn all pruned vines. Complete coverage is important for scale control. Do not use dormant oils after the buds start to open.
	Superior oil 1% – Follow manufacturer's recommendations.

Table 2. Just before bloom

Insect	Spray Materials in 1 Gallon and Remarks
Grape berry moths, leaf-chewing insects	**Carbaryl 50WP (Sevin)** – 2 tablespoons/gal water. PHI=7 days; Carbaryl is highly toxic to bees. Read label.
	Imidan 70W (Phosmet) – 1⅓-2⅛ pounds/acre. PHI=14 days; do not use Imidan in home and gardens.

Table 3. Postbloom sprays: just after bloom and later at 10- to 14-day intervals to harvest

Insect	Spray Materials in 1 Gallon and Remarks
Citrus blackflies, citrus leafminers, citrus whiteflies	**Esteem 0.86EC (Pyriproxyfen)** – 10 fl. ounces/acre. Be sure to apply in sufficient water to ensure thorough coverage of tree. Apply before populations build; 1 day pre-harvest interval. Do not make more than 2 applications/season. Allow 21 days between applications.
European red mites, two-spotted mites	**Vendex 50WP (Fenbutatin-oxide)** – PHI=14 days; apply 1-2 pounds/acre when mites first appear. Limit to 2 applications/season; efficacy reduced at temperatures below 70 F.
Grape berry moths, leaf-chewing insects	**Carbaryl 50WP (Sevin)** – 2 tablespoons/gal water. PHI=7 days; Carbaryl is highly toxic to bees. Read label.
	Imidan 70W (Phosmet) – 1⅓-2⅛ pounds/acre. PHI=14 days; do not use Imidan in home and gardens.
Leafhoppers, mealybugs	**Admire Pro (Imidacloprid)** – 1.0-1.4 ounce/acre; no pre-harvest interval limitation. Allow 14 days between applications. Limit to 2.8 ounces/acre/year.

Warning: Re-entry times for workers entering groves and/or treated fields should be strictly observed. Be sure to check the label for this information.

Blueberry

Table 4. Dormant spray oil

Insect	Insecticide	Remarks
Scales	Esteem 0.86EC (Pyriproxyfen) – 16 ounces/acre + Oil – 1.5 gallons	PHI=7 days; limit to 2 applications/growing season. Allow 14 days between Esteem applications.
	Summer or Superior oil (2%-3% actual oil)	Follow manufacturer's directions when using or mixing oil. Thorough coverage is necessary when using any foliar product to control scale insects.

Table 5. Petal fall and cover spray: 10-14 days apart

Insect	Insecticide	Remarks
Maggots, weevils	Carbaryl 50WP (Sevin) 3-4 pounds/100 gallons	PHI=7 days; highly toxic to bees. A diluted spray of 125-150 gallons/acre is recommended first application, 3 weeks before harvest. Repeat 10 days later if needed.
	Lannate SP (Methomyl) – ½ pound/acre	PHI=3 days; highly toxic to bees. Do not apply during bloom. Toxic to fish, aquatic invertebrates, and mammals. Limit to 4 applications/season. Use with care.
	Lannate (2.4) LV (Methomyl) – 1½ pints/acre	
Fruitworms	Esteem 0.86EC (Pyriproxyfen) – 16 ounces/acre	PHI=7 days; see preceding remarks; follow label.
Fruitworms (suppression)	SpinTor 2SC (Spinosad) – 4-6 fluid ounces/acre	PHI=3 days; see preceding remarks.
Fruitworms, maggots, weevils	Imidan 70W (Phosmet) – 1 ⅓ pounds/acre	PHI=3 days; do not make more than 5 applications/acre/year.
Maggots, weevils, maggots	Carbaryl 50WP (Sevin) 3-4 pounds/100 gallons	PHI=7 days; highly toxic to bees. A diluted spray of 125-150 gallons/acre is recommended first application, 3 weeks before harvest. Repeat 10 days later if needed.
	Lannate SP (Methomyl) – ½ pound/acre	PHI=3 days; highly toxic to bees. Do not apply during bloom. Toxic to fish, aquatic invertebrates, and mammals. Limit to 4 applications/season. Use with care.
	Lannate (2.4) LV (Methomyl) – 1½ pints/acre	

Table 6. Postharvest

Insect	Insecticide	Remarks
Fire ants	Extinguish IGR (Methoprene) – 1.0-1.5 pounds/acre (Broadcast)	Apply in April when ants are actively foraging and in October prior to cool weather. Apply to dry soil.

Bramble (Blackberry, etc.)

Table 7. Dormant

Insect	Time of Application and Insecticide/Gallon	Remarks
Mites, scales	Summer or Superior oil	Follow the manufacturer's directions. Complete spray coverage is necessary.

Table 8. Delayed dormant as buds begin to break

Insect	Time of Application and Insecticide/Gallon	Remarks
Scales	Summer or Superior oil	Follow the manufacturer's directions. Complete spray coverage is necessary.

Table 9. Prebloom just before blossoms open

Insect	Time of Application and Insecticide/Gallon	Remarks
Aphids	Malathion 57EC (Malathion) – 3 pints/acre	PHI=1 day; highly toxic to bees. Do not apply at bloom or when bees may be exposed.
Leafhoppers, leafrollers, sawflies, thrips	Carbaryl 50W (Sevin) – 1 tablespoon	PHI=7 days; highly toxic to bees; do not apply at bloom or when bees may be exposed.
	SpinTor 2SC (Spinosad) – 4-6 fluid ounces/acre	SpinTor is toxic to bees exposed to treatment within 3 hours of spray; toxic to aquatic invertebrates. Rotate products after 2 continuous applications of SpinTor. Limit to 29 fl. ounces/acre/ season. Allow 3 days before harvest.
Leafrollers	Brigade WSB (Bifenthrin) – 8-16 ounces/acre	PHI=3 days; highly toxic to bees and extremely toxic to fish and aquatic invertebrates. May not be used if endangered species may get into contact with the treatment. Read label. Consult local agents.
Mites	Brigade WSB (Bifenthrin) – 16 ounces/acre	
Mites, thrips	Malathion 57EC (Malathion) – 1½ pints/100 gallons water	PHI=1 day; highly toxic to bees. Do not apply at bloom or when bees may be exposed.

Table 10. After blossom to harvest

Insect	Time of Application and Insecticide/Gallon	Remarks
Blackberry and raspberry crown borers, leafhoppers, mites, sawflies, thrips	Malathion 57EC (Malathion) – 1½ pints/100 gallons water	August-September: Ideal time for fall applications; PHI=1 day; highly toxic to bees. Do not apply at bloom or when bees may be exposed.

Table 11. April/October

Insect	Time of Application and Insecticide/Gallon	Remarks
Fire ants	Extinguish (Methoprene) – 1.0-1.5 pounds	Broadcast in April when ants are actively foraging and in October prior to cool weather. Apply on dry soil.

Note: Various borers cause problems in the canes. Infested or galled canes should be cut out and destroyed. Thorough spray coverage is important for any foliar product used. The volume of spray used should increase throughout the season.

Strawberry Spray Guide

Table 1. Aphids

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Admire Pro	1.3 fl. ounces/acre	7 days	Allow 5 days between applications. Toxic to bees; do not apply during bloom. Use a spreader sticker to improve coverage. Apply before heavy infestations get established. Limit 3.9 fluid ounces/acre per crop season.
Malathion 5 pounds EC	1.0-1½ pints	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.
Malathion 25% WP	3 pounds	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.

Table 2. Armyworms

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Carbaryl 4L	1-2 quarts/acre	7 days	A dilute spray of 100-200 gallons/acre is suggested. Read label for susceptibility of some varieties; highly toxic to bees. Repeated use may cause spider mite problems.
SpinTor 2SC	4-6 fluid ounces/acre	1 day	SpinTor is toxic to bees exposed to treatment within three hours of spray; toxic to aquatic invertebrates. Rotate product after 2 continuous applications. Limit to 29 fl. ounces/ acre/season. See preceding remarks on SpinTor.

Table 3. Fire Ants

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Extinguish IGR	1.0-1.5 pounds/ acre	See label.	Apply to row middles in April when ants are actively foraging and in October prior to cool weather. Do not allow contact with fruit. Do not use when soil is too wet.

Table 4. Lygus bugs and leafhoppers

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Malathion 5 pounds EC	1.0-1½ pints	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.
Malathion 25% WP	3 pounds	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.

Table 5. Lygus and tarnished plant bugs

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Brigade WSB	24 fluid ounces/ acre (3 soluble bags)	0 days	Highly toxic to bees and extremely toxic to fish and aquatic invertebrates. May not be used if endangered species could get in contact with treatment. Read label. Consult local agents.
Danitol 2.4 EC	10 ⅔ fluid ounces/acre	2 days	Allow 30 days between treatments. Use only when mite populations are low. Add spreader sticker. Limit to 2 applications/year.

Table 6. Snails and slugs

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Metaldehyde bait	See label.	See label.	Apply to soil around plants. Do not contaminate edible parts. Toxic to dogs and cats.

Table 7. Spittlebugs

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Malathion 5 pounds EC	1.0-1.5 pints	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.
Malathion 25% WP	2-4 pounds	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use when cyclamen mites are a problem.
Danitol 2.4EC	10 ⅔ fluid ounces/ acre	2 days	Allow 30 days between treatments. Use only when mite populations are low. Add spreader sticker. Limit to 2 applications/year
Carbaryl 80% S	1¼ pounds	7 days	A dilute spray of 100-200 gallons/acre is suggested. Read the label for susceptibility of some varieties; highly toxic to bees. Repeated use may cause spider mite problems.

Table 8. Strawberry leaf rollers

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Carbaryl 80% S	1¼ pounds	7 days	A dilute spray of 100-200 gallons/acre is suggested. Read the label for susceptibility of some varieties; highly toxic to bees. Repeated use may cause spider mite problems.
Malathion 5 pounds EC	1.0-1½ pints	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use it when cyclamen mites are a problem.
Malathion 25% WP	3 pounds	3 days	Toxic to fish and highly toxic to bees. Observe label. Do not use it when cyclamen mites are a problem.
SpinTor 2SC	4-6 fluid ounces/acre	1 day	SpinTor is toxic to bees exposed to treatment within three hours of spray; toxic to aquatic invertebrates. Rotate the product after 2 continuous applications. Limit to 29 fl. ounces/ acre/season.

Table 9. Strawberry weevils

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Carbaryl 80% S	1¼-2½ pounds/acre	7 days	A dilute spray of 100-200 gallons/acre is suggested. Read the label for susceptibility of some varieties; highly toxic to bees. Repeated use may cause spider mite problems.

Table 10. Two-spotted mites

Insecticide and Formulation	Rate/50 Gallons	Cutoff Date	Restrictions or Limitations
Acramite 50WS	0.75-1.0 pound/acre	1 day	Effective mite control is better accomplished when treatments are conducted when mites first appear before populations build up. Each bag contains two water-soluble bags of ½ pound each. Limit to 2 applications/season and a minimum of 21 days between applications.
Agri-Mek 0.15 EC	16 fluid ounces/acre	3 days	Do not apply more than 64 fl. ounces/acre. Do not apply within 3 days of harvest. Allow 21 days between treatments.
Danitol 2.4EC	16-21⅓ fluid ounces/acre	2 days	Allow 30 days between treatments. Use only when mite populations are low. Add spreader sticker. Limit to 2 applications/year.
Insecticidal soap (M-Pede)	1 gallon	0 days	Thorough coverage is needed.
Savey 50DF	6.0 fluid ounces/ acre	3 days	Limit to 1 application/year. Apply as soon as mites are detected. Savey is predominantly an ovicide/ larvicide and will not control adult mites.
Vendex 50WP	6-8 fluid ounces (1½-2 pounds/acre)	1 day	Do not apply more than 2 times/season. The efficacy of Vendex is reduced when daily temperatures are below 70 F. Toxic to birds, mammals, and fish.
Zeal	2-3 fluid ounces/ acre	1 day	Apply when populations are low. Works better against eggs and larvae (immature mites). Limit to 1 application/season.

Mite-resistance management plan
Repeated use of the same miticide is documented to result in a rapid buildup of miticide-resistant strains of mites. To reduce the potential risk of developing resistant mite populations, miticides should be alternated as part of a mite-resistance management plan. If more than one application is needed to control heavy and prolonged mite infestations, always alternate with products of different modes of action. Observe the minimum required spray intervals and restrictions on the amount of product and number of applications/area/seasons. Closely monitor mite populations to determine species, infestation levels, and the presence of predatory organisms. Use miticide sprays only when needed.

Recommended miticide rotation
If you follow this rotation of miticides, you should be able to decrease the spider mite population while conserving predatory mites. Scout for mites using a 10X hand lens before you spray. Treat when you see more than five mites per leaflet on young plants. A balance of natural control (predatory mites and other insects that eat the mites) and miticides is the best way to control mites. It may be possible that predatory mites can keep your mites in check, but only if you don't kill them by using a broad-spectrum product that will kill the predators. If you use the wrong product at the beginning of the season (e.g., Brigade), then the entire season could be worse because all the natural enemies were killed by that first spray. In general, mites can become a huge problem if they are sprayed on a schedule. We recommend rotating the following three miticides in the order they are listed.

1. Acramite – Limit to one application per season. This is a contact miticide, meaning that it kills mites that come into contact with the miticide. It also has long residual activity, so larvae that hatch out of eggs will also be killed from the first application.
2. Agri-Mek – If mites are still present, apply this product 21 days after the acramite application. This is best when applied in a paired application; two applications spaced seven to 10 days apart. This product moves in the leaf from the top to the bottom and will remain in the leaf for a period of time. It is less effective when used in cold weather because it does not move in the leaf as well as in warm weather. Combine Agri-Mek with horticultural oil to help movement in the leaf except in extremely hot weather because the oil may burn the leaf. Do not exceed 16 fl. ounces/application or 64 fl. ounces (four applications)/acre in a growing season. Do not apply in less than 100 gallons of water/acre (200 gallons/acre is optimal). Do not repeat treatment within 21 days of second application.
3. Savey – This growth regulator kills eggs, young nymphs (immature mites), and sterilized females. This should also be limited to one application per season.

In general, be sure to include enough water to adequately cover your strawberry plants since most of these are contact miticides. It is important to make sure there is good spray coverage on your plants.

Note
Add a spreader sticker or liquid soap to spray the mixture to obtain better coverage. Follow the manufacturer's recommendations.

Warning
Always wear appropriate personal protective equipment when handling and spraying pesticides. Re-entry times for workers entering treated fields should be strictly observed. Be sure to check the label for this information.

Fruit and Nuts – Home Uses

Citrus Spray Schedule

The three spray applications suggested should control most pests and provide quality fruit.

Postbloom spray: when 75% of petals have fallen

Table 1. Scales, whiteflies, mealybugs, mites

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Malathion 57EC	1 pint	2 teaspoons	Do not apply Malathion or Vendex fewer than 7 days before harvest. Do not apply Malathion to plants in full bloom. Do not use Vendex on tangerines, tangelos, Reed or Red blush grapefruit. Do not apply Vendex when daily temperatures at application average below 70 F. Make no more than 2 applications of Vendex/year and allow 60-day intervals between applications.
Vendex 50WP	4-6 ounces	1-1½ teaspoons	

Table 2. Thrips, leafminers

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Spinosad	4-6 ounces	1 teaspoon	Allow a minimum of 7 days between last application and harvest; several formulations available for home gardens (i.e., Spinosad, Success, Conserve, Naturalyte, etc.); follow label recommendations.

Table 3. Asian citrus psyllid

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Bayer Advanced Fruit, Citrus & Vegetable Insect Control	Varies, depending on size of tree.		• See product label for instructions and restrictions. • 0.15 to 0.2 fluid ounce/inch of trunk diameter at breast height or/foot of tree height. Do not apply more than 5.9 fluid ounces of product/year.

Table 4. Aphids, Asian citrus psyllid, white flies, thrips, leafhoppers

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Monterey Fruit Tree & Vegetable Systemic Soil Drench	Varies, depending on size of tree.	See label.	See product label for instructions, application rate, and restrictions.

Summer spray: July 15-Aug. 15

Table 5. Scales, whiteflies, mealybugs, leaf-footed bugs, mites

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Vendex 50WP +	4-6 ounces	1-1½ teaspoons	Same as postbloom spray.
Sun spray ultra-fine oil or	½-1 gallon	2½-4 tablespoons	Use caution when applying oils; read the label; do not spray when temperatures exceed 85 F; read footnotes.
Summer oil emulsion or	½ gallon	5 tablespoons	Follow label.
Malathion 57EC	1 pint	2 teaspoons	Same as postbloom spray.

Table 6. Asian citrus psyllid

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Bayer Advanced Fruit, Citrus & Vegetable Insect Control	Varies, depending on size of tree.	See label.	See product label for instructions and restrictions.

Table 7. Thrips, leafminers

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Spinosad	See label.	See label.	See limitations above; read the label.

Table 8. Aphids, Asian citrus psyllid, white flies, thrips, leafhoppers

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Monterey Fruit Tree & Vegetable Systemic Soil Drench	Varies, depending on size of tree.	See label.	See product label for instructions, application rate, and restrictions.

Fall spray: Oct. 15-Nov. 15

Table 9. Scales, whiteflies, mealybugs, leaf-footed bugs

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Malathion 57EC	1 pint	2 teaspoons	Same as postbloom spray.

Table 10. Aphids, Asian citrus psyllid, white flies, thrips, leafhoppers

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Monterey Fruit Tree & Vegetable Systemic Soil Drench	Varies, depending on size of tree.	See label.	See product label for instructions, application rate, and restrictions.

Table 11. Asian citrus psyllid

Pesticide and Formulation	Amount to Use for 50 gallons	Amount to Use for 1 gallon	Limitations
Bayer Advanced Fruit, Citrus & Vegetable Insect Control	Varies, depending on size of tree.	See label.	See product label for instructions and restrictions.
Vendex 50WP	4-6 ounces	1-1½ teaspoons	Follow label.
Spinosad	See label.	See label.	Same as postbloom spray; read the label.

Cautions

- Read the pesticide label and follow the manufacturer's safety recommendations.
- Oil emulsion sprays should not be applied to drought-stricken trees when the temperature is above 85 F or below 45 F. Oil emulsion sprays applied after Aug. 15 may inhibit solid formation, retard coloring of fruit and reduce the tolerance of trees to cold. Follow specific instructions on the label of all pesticides.

Figs Spray Schedule

Table 1. Vinegar flies, Driedfruit beetles

Material	Rate	Restrictions
Malathion 57 EC	2 quarts plus 1-2 gallons unsulfurized molasses/acre	• PHI=3 days; use 300 gallons of water/acre. • Sanitation: Early harvest and complete fruit removal at harvesting will reduce fruit exposure to flies and driedfruit beetles. Disc under affected hosts to destroy fermented fruit residues.
Pyganic	1-1.4 fl. oz. per acre	See label for restrictions.

Table 2. Fig scale

Material	Rate	Restrictions
Volk supreme oil	3 gallons/100 gallons water	Dormant or delayed dormant spray only.
Bonide insecticidal soap RTU	Spray directly on insects and leaves.	See label for details.
Nature's care insecticidal soap RTU	Spray directly on insects and leaves.	See label for details.

Table 3. Spider mites

Material	Rate	Restrictions
Volk supreme oil	3 gallons/100 gallons water	Dormant or delayed dormant spray only.
Sulfur	Follow the labeled rate.	Do not mix with oils, and/or do not apply within 3 weeks of oil applications to avoid fruit burn. Some sulfur formulations should not be combined with spreader stickers. Sulfur may cause eye and skin irritation. Avoid when hot temperatures (above 90 F) are expected within 3 days of spraying.
Hi-Yield Garden, Pet & Livestock Dust	Appy using a duster directly to leaves and insects when possible.	Not for use on plants for sale or in commercial settings. See label for more details.

RTU: Ready-to-use

Peach and Plum Spray Schedule

Dormant (mid-winter before bud swell)

Table 1. Mites, scales, lesser peachtree borer

Insecticides	Rates: 25 Gallons Water	Rates: 3 Gallons Water	Comments
Dormant oil	2 quarts	4 ounces or 8 tablespoons	Apply every 10 days during dormant season. Complete coverage is essential. Do not use when temperature is expected to exceed 85 F or be below 45 F.

Petal fall

Table 2. Plant bugs, plum curculio, Oriental fruit moths, aphids

Insecticides	Rates: 25 Gallons Water	Rates: 3 Gallons Water	Comments
Carbaryl 50WP	1 pound	2 ounces or 4 tablespoons	Allow minimum 3 days before harvest. Carbaryl is highly toxic to bees. It tends to increase scales and sometimes mite problems.
Carbaryl 80% Sprayable	0.5 pound	1 ounce or 2 tablespoons	Follow label
Malathion 25WP	0.5 pound	1 ounce or 2 tablespoons	Do not use within 7 days of harvest.

Cover sprays (7-14 days apart) from petal fall to two weeks before harvest

Table 3. Plum curculio, stink bugs, catfacing insects, Oriental fruit moths

Insecticides	Rates: 25 Gallons Water	Rates: 3 Gallons Water	Comments
Malathion 25WP	0.5 pound	1 ounce or 2 tablespoons	Do not use within 7 days of harvest.
Carbaryl 50 WP	1 pound	2 ounces or 4 tablespoons	Allow minimum 3 days before harvest.
Fine spray oil	Follow label.	Follow label.	Use fine spray oils for mite control as needed. Do not use on heat or drought stressed trees.

2 weeks before harvest, to harvest

Table 4. Plum curculio, stink bugs, catfacing insects, Oriental fruit moths

Insecticides	Rates: 25 Gallons Water	Rates: 3 Gallons Water	Comments
Carbaryl 50WP	1 pound	2 ounces or 4 tablespoons	Allow minimum 3 days before harvest.
Fine spray oil	Follow label.	Follow label.	Use fine spray oils for mite control as needed. Do not use on heat or drought stressed trees.

Table 5. Curative products, applied when a pest insect at times dictated by the label

Insect or Arthropod	Material	Rate	Restrictions
Plum curculio, stink bugs, Oriental fruit moths	Hi-Yield Garden, Pet & Livestock Dust	Appy using a duster directly to leaves and insects when possible.	Not for use on plants for sale or in commercial settings, See label for more details
Aphids, scales, sharpshooters, stink bugs	Pyganic	1-1.4 fl oz per acre	See label for restrictions.
Aphids, Plum curculio, stink bugs, mites, Oriental fruit moths, scales,	Feneva	Application rate depends on level of infestation. See label for details.	See label for restrictions.
Aphids, Kudzu bugs, Brown marmorated stink bugs,	Ortho-Home Defense	Spot treatment only.	See label for restrictions.
Aphids, mites	M-pede	0.25%-4%	See label for restrictions, wear appropriate PPE on the label

Pecan Spray Schedule for Yard Trees and Home Orchards

Insects and diseases can reduce the quantity and quality of pecans harvested from yard trees by homeowners. Insects and diseases also can have a negative effect on the overall health and vigor of the trees, thus affecting their value as shade trees.

Pest identification
It is important to learn how to identify the major insect pests and diseases of pecans. Knowing which insect pest is present will determine what insecticide to use. If an insect pest or disease is not present, control measures are unnecessary.

Cultural practices
Pecan trees that are healthy and vigorous are less susceptible to certain types of insects, such as wood borers. Proper fertilization, watering, and pruning are conducive to optimum tree growth and health. Keeping the area around the tree free of old and aborted nuts, leaves and twigs and limbs will also help in reducing insect and disease problems.

Spray equipment
Good spray coverage is essential for insect and disease control. It generally is not practical for homeowners to spray trees that are more than 30 feet tall since the spray equipment necessary to use on trees of that height or higher is quite expensive. Hose-on sprayers can be used on trees up to 30 feet tall. A commercial applicator can be used; however, it can be expensive if multiple pesticide applications are required.

Pesticide safety
When purchasing and using any pesticide, be sure to read the label. The label will tell you what the active ingredient is and its relative toxicity, safety precautions when using the pesticide, what it's labeled for and what rates to use, and how to properly dispose of the empty container. To avoid accidental injury or death, always keep the pesticide in its original container.

Suggested materials *(listed as active ingredients)*
- Malathion 55% EC.
- Carbaryl 23.7% (liquid formulation, not dust).
- Imidacloprid 1.47% (applied as soil drench).
- Potassium laurate 1% (Sprayed directly on pest insects).
- Spinosad 0.5%.
- Hexythiazox 50% (Insect growth regulator, Dry flowable powder in packets).
- *Bacillus thuringiensis* (B.t.).
- Horticultural Oil Spray (80%-97% oil emulsion).
- See label for correct rates to use.

Spray periods
- **Dormant (late winter) –** Apply dormant oil before bud break in late winter for control of scales.
- **Bud Break –** Pecan Phylloxera. This spray should be applied when the opening buds are 0.75-1.0 inches in length (leaves expanding and starting to unfurl). Spraying for this insect is unnecessary if galls formed by pecan phylloxera have not been observed. Use Malathion for control of this insect.
- **Pollination –** Pecan Nut Casebearer. This spray should be applied around May 10-15 (about five days earlier in south Louisiana). Pheromone traps can be used to detect casebearer activity and to determine if treatment is necessary. Use Malathion, Spinosad, or *Bacillus thuringiensis* for casebearer control.
- **Post-Pollination –** Pecan Nut Casebearer and Aphids. This spray, if necessary, should be made around June 20, or about six weeks after the pollination spray. Use pheromone traps to determine if casebearer is present; if not, treatments are unnecessary. Insecticides for casebearer control are the same as those listed for the pollination spray. For aphids use imidacloprid applied as a soil drench.
- **Half-Shell Hardening** – Pecan Weevil, Hickory Shuckworm, and Fall Webworm. This spray is usually applied in mid-August. If hickory shuckworm is a problem, two sprays, one applied in mid-August and a second spray applied approximately two weeks later, will usually control shuckworm. Raking up and destroying old pecans and shucks will also help control hickory shuckworm. For hickory shuckworm use carbaryl, Spinosad, or *Bacillus thuringiensis*. For pecan weevils, use carbaryl. The first application should be made when nuts enter the dough stage and weevils are present around Aug. 20. If infestation levels are high, an additional one to two applications, applied 10-14 days apart, may be needed. On tall trees, thoroughly spraying the trunk and lower limbs can suppress pecan weevil. Use spinosad or *Bacillus thuringiensis* for control of fall webworm. Spray web and surrounding foliage. Fall webworms can also be controlled by removing (where practical) the webbing and enclosed caterpillars from the tree.

Fire ant control
Many different types of insecticides are available for the control of fire ants. These products can be applied directly to the mound as contact insecticides or drenches, or they can be broadcast as bait to the area around the mounds. For a comprehensive listing of insecticides that can be used for fire ant control refer to the section, Louisiana Recommendations for Control of Insects on Lawns, in the Louisiana Insect Pest Management Guide.

Small Fruit Spray Schedule

(Grape, Blueberry, and Bramble)

Table 1. Blueberry

Insect	When to Spray	Spray Materials in 1 Gallon and Remarks
Scales	Delayed dormant – buds 0.25-0.25 inch green	**Summer or Superior Oil** (2%-3% actual oil). Follow the manufacturer's directions. Thorough coverage is necessary when using spray products to control scale insects.
Fruit worms, maggots, weevils	Petal fall	**Malathion 57EC** – 2 teaspoons. Allow 1 day before harvest: toxic to fish and highly toxic to bees. Follow label.
		Carbaryl 50W – 1 tablespoon. Allow 7 days before harvest; highly toxic to bees.
		Monterey Fruit Tree & Vegetable Systemic Soil Drench. Varies, depending on size of tree. See product label for instructions, application rate, and restrictions. **Do not apply during bloom**
Fruit worms (suppression)	Petal Fall	**SpinTor 2SC** – 4-6 fl. ounces/acre. SpinTor is toxic to bees exposed to treatment within 3 hours of spray; toxic to aquatic invertebrates. Rotate the product after 2 continuous applications. Limit to 29 fl. ounces/acre/season. Allow 3 days before harvest.
Maggots	Covers sprays – 10 days after petal fall to harvest	Same as above. Follow labels.
Spotted Wing Drosophila	Weekly application as fruit approaches ripeness	**Carbaryl 50W** (Sevin Dust), **spinosad, pyrethrins, bifenthrin, beta-cyfluthrin, esfenvalerate, fenpropathrin, zetacypermethrin.** Follow label directions. Rotate products weekly to reduce resistance development.

Table 2. Bramble (blackberry, etc.)

Insect	When to Spray	Spray Materials in 1 Gallon and Remarks
Scales, mites	Dormant	**Summer or Superior oil.** Follow the manufacturer's directions. Complete spray coverage is necessary.
Scales	Delayed dormant – as buds begin to break	**Summer or Superior oil.** Follow the manufacturer's directions. Complete spray coverage is necessary.
Aphids	Prebloom – just before blossoms open	**Malathion 57EC – 3 pints/acre. PHI=1 day; highly toxic to bees.**
Leafhoppers, leafrollers, sawflies, thrips	See label.	**Carbaryl 50W** – 1 tablespoon. PHI=7 days; highly toxic to bees; do not apply at bloom or when bees may be exposed.
Spotted Wing Drosophila	Weekly application as fruit approaches ripeness	**Carbaryl 50W** (Sevin Dust), **spinosad, pyrethrins, bifenthrin, beta-cyfluthrin, esfenvalerate, fenpropathrin, zetacypermethrin.** Follow label directions. Rotate products weekly to reduce resistance development.
Aphids, Leafhoppers, whiteflies	Do not apply during bloom.	Monterey Fruit Tree & Vegetable Systemic Soil Drench. **Varies, depending on size of tree.** See product label for instructions, application rate, and restrictions.

Table 3. Grape

Insect	When to Spray	Spray Materials in 1 Gallon and Remarks
Scales	Dormant spray	**Superior oil 1%.** Follow the manufacturer's recommendations. **Copper sulfate (bluestone)** – 6 teaspoons. Apply after pruning; burn all pruned vines. Complete coverage is important for scale control. Do not use dormant oils after the buds start to open.
Grape berry moths, leaf chewing insects	Just before bloom	**Carbaryl 50WP** – 2 tablespoons/gal. water. PHI=7 days; Carbaryl is highly toxic to bees. Read label.
Grape berry moths, leaf chewing insects	Postbloom sprays – just after bloom and then at 10- to 14-day intervals to harvest	**Carbaryl 50WP** – 2 tablespoons/gal. water. PHI=7 days; Carbaryl is highly toxic to bees. Read label.
Spotted Wing Drosophila	Weekly application as fruit approaches ripeness	**Carbaryl 50W** (Sevin Dust), **spinosad, pyrethrins, bifenthrin, beta-cyfluthrin, esfenvalerate, fenpropathrin, zetacypermethrin.** Follow label directions. Rotate products weekly to reduce resistance development.
Aphids, whiteflies	Do not apply during bloom; apply only once per year.	Monterey Fruit Tree & Vegetable Systemic Soil Drench. **Varies, depending on size of tree.** See product label for instructions, application rate, and restrictions.
Aphids, mites, scales, whiteflies	Best used against eggs and immature stages	**M-pede** See label for restrictions, wear appropriate PPE on the label. Can be applied up to harvest.

How to Mix Insecticides

1. **How to mix wettable powder for spraying:**
If you have 50 percent Carbaryl wettable powder and want to make 50 gallons of spray containing 0.5 percent Carbaryl, use the following formula: (water weighs 8.345 pounds/gallon)

$$\frac{Gallons\ desired\ \times weight\ of\ water\ \times desired\ concentration}{\%\ active\ ingredient\ in\ insecticide\ used} = pounds\ of\ wettable\ powder$$

$$\frac{50\ \text{gallons} \times 8.345 \times 0.5}{50} = 4.17\ \text{pounds}$$

4.17 pounds of the 50 percent Carbaryl will make 50 gallons of 0.5 percent Carbaryl.

2. **How to mix emulsifiable concentrate for spraying:**
If you have 50 percent Malathion emulsifiable concentrate and want to make a 2 percent spray, use the following formula:

$$\frac{\%\ insecticide}{Desired\ concentration} = \frac{50}{2} = 25$$

The correct dilution is 1 part of the Malathion to 25 parts of water.

3. **How to mix dusts:**
If you have 25 percent Malathion dust and want to make 100 pounds of dust containing 5 percent Malathion, use the following formula:

$$\frac{Desired\ concentration\ \times Desired\ Weight}{\%\ active\ ingredient\ in\ insecticide\ used} = factor$$

$$\frac{5 \times 100}{25} = 20$$

20 pounds of the Malathion dust should be added to 80 pounds diluents to make 100 pounds of 5 percent dust.

Insecticide Dilution Tables

Table 1. Amount of formulated insecticide materials to use to provide the indicated active ingredient.

Formulation	0.25 pound/ acre	0.50 pound/ acre	0.75 pound/ acre	1.0 pound/ acre	1.25 pounds/ acre	1.5 pounds/ acre	2.0 pounds/ acre
1% Dust	25.0 pounds	50.0 pounds	75.0 pounds	100.0 pounds	125.0 pounds	150.0 pounds	200.0 pounds
5% Dust	5.0 pounds	10.0 pounds	15.0 pounds	20.0 pounds	25.0 pounds	30.0 pounds	40.0 pounds
10% Dust	2.5 pounds	5.0 pounds	7.5 pounds	10.0 pounds	12.5 pounds	15.0 pounds	20.0 pounds
25% WP	1.0 pound	2.0 pounds	3.0 pounds	4.0 pounds	5.0 pounds	6.0 pounds	8.0 pounds
40% WP	2/3 pound	1.25 pounds	1 7/8 pounds	2.5 pounds	3 1/6 pounds	3.75 pounds	5.0 pounds
50% WP	0.5 pound	1.0 pound	1.5 pounds	2.0 pounds	2.5 pounds	3.0 pounds	4.0 pounds
75% WP	1/3 pound	2/3 pound	1.0 pound	1 1/3 pounds	1 2/3 pounds	2.0 pounds	2 2/3 pounds
1 pound/gal. EC	1.0 quart	2.0 quarts	3.0 quarts	4.0 quarts	5.0 quarts	6.0 quarts	8.0 quarts
1.5 pounds/gal. EC	2/3 quart	1 1/3 quarts	2.0 quarts	2 2/3 quarts	3 1/3 quarts	4.0 quarts	5 1/3 quarts
2 pounds/gal. EC	1.0 pint	1.0 quart	3.0 quarts	2.0 quarts	5.0 pints	3.0 quarts	2.0 quarts
4 pounds/gal. EC	0.5 pint	1.0 pint	1.5 pints	1.0 quart	2.5 pints	3.0 pints	2.0 quarts
6 pounds/gal. EC	1/3 pint	2/3 pint	1.0 pint	1 1/3 pints	1 2/3 pints	2.0 pints	2 2/3 pints
8 pounds/gal. EC	0.25 pint	0.5 pint	0.75 pint	1.0 pint	1.25 pints	1.5 pints	2.0 pints

EXAMPLE: You wish to apply an insecticide at the rate of 1 pound (active ingredient) per acre and you purchase an emulsifiable concentrate (EC) formulation containing 2 pounds (active ingredient) per gallon. From the table above, you find that 2 quarts of the formulation are needed per acre to provide the desired dosage.

The tables below provide a quick reference to determine the amount of insecticide to mix with different amounts of water to obtain the same concentration of spray.

Example: **1 cup** of liquid insecticide in **100 gallons** of water makes **the same spray concentration** as **4 tablespoons** in **25 gallons**.

Table 2. For use with liquid insecticide.

Amount of Water Used	Amount of Liquid Insecticide			
100 gallons	1 cup	1 pint	1 quart	2 quarts
50 gallons	0.5 cup	1 cup	1 pint	1 quart
25 gallons	4 tablespoons	0.5 cup	1 cup	1 pint
2.5 gallons	1.5 teaspoons	2.5 teaspoons	5 teaspoons	10 tablespoons
1 gallon	0.5 teaspoon	1.0 teaspoon	2 teaspoons	4 teaspoons

Table 3. For use with wettable powder insecticides.

Amount of Water Used	Amount of Wettable Powder Insecticide			
100 gallons	1 pound	2 pounds	3 pounds	5 pounds
50 gallons	0.5 pound	1 pound	1.5 pounds	2.5 pounds
25 gallons	0.25 pound	0.5 pound	0.75 pound	1.25 pounds
3 gallons	2 tablespoons	3 tablespoons	5 tablespoons	8 tablespoons
1 gallon	2 teaspoons	1 tablespoon	1.5 tablespoons	2.5 tablespoons

Table 4. Read across from the insecticide formulation you have and down from the concentration of the insecticide you want in the spray. The amount of insecticide to mix with 1 gallon of water to make that concentration is indicated at the point the lines meet.

WETTABLE POWDER (WP)

Insecticide Formulation	The Concentration of Actual Chemical Wanted in the Spray Solution								
	0.0313%	**0.0625%**	**0.125%**	**0.25%**	**0.5%**	**1.0%**	**2.0%**	**3.0%**	**5.0%**
15% WP	2.5 teaspoons	5.0 teaspoons	10.0 teaspoons	7.0 tablespoons	1.0 cup	2.0 cups	4.0 cups	6.0 cups	10.0 cups
25% WP	1.5 teaspoons	3.0 teaspoons	6.0 teaspoons	12.0 teaspoons	8.0 tablespoons	1.0 cup	2.0 cups	3.0 cups	5.0 cups
40% WP	1.0 teaspoon	2.0 teaspoons	4.0 teaspoons	8.0 teaspoons	5.0 tablespoons	10.0 tablespoons	1.25 cups	2.0 cups	3.25 cups
50% WP	0.75 teaspoons	1.5 teaspoons	3.0 teaspoons	6.0 teaspoons	4.0 tablespoons	8.0 tablespoons	1.0 cup	1.5 cups	2.5 cups
75% WP	0.5 teaspoon	1.0 teaspoon	2.0 teaspoons	4.0 teaspoons	3.0 teaspoons	5.0 tablespoons	10.0 tablespoons	1.0 cup	2.0 cups

EMULSIFIABLE CONCENTRATE (EC)

Insecticide Formulation	The Concentration of Actual Chemical Wanted in the Spray Solution								
	0.0313%	**0.0625%**	**0.125%**	**0.25%**	**0.5%**	**1.0%**	**2.0%**	**3.0%**	**5.0%**
10%-12% EC 1 pound actual/gal	2.0 teaspoons	4.0 teaspoons	8.0 teaspoons	16.0 teaspoons	10.0 tablespoons	2/3 pint	1 1/3 pints	1.0 quart	3.25 pints
15%-20% EC 1.5 pounds actual/gal	1.5 teaspoons	3.0 teaspoons	6.0 teaspoons	12.0 teaspoons	7.5 teaspoons	0.5 pint	1.0 pint	1.5 pints	2.5 pints
25% EC 2 pounds actual/gal	1.0 teaspoons	2.0 teaspoons	4.0 teaspoons	8.0 teaspoons	5.0 tablespoons	10.0 tablespoons	2/3 pint	1.0 pint	1.75 pints
33%-35% EC 3 pounds actual/gal	0.75 teaspoon	1.5 teaspoons	3.0 teaspoons	6.0 teaspoons	4.0 tablespoons	8.0 tablespoons	0.5 pint	0.75 pint	1 1/3 pints

Insecticide Formulation	The Concentration of Actual Chemical Wanted in the Spray Solution								
	0.0313%	0.0625%	0.125%	0.25%	0.5%	1.0%	2.0%	3.0%	5.0%
40%-50% EC 4 pounds actual/gal	0.5 teaspoon	1.0 teaspoon	2.0 teaspoons	4.0 teaspoons	8.0 teaspoons	5.0 tablespoons	10.0 tablespoons	0.5 pint	4/5 pint
57% EC 5 pounds actual/gal	7/16 teaspoon	7/8 teaspoon	1.75 teaspoons	3.5 teaspoons	7.0 teaspoons	0.5 tablespoons	9.0 tablespoons	14.0 tablespoons	1.5 cups
60%-65% EC 6 pounds actual/gal	3/8 teaspoon	0.75 teaspoon	0.5 tablespoons	1.0 tablespoons	2.0 tablespoons	4.0 tablespoons	8.0 tablespoons	12.0 tablespoons	1.5 cups
70%-75% EC 8 pounds actual/gal	0.25 teaspoon	0.5 teaspoon	1.0 teaspoon	2.0 teaspoons	4.0 teaspoons	8.0 teaspoons	5.0 tablespoons	7.5 tablespoons	13.0 tablespoons

Trade Names Used in Guide

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
abamectin	Abba Abathor Affirm Agri-Mek Avid CAM-MEK Dynamec Epi-Mek Reaper Timectin Vertimec Zephyr	a mixture of avermectin B1a (10E,14E,16E,22Z)-(1R,4S,5′S,6S,6′R,8R,12S,13S,20R,21R,24S)-6′-[(S)-sec-butyl]-21,24-dihydroxy-5′,11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.14,8.020,24]pentacosa-10,14,16,22-tetraene)-6-spiro-2′-(5′,6′-dihydro-2′H-pyran)-12-yl 2,6-dideoxy-4-O-(2,6-dideoxy-3-O- methyl-α-L-arabino-hexopyranosyl)-3-O-methyl-α-L-arabino-hexopyranoside and avermectin B1b (10E,14E,16E,22Z)-(1R,4S,5′S,6S,6′R,8R,12S,13S,20R,21R,24S)-21,22-dihydroxy-6′-isopropyl-5′,11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.14,8.020,24]pentacosa-10,14,16,22-tetraene)-6-spiro-2′-(5′,6′-dihydro-2′H-pyran)-12-yl 2,6-dideoxy-4-O-(2,6-dideoxy-3-	6	AMVAC Parsons Pest Man. Sunwell Syngenta Syngenta CAM CO. Syngenta Syngenta Loveland Tide International Syngenta Syngenta
acephate	Orthene Surrender FateSystemic Insect Con.	O,S-Dimethyl acetylphosphoramidothioate	1B	AMVAC Martin’s Future Crop Sci. Bonide LoveLand
acetamiprid	Assail Intruder Tristar	N-[(6-chloro-3-Pyridy) methyl] –n2-Cyanogen -n- methylacetamidine	4A	United Phos. AgNova Nufarm
allethrin	Pynamin	(RS)-3-allyl-2-methyl-4-oxocyclopent-2-enyl(1RS)-cis-transchrysanthemate; also referred to as allyl homolog of cinerin I.	3A	Sumitomo Chemical Co. Ltd.
amitraz	Taktic	N-methylbis(2,4-xylyliminomethyl)amine	19	InTerveT, Inc.
aluminum phosphide	Phostoxin	aluminum phosphide (AIP)	24A	Degesch America
Bacillus sphaericus	VectoLex	Serotype (H-5a5b)	11	Valent BioSciences Corp.
Bacillus thuringiensis	Biobit Condor Crymax DiPel Javelin Thuricide XenTari	Spores and crystalline delta-endotoxin as A.I. which are produced by *Bacillus thuringiensis* spp. k*urstaki*, Serotype H-3a3bin fermentation.	11A	Valent USA Certis USA Certis USA Valent USA Certis USA OHP Inc. Valent USA
Bacillus thuringiensis	VectoBac	Crystalline delta-endotoxin as A.I. (produced by fermentation of *Bacillus thuringiensis* spp. *israelensis*, Serotype H-14)	11	Valent BioSciences Corp.

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
beta-cyfluthrin	Baythroid Tempo Ultra	cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2- dichloroethenyl-2 2-dimethylcyclopropanecarboxylate (CAS 9CI)	3A	Bayer Corp. Bayer Corp.
bifenazate	Floramite	hydrazine carboxylic acid, 2-(4-methoxy-[1'1-biphenyl]-3-yl)-1 methylethyl ester (CA)	25	OHP Inc.
bifenthrin	Brigade Capture Discipline Fanfare Talstar	[1α,3α-(Z)]-(±)-(2 methyl[1,1'-biphenyl]-3-yl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropanecarboxylate(CAS)	3A	FMC FMC AMVAC Adama FMC
bifenthrin + imidacloprid	Brigadier	(2-methyl[1,1'-biphenyl]-3-yl)methyl (1R,3R)-rel-3-[(1Z)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethylcyclopropanecarboxylate and (2E)-1-[(6-chloro-3-pyridinyl)methyl]-N-nitro-2-imidazolidinimine	3A + 4A	FMC
buprofezin	Applaud Talus	2-tert-butylimino-3-isopropyl-5-phenyl-1,3,5-thiadiazinan-4-one	18	Corteva SePRO
carbaryl	Sevin	1-napthyl methylcarbamate	1A	GardenTech
chlorantraniliprole	Acelepryn Coragen Prevathon Vantacor	3-bromo-N-[4-chloro-2-methyl-6-[(methylamino)carbonyl] phenyl]-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide	28	DuPont Dupont FMC Corp FMC Corp
chlorfenapyr	Intrepid Phantom Pylon 2SC	4-bromo-2-(4-chlorophenyl)-1-(ethoxymethyl)-5-(trifluoromethyl)-1H-pyrrole-3-carbonitrile	13	BASF
chlorpyrifos	Dursban Pro Lorsban Nufos	O,O-diethyl O-(3,5,6-trichloro-2-pyridinyl)phosphorothioate	1B	Corteva Corteva FMC Corp
clothianidin	Arena Belay Poncho	(E)-1-(2-chloro-1,3 thiazo)-5-ylmethyl)-3-methyl-2 nitroguanidine	4A	Valent Valent Bayer
coumaphos	Co-Ral	O,O-diethyl O-(3-chloro-4-methyl-2-oxo2H-1-enzopyuran 7-yl-phosphorothioate	1B	Bayer Corp.
coumpahos + diazinon	Co-Ral Plus	O,O-diethyl O-(3-chloro-4-methyl-2-oxo2H-1-enzopyuran 7-yl-Phosphorothioate + O,O,Diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl)	1B	Bayer Corp.
cyromazine	Citation	N-cyclopropyl-1,3,5-triazine-2,4,6-triamine	17	Syngenta
diazinon	Optimizer Patriot	O,O,Diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl)	1B	Y-Tex Corp. Bayer Corp
diazinon + chlorpyrifos	Warrior (ear tag)	O,O,Diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl)	1B	Y-Tex
dichlorvos	Nuvan Vapona	2,2-dichlorovinyl dimethyl phosphate (IUPAC)	1B	AMVAC Bayer Corp

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
dicofol	Kelthane	2,2,2-trichloro-1,1-bis(4-chlorophenyl)ethanol(IUPAC)	3	Corteva
dicrotophos	Bidrin	(E)-2-dimethylcarbamoyl-1-methylvinyl dimethyl phosphate (IUPAC)	1B	AMVAC
diflubenzuron	Vigilante	N-[(4-Chlorophenyl)amino]carbonyl-2,6-Difluorobenzamide	15	Chemtura Corp.
dimethoate	Cygon Cygon 2E	O,O-dimethyl S-(N-methylcarbamoylmethyl	1B	Bonide Hi-Yield
dioxathion	Del-Tox	2,3-p-dioxanedithion-S,S-bis-(O,O-diethyl phosphrodithioate)	1B	AgrEvo
disulfoton	Di-Syston	O,O-diethyl S-[2-(ethylthio)ethyl]phosphorodithioate (CAS)	1B	Bayer Corp.
endosulfan	Phaser	6,7,8,9,10,10-herachloro-1,5,5a,6,9,9a- hexahydro-6,9-methano-2,4,3-benzodioxathiepin 3-oxide (IUPAC)	2A	Aventis CropScience
eprinomectin	Eprinex	(4’’R)-4”-(Acetylamino)-4”-deoxy-avermectin B1	6	Merck Agvet
esfenvalerate	Asana XL	(S)-α-cyano-3- phenoxybenzyl) (S)-2-(4-chlorophenyl)3- methylbutyrate (IUPAC); (S)-cyano(3-phenoxyphenyl)methyl (S)-4-chloro-α(1-methylethyl)benzeneacetate (CAS)	3A	Dupont
etoxazole	Zeal	2-(2,6-difluorophenyl)-4-[4-(1,1-dimethylethyl)-2-ethoxyphenyl]-4,5-dihydrooxazole	10B	Valent USA
fenbutatin-oxide	Vendex	hexakis(2-methyl-2-phenylproply)distannoxane(CAS)	12B	UPI
fenoxycarb	Award Logic	(ethyl [2-4 phenoxyphenoxy ethyl] carbamate)	7B	Syngenta Syngenta
fenthion	Spotton	O,O-Dimethyl O-[3-methyl-4-(methylthio)phenyl]phosphorothioate	1B	Bayer Corp.
fipronil	Ceasefire Chipco Choice Regent Over ‘n Out Termidor Top Choice	[5-amino-1-(2,6-dichloro-4-trifluoromethyl)phenyl-4-(1,R,S)-(trifluoromethyl)su-1-H-pyrasole-3-carbonitrile]	2B	Bayer BASF
flonicamid	Carbine	N-cyanomethyl-4-(trifluoromethyl) nicotinamide	9C	FMC
gamma-cyhalothrin	Prolex	Cyclopropanecarboxylic acid, 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl,cyano(3-phenoxyphenyl) methyl ester	3A	Pytech
halo fenozide	Mach 2	N-tert-butyl-N'-(4-chlorobenzoyl)benzohydrazide; benzoic acid,4-chloro-2 benzoyl-2-(1,1-dimethylethyl) hydrazide	18	Corteva
hydramethylnon	Amdro	Tetrahydro-5, 5-dimethyl-2 (1H)-pyrimidinone[3-[4(trifluoromethyl) phenyl]-1-[2-[4-(trifluoromethyl)phenyl]etheny]-2-propenylidene]hydrazone	20A	AMBRANDS

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
imidacloprid	Admire Gaucho Marathon Merit Premise	1-(6-chloro-3-pyridin-3-ylmethyl)-N-nitroimidazolidin-2- ylidenamine (IUPAC)	4A	Bayer Corp Bayer Corp OHP Inc. Bayer Corp Bayer Corp
imidacloprid + beta-cyfluthrin	Leverage	(2E)-1-[(6-chloro-3-pyridinyl) methyl]-N-nitro-2-imidazolidinimine + cyano(4-fluoro-3-pheno xyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropanecarboxylate	3A + 4A	Bayer Corp
insecticidal soap	M-PEDE Safer	potassium salts of fatty acids	unknown	Gowan Safer
indoxacarb	Advion Steward	(S)-methyl 7-chloro-2,5-dihydro-2-[{(methoxy-carbonyl){4trifluoromethoxy)phenyl}amino}-carbonyl}indeno{1,2-e}[1,3,4}oxadiazine-4a-(3H)-carboxylate	22A	DuPont FMC Corp.
isofenphos	Oftanol	1-methylethyl 2[(ethoxy)(1methylethyl)amino]phosphinothioyl oxy benzoate (CAS)	1B	Bayer Corp.
lambda-cyhalothrin	Battle Commodore Karate Z Saber Warrior T	α-cyano-3-phenoxybenzyl 3-(2-Chloro-3,3,3- trifluoroprop-1-enyl)-2,2-dimethylcyclopropane-carboxylate	3A	Lesco Syngenta Syngenta Merck Syngenta
lambda-cyhalothrin + PBO	Saber Extra (ear tag)	α-cyano-3-phenoxybenzyl 3-(2-Chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropane-Carboxylate	3A	Merck
lambda-cyhalothrin+ thiamethoxam	Endigo	Combination of lambda-cyhalothrin and thiamethoxam (premix): [1α(S),3α(Z)]-(±)-cyano-(3-phenoxyphenyl)methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate and 3-[(2-chloro-5-thiazolyl)methyl]tetrahydro-5-methyl-N-nitro-4H-1,3,5-oxadiazin-4-imine	3A + 4A	Syngenta
malathion	Fyfanon	diethyl (dimethoxythiophosphorylthio)succinate	1B	Cheminova, Inc.
mancozeb	Dithane	coordination product of zinc ion, manganese ethylene bisdithiocarbamate related to both maneb and zineb	M3	Corteva
methidathion	Supracide	S-2,3-dihydro-5-methoxy-2-oxo1,3,4-thiadiazol-3-ylmethyl O,O-dimethyl-phosphorodithioate(IUPAC)	1B	Gowan Company
methiocarb	Slugger	3,5-dimethyl-4-(methylthio)phenyl methylcarbamate (CAS)	1A	OR-CAL
methomyl	Lannate	S-methyl N-[(methylcarbamoyl)oxy]thioacetimidate (CAS 8CI)	1A	DuPont
methoxyfenozide	Intrepid	Benzoic acid, 3-methoxy-2-methyl, 2-(3,5-dimethylbenzoyl)-2-(1,1-dimethyethyl) hydrazide	18	Corteva
mineral oil	TriTek	mineral oil	unknown	Brandt

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
naled	Dibrom Trumpet	1,2-dibromo-2,2-dichloroethyl dimethyl phosphate	1B	AMVAC AMVAC
novaluron	Diamond	*N*-[[[3-chloro-4-[1,1,2-trifluoro-2-(trifluoromethoxy) ethoxy]phenyl]amino]carbonyl]-2,6-difluorobenzamide	15	Adama
oxamyl	Vydate	S-methyl N' N'-dimethyl-N-(methylcarbamoyloxy)-1-thio-oxamimidate(IUPAC)	1A	Corteva
permethrin	Ambush Astro DeLice Permanone Pounce	3-phenoxybenzyl (1RS)-cis, trans-3-(2,2- dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate (IUPAC)	3A	Syngenta FMC Coopers Bayer Corp FMC
phorate	Thimet	O,O-Diethyl S-[(ethylthio)methyl]phosphorodithioate (CAS)	1B	Amvac Chemical
phosmet	Imidan	S-[(1,3-dihydro-1,3-dioxo-2H-isoindol-2-yl)methyl]O,O-dimethyl phosphorodithioate(CAS 9Cl)	1B	Gowan Company
propargite	Comite	sulfurous acid,2[4(1,1-dimethyl-ethyl)phenoxy]cyclohexy1-2- propanyl sulfite (CAS 9C1)	12C	Uniroyal Chemical/ Crompton Corp.
propoxur	Baygon	2-(1-methylethoxy)phenyl methylcarbamate(CAS)	1A	Bayer Corp.
pyriproxyfen	Distance	(2-[1-methyl-2-(4-phenoxyphenoxy)ethoxy]pyridine)	7C	Nufarm
pyrethrin	Pyrethrin	Pyrethrin (natural product)	3A	several
s-methoprene	Altosid Extinguish	isopropyl (E,E)-(RS)-11-methoxy-3,7,11-trimethyl-dodeca-2,4- dienoate (IUPAC)	7A	Wellmark International Phoenix Environmental Design
s-methoprene, + hydromethylnon	Extinguish Plus	(s)-methoprene[isopropyl (2E, 4E, 7S)-11-methoxy-2,7,11-trimethyl-2,4-dodecadienoate] + tetrahydro-5, 5-dimethyl-2 (1H)-pyrimidinone [3-[4(trifluoromethyl)phenyl]-1-[2-[4-(trifluoromethyl)phenyl]etheny]-2-propenylidene]hydrazone	7A	Phoenix Environmental Design
spinetoram	Radiant	Mixture of spinetoram-J and spinetoram-L	5	Corteva
spinosad/spintor	Conserve SC Entrust Success Tracer	Spinosyn A and Spinosyn D	5	Corteva
spiromesifen	Forbid 4F Oberon	2-oxo-3-(2,4,6-trimethylphenyl)-1-oxaspiro[4,4]non-3-en-4-yl3, 3 dimethylbutanoate	23	Bayer Corp Bayer Corp
tebufenozide	Confirm Mimic	N-tert-butyl-N'-(4-ehylbenzoyl)-3,5-dimethylbenzo-hydrazide (IUPAC);3,5-dimethylbenzoic acid 1-(1,1-dimehtylethyl)-2-	18	Corteva Bayer
tefluthrin	Force	(2,3,5,6-tetrafluoro-4-methylphenyl)methyl-(1a,3a)-(Z)-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate	3A	Syngenta

Common Name	Trade Name	Chemical Name	IRAC Classification	Company
temephos	Abate	O,O' -(thiodi-4,1-phenylene) O,O, O' O'-tetramethyl phosphorothioate	1B	BASF Corp.
terbufos	Counter	S-[(1,1-Dimethylethyl thio)methyl]O,O-diethyl phosphorodithioate (CAS)	1B	AMVAC
tetrachlorvinphos	Rabon	2-chloro-1-(2,3,5 trichlorophenyl) dimethyl phosphate vinyl	1B	Bayer Livestock
tetrachlorvinphos + dichlorvos	Ravap	(Z)-2-chloro-1-(2,4,5-trichlorophenyl) vinyl dimethyl phosphate + 2,2-dichlorovinyl dimethyl phosphate (IUPAC)	1B	Bayer Livestock
thiamethoxam	Centric Meridian	3-[(2-chloro-5-thiazolyl)methyl] tetrahydro-5-methyl-N-nitro-4H-1,3,5-oxadiazin-4-imine	4A	Syngenta Syngenta
tralomethrin	Scout X-Tra	(1R, 3S) 3 [(1'RS)(1',2',2',2',-tetrabromoethyl)]-2,2-dimethylcyclopropanecarboxylic acid (S)-a-cyano-3-phenoxybenzyl ester (CAS)	3A	Aventis CropScience
zeta-cypermethrin	Mustang	☐-Cyano(3-phenoxyphenyl)methyl (±)-cis-trans3-(2,2dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (CAS)	3A	FMC Corp
zeta-cypermethrin + bifenthrin	Hero Mustang Maxx	α-Cyano(3-phenoxyphenyl)methyl (±)-cis-trans3-(2,2 dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (CAS) +[1a,3a-(Z)]-(±)-(2 methyl[1,1¢-biphenyl]-3-yl)methyl 3-(2-chloro-3,3, 3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropanecarboxylate(CAS)	3A	FMC Corp

NOTE: This list is presented for information only. No endorsement is intended for products mentioned nor is criticism meant for products not mentioned.

Worker Protection Standard (WPS)

The Environmental Protection Agency (EPA) Agricultural Worker Protection Standard (WPS) is aimed at reducing the risk of pesticide poisoning and injury among agricultural workers and pesticide handlers. Pesticide applicators must comply with this OSHA regulation when using agricultural use pesticide products that reference the Worker Protection Standard, 40 CFR 170. In 2015, the EPA made major revisions to the Worker Protection Standard (WPS).

The LSU AgCenter has since worked to provide an updated WPS Train-the-Trainer program that is approved by the EPA. In Louisiana, those employers who wish to train their own workers and handlers (or other workers and handlers on nearby agricultural establishments) must be certified pesticide applicators and have been trained in the new WPS Train-the-Trainer program provided through the LSU AgCenter. Note: all agricultural workers and handlers (who work with or around applied pesticides and who work for one of these four establishments: farm, forest, plant nursery or greenhouse operation) must be trained on a yearly basis with approved training materials.

If a pesticide applicator who has had "WPS Trainer status" has attended a WPS Train-the-Trainer program prior to November 2016, then he or she must attend an updated WPS Train-the-Trainer program. Once this training has been completed, the "WPS Trainer" category will be added to the back of their pesticide certification card. This WPS Trainer certification will be renewed when they attend their normal pesticide applicator recertification meeting, on their three-year recertification cycle. Training dates and locations can be found at www.lsuagcenter.com/pesticide. (Select the WPS tab.)

If you would like to receive WPS Train-the-Trainer training so that you will be certified to administer WPS worker/handler training to workers who perform work around or with agricultural pesticide products, please email LSUAGPSEP@agcenter.lsu.edu and someone at the LSU AgCenter's Pesticide Safety Education Program will assist you.

As part of the revised rule there are a few things that need to be pointed out:

- Workers and handlers must be trained every 12 months.
- WPS trainers must participate in the new EPA-approved Train-the-Trainer Program (See information above).
- Workers and handlers must be trained by using EPA-approved training materials
- No longer using the card system for records of training. You must maintain the following worker/handler annual training information:
    - Trained worker's printed name and signature.
    - Date of the training.
    - Information identifying which EPA-approved training materials were used.
    - The trainer's name (and certification number) and qualification to train.
    - The worker or handler employer's name.
- The LSU AgCenter has created a record-keeping form that you are welcome to use. If you would like to download a training verification form for WPS, please do so by going to the LSU AgCenter's PSEP website (within the WPS tab).
- Must retain records of training of workers and handlers for at least two years.
- Maintain the following information at a central location:
    - New safety poster https://npsecstore.com/collections/posters.
    - Application records.
    - Emergency medical contact information.
    - SDS (safety information).
- When using a pesticide that requires a respirator, employers must:
    - Have an employee medically evaluated by a physician or other licensed healthcare professional.
    - Have employees go through an annual fit test for each type of respirator required by the pesticide product label.
    - Have the employee participate in annual training on how to properly use the respirator(s).
    - Maintain records for two years of the completion of the above, respirator requirements.

The ***How to Comply Manual*** is a great reference guide and can be ordered at www.npsecstore.com.

To get more information about the WPS revised rule you will need to refer to the final rule at https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps.

Where to get updated information:

- www.lsuagcenter.com/pesticide
- https://npsecstore.com/ (for the new poster and other important WPS materials)
- https://www.pesticideresources.org/ (to get EPA approved worker/handler training materials)

This section was revised by Bryan Gueltig.

Insect Identification Services

The LSU AgCenter, LSU Department of Entomology, and Louisiana State Arthropod Museum (LSAM) offer insect identification services for the citizens and stakeholders of Louisiana.

Due to the diversity of insects in our state and the diversity of places where insects are found, we have established a standard operating procedure to best serve you. If you have an insect (or arthropod) that you are concerned about, either for crop health, garden health, or personal health reasons, please follow the steps below. Note: Although we are interested in all insects, please refrain from submitting specimens that are simply interesting or curious to you! The internet is a great source of information, and we do our best to provide services to insects of potential impact.

Identification Procedure

1. Either photograph or collect the insect in the appropriate manner (requirements provided below). Note: if you have an infestation or more than one insect is present, it is often useful to image or collect several, as this may assist in identification.
2. Submit the image or specimen and associated data to your parish/county extension agent. A complete list of agents is available here: https://www.lsuagcenter.com/portals/it/find-your-agent
3. The parish/county agent will respond with identification and specimens of particular importance will be sent to the Department of Entomology at LSU for confirmation and/or vouchering.
4. In the event the parish agent cannot successfully identify the insect, he/she will contact Victoria Bayless, Curator of the LSAM, and state insect identifier. She will work with the parish agent, faculty, and staff in the Department of Entomology to identify the specimen.

Photo Requirements

In order to provide a ***rapid*** and ***accurate*** identification, we have requirements necessary for all submissions. Any submissions not meeting these minimum requirements can result in delays in identification or an inability to provide an accurate and confident response.

Photos of Insects - Requirements

1. The insect is in-focus (not blurry)
2. There is something for scale included in the image (a coin, a pen/pencil, ruler, etc.)
3. Appropriate data is provided with the image
   - Date image was taken.
   - Location of the image (parish + nearest town are good, GPS coordinates are best).
   - Submitter’s contact information, including name, phone, email, and address.
   - Additional notes that may be helpful, including where the insect was collected, why it is a suspected pest, etc.

The submission portal for images and associated information is here:

http://forms.lsuagcenter.net/form.aspx?pid=55d2084f-b9d4-4d70-8ba5-186f35f6fc5e&formid=f4e73049-df5c-4e7d-8313-2d03b7125962

Dead Specimen Requirements

Submission of the actual insects themselves is the best way to receive a confident identification. This process takes time, however, and some important requirements must be followed to make an identification as quickly as possible. Note: we will not accept any bodily tissues or fluids. If the samples appear to be unhygienic and/or pose a health concern, we will incinerate without identification.

- In order to kill an insect, simply collect into a sealed container (plastic zipper baggie, pill bottle, etc.) and freeze for several hours (overnight preferred). Insects are extremely hardy and may re-animate if not frozen for at least several hours!
- If the insect is soft-bodied (“squishy,” e.g., caterpillars, fly maggots, etc.), they can be placed in a sealed container of rubbing alcohol, ethanol, or even white vinegar for preservation. If this is not done, the specimens will shrivel, likely making identification impossible.

Insect Specimens - Requirements

1. The insect is dead and in a sealed container (see above).
2. Appropriate data is provided with the insect
    - Date collected.
    - Location where insects were collected (parish + nearest town are good, GPS coordinates are best. When possible, please use decimal degrees to four decimal places).
    - If the insect is in fluid, you *must state* what the fluid is (e.g., rubbing alcohol).
    - Submitter’s contact information, including name, phone, email, and address.
    - Additional notes that may be helpful, including where the insect was collected, why it is a suspected pest, etc.
3. Ship specimen(s) to the address below. If the specimen is in rubbing alcohol or ethanol, please ensure it is packaged appropriately to avoid leakage.

Specimens should be sent to the following address:
Insect Identification Services
c/o Department of Entomology, LSAM
404 Life Sciences Building, Louisiana State University
Baton Rouge, LA 70803

Insect Identifiers for Louisiana State University Entomology Department

When mailing large specimens please send as complete and non-damaged a specimen as possible. For microscopic specimens please follow the guidelines below. Photographs can be sent directly to the emails below.

Stephen Baca: Insect Identification (Physical Specimens and Photo ID), life history and general control.
Email: sbaca@agcenter.lsu.edu
Assistant Professor and Director of the LSAM
Office: 225-578-1813
Mail Specimens to Entomology Department
402 Life Sciences Rm 404, Baton Rouge, LA 70803 with email indicating you have specimens being delivered.

Chris Carlton: Insect Identification (Photo ID), life history, no chemical control recommendations.
Email: ccarlt@lsu.edu

Victoria Bayless: Insect and Spider identification no chemical control recommendations (Physical Specimens and Photo ID).
Email: vbayless@agcenter.lsu.edu
Send specimens to: PO Box 139, Rosedale, LA 70772 with email indicating you have specimens being delivered.
Office: 225-578-1634

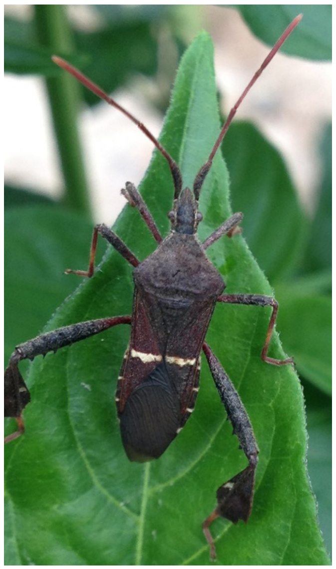
Kristen Healy: Public health entomology, medical entomology, and pollinators; some control recommendations.
Email: khealy@lsu.edu
Office: 225-578-7386

Karen Sun: Identification of termites and ants; some control recommendations.
Email is preferred method of contact
Email: qsun@agcenter.lsu.edu
Office: 225-578-1831

Aaron Ashbrook: Urban and Peri-urban insects, household, gardens, lawns; some control recommendations.
Email: aashbrook@agcenter.lsu.edu
Office: 225-578-1634

Mike Stout: General questions about the Entomology Department, agricultural pests
Email: mstout@agcenter.lsu.edu
Office: 225-578-1634

2025 Louisiana Fruit and Nuts Insect Pest Management Guide

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