

UC IPM Pest Management Guidelines: PECANS

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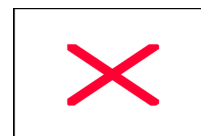
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An illustrated version of this guideline is available online at <http://ipm.ucanr.edu/PMG/selectnewpest.pecans.html>

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Updates: These guidelines are updated regularly. Check with your University of California Cooperative Extension Office or the UC IPM website for information on updates.

Note to readers: These guidelines represent the best information currently available to the authors and are intended to help you make the best choices for an IPM program. Not all formulations or registered materials are mentioned. Always read the label and check with local authorities for the most up-to-date information regarding registration and restrictions on pesticide use. Check with your agricultural commissioner for latest restricted entry intervals.

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General Information

(Section reviewed 12/15)

RELATIVE TOXICITIES OF INSECTICIDES AND MITICIDES USED IN PECANS TO NATURAL ENEMIES AND HONEY BEES (6/18)

Common name (Example trade name)	Mode of Action ¹	Selectivity ² (affected groups)	Predatory Mites ³	General Predators ⁴	Parasite ⁴	Honey Bees ⁵	Duration of impact to natural enemies ⁶
azadirachtin (Neemix)	un	broad (insects, mites)	M	L/M	L/M	II	short
dimethoate	1B	broad (insects)	H	H	H	I	long
flonicamid (Beleaf)	29	narrow (sucking insects)	L	L	L	III	short
flupyradifurone (Sivanto)	4D	narrow (sucking insects)	—	—	—	I	—
imidacloprid (Admire Pro)	4A	narrow (sucking insects)	—	L	—	I	—
potassium salts of fatty acids (DES-X, M-Pede)	un	broad (insects)	—	—	—	III	—
pymetrozine (Fulfill)	9B	narrow (aphids)	L	L	L	II	short
spirotetramat (Movento)	23	narrow (aphids)	L	L	L	II	short

H = high M = moderate L = low — = no information un = unknown or uncertain mode of action

- ¹ Rotate chemicals with a different mode-of-action group number, and do not use products with the same mode-of-action group number more than twice per season to help prevent the development of resistance. For example, the organophosphates have a group number of 1B; chemicals with a 1B group number should be alternated with chemicals that have a group number other than 1B. Mode-of-action group numbers ("un" = unknown or uncertain mode of action) are assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their website at <http://irac-online.org/>.
- ² Selectivity: *broad* means it affects most groups of insects and mites; *narrow* means it affects only a few specific groups.
- ³ Generally, toxicities are to western predatory mite, *Galendromus occidentalis*.
- ⁴ Toxicities are averages of reported effects and should be used only as a general guide. Actual toxicity of a specific chemical depends on the species of predator or parasite, environmental conditions, and application rate.
- ⁵ Ratings are as follows: I—Do not apply or allow to drift to plants that are flowering; II—Do not apply or allow to drift to plants that are flowering, except when the application is made between sunset and midnight if allowed by the pesticide label and regulations; III—No bee precaution, except when required by the pesticide label or regulations. For more information about pesticide synergistic effects, see *Bee Precaution Pesticide Ratings*.
- ⁶ Duration: *short* means hours to days; *moderate* means days to 2 weeks; and *long* means many weeks or months.

Acknowledgments: This table was compiled based on research data and experience of University of California scientists who work on a variety of crops and contribute to the Pest Management Guideline database, and from Flint, M. L. and S. H. Dreistadt. 1998. *Natural Enemies Handbook: An Illustrated Guide to Biological Pest Control*, ANR Publication 3386.

Insects

(Section reviewed 12/15)

BLACK PECAN APHID (6/18)

Scientific Name: *Melanocallis caryaefoliae*

DESCRIPTION OF THE PEST

The black pecan aphid is the only black colored aphid that attacks pecan foliage.

- The adult may be various shades of green or black.
- Nymphs tend to be lighter in color than the adults, especially in spring when instars one through four have little dark pigment.
- Antennae are pale yellow with small amounts of black on several segments.
- Eyes are dark red and cornicles are short. In the other two aphid species present on pecan, cornicles are absent or greatly reduced.

Black pecan aphids have multiple generations each year, beginning development in March and continuing into November. Numbers generally peak in fall.

DAMAGE

Black pecan aphid feeding causes bright yellow, angular, 0.4 square inch spots to develop on the leaves between the veins. The spots die and turn brown, and just a few such spots cause a leaflet to shed. Premature leaf drop results in poor nut quality and reduced bloom in subsequent seasons.

MANAGEMENT

Begin scouting for black pecan aphids and their feeding damage in late summer. Continue scouting every 4 to 5 days through the end of the season.

Look at both the bottom and top surfaces of 5 compound leaves on at least 10 random trees throughout the orchard for a total sample of at least 50 compound leaves.

Usually control is not needed until late in the season (after mid-July). At that time, apply a pesticide if levels exceed an average of one black pecan aphid per compound leaf. Note that this threshold was developed in Texas and has not been proven in California.

Soil applied imidacloprid may be less effective than foliar applications, probably because black pecan aphids ingest lower volumes of sap than other aphid species. Foliar applications may help to slow the development of resistance to imidacloprid, because aphids are not subjected to sublethal doses of imidacloprid, which may be the case with soil application.

Use insecticides that preserve beneficial insects because beneficial insects will decrease aphid numbers over time.

Common name (Example trade name)	Amount per acre	REI‡ (hours)	PHI‡ (days)
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Not all registered pesticides are listed. The following are ranked with the pesticides having the greatest IPM value listed first—the most effective and least harmful to natural enemies, honey bees, and the environment are at the top of the table. When choosing a pesticide, consider information relating to air and water quality, resistance management, and the pesticide’s properties and application timing. Always read the label of the product being used.

A. FLUPYRADIFURONE (Sivanto 200SL) MODE-OF-ACTION GROUP NUMBER ¹ : 4D	7–10.5 fl oz	12	7
B. FLONICAMID			

	(Beleaf 50SG)	2–2.8 oz	12	40
	MODE-OF-ACTION GROUP NUMBER ¹ : 29			
C.	SPIROTETRAMAT (Movento)	6–9 fl oz	24	7
	MODE-OF-ACTION GROUP NUMBER ¹ : 23			
	COMMENTS: Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
D.	PYMETROZINE (Fulfill)	4 oz	12	14
	MODE-OF-ACTION GROUP NUMBER ¹ : 9B			
	COMMENTS: A selective feeding blocker. Low toxicity to beneficial insects, but do not apply when bees are actively foraging.			
E.	IMIDACLOPRID (Admire Pro)	Label rates	12	See label
	MODE-OF-ACTION GROUP NUMBER ¹ : 4A			
	COMMENTS: Soil-applied formulations of imidacloprid must be applied preventively before monitoring indicates a need; use if aphids have been a chronic problem in past years. Resistance has been observed in New Mexico. Foliar applications may help to slow the development of resistance to imidacloprid because aphids are not subjected to sublethal doses (as may be the case with soil applications). Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
F.	DIMETHOATE (Dimethoate E267)	1 pt	48	21
	MODE-OF-ACTION GROUP NUMBER ¹ : 1B			
	COMMENTS: Ground application only. Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
G.	POTASSIUM SALTS OF FATTY ACIDS# (DES-X, M-Pede)	Label rates	12	0
	MODE-OF-ACTION GROUP NUMBER ¹ : unknown			
H.	AZADIRACHTIN# (Neemix 4.5)	Label rates	4	0
	MODE-OF-ACTION GROUP NUMBER ¹ : un			
	COMMENTS: For larval stages.			
I.	NARROW RANGE OIL#	Label rates	See label	0
	MODE OF ACTION: Contact including smothering and barrier effects.			
	COMMENTS: Although research has not been done in pecans, in other tree crops oil is used to suppress aphids, while preserving beneficials. In organic crops, check with the certifier to determine which products are organically acceptable.			

- ‡ Restricted entry interval (REI) is the number of hours from treatment until the treated area can be safely entered without protective clothing. Preharvest entry interval (PHI) is the number of days from treatment to harvest. In some cases the REI exceeds the PHI. The longer of these two intervals is the minimum time that must elapse before harvest.
- * Permit required from county agricultural commissioner for purchase or use.
- 1 Rotate chemicals with a different mode-of-action Group number, and do not use products with the same mode-of-action Group number more than twice per season to help prevent the development of resistance. For example, the organophosphates have a Group number of 1B; chemicals with a 1B Group number should be alternated with chemicals that have a Group number other than 1B. Mode-of-action Group numbers (un = unknown or uncertain mode of action) are assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their website at <http://irac-online.org/>.
- # Acceptable for use on organically grown produce. Check with your certifier if use is permissible.

YELLOW APHID COMPLEX (6/18)

Scientific Names: Yellow pecan aphid: *Monelliopsis pecanis*
Black margined aphid: *Monellia caryella*

DESCRIPTION OF THE PESTS

The yellow pecan aphid and the black margined aphid are similar in appearance.

- Both species are yellow with black markings. The amount of black pigmentation varies with the stage of development and the time of year, but in general it increases from spring to fall.
- The cornicles on both species are reduced to pores.
- Except for the winged adults, yellow pecan aphids have long setae (hairs) that tend to stand out from the body at 45- to nearly 90-degree angles, giving the aphids a pincushion look. In contrast, black margined aphids have much shorter setae and they form less than a 45-degree angle with the body.
- Yellow pecan aphids have red eyes.

There are multiple generations of both species each year. Numbers tend to peak in spring and again in fall.

DAMAGE

The yellow pecan aphid and black margined aphid cause similar types of damage. They are significant pests of pecan in California and can dramatically impact production and nut quality.

Both species feed primarily on the underside of leaves. Black margined aphids feed on major leaflet veins, while yellow pecan aphids feed on the network of small veins located throughout the leaf.

They damage pecan trees by extracting large amounts of photosynthate and water from leaves, which impairs the growth of shoots and roots. They also secrete large amounts of honeydew onto leaves. The sooty mold that grows on the honeydew can reduce photosynthetic efficiency.

MANAGEMENT

Monitor often since aphid numbers can increase rapidly and exceed economic thresholds quickly. Begin scouting for yellow pecan and black margined aphids in May and continue every 4 to 5 days throughout shoot and nut development. Look at the undersurface of 5 compound leaves on at least 10 random trees throughout the orchard for a total sample of at least 50 compound leaves.

- Before June 1: Apply an insecticide if honeydew is accumulating.
- June 1 to August 15: Apply an insecticide if the total number of aphids exceeds an average of 20 per compound leaf.
- August 15 to leaf fall: Apply an insecticide if the total number of aphids exceeds an average of 10 per compound leaf.

Insecticides that preserve beneficial insects will decrease aphid populations over time.

Although imidacloprid is traditionally soil applied early in the season, foliar application is recommended later in the season, because imidacloprid is slowly taken up by the roots and translocated throughout the plant. By the time imidacloprid builds up to high enough levels in the leaves, aphids are already present and have damaged leaves.

Foliar application may also help to slow the development of resistance, because aphids are not subjected to sublethal doses of imidacloprid, which may be the case with soil application. Researchers have some evidence of resistance to imidacloprid in California, Texas and New Mexico. Furthermore, growers have observed what appears to be imidacloprid resistance in Arizona.

Common name (Example trade name)	Amount per acre	REI‡ (hours)	PHI‡ (days)
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Not all registered pesticides are listed. The following are ranked with the pesticides having the greatest IPM value listed first—the most effective and least harmful to natural enemies, honey bees, and the environment are at the top of the table. When choosing a pesticide, consider information relating to air and

water quality, resistance management, and the pesticide's properties and application timing. Always read the label of the product being used.

NOTE: Yellow pecan aphid resistance to insecticides has been a problem in other pecan-growing states. Alternate insecticides with different mode-of-action group numbers, and do not use each more than once a season.

A.	FLUPYRADIFURONE (Sivanto 200SL)	7–10.5 fl oz	12	7
	MODE-OF-ACTION GROUP NUMBER ¹ : 4D			
B.	FLONICAMID (Beleaf 50SG)	2–2.8 oz	12	40
	MODE-OF-ACTION GROUP NUMBER ¹ : 29			
C.	IMIDACLOPRID (Admire Pro)	Label rates	12	See label
	MODE-OF-ACTION GROUP NUMBER ¹ : 4A			
	COMMENTS: Soil-applied formulations of imidacloprid must be applied preventively before monitoring indicates a need; use if aphids have been a chronic problem in past years. Use foliar applications later in the season, which may help to slow the development of resistance because aphids are not subjected to sublethal doses (as may be the case with soil applications). Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
D.	SPIROTETRAMAT (Movento)	6–9 fl oz	24	7
	MODE-OF-ACTION GROUP NUMBER ¹ : 23			
	COMMENTS: Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
E.	PYMETROZINE (Fulfill)	4 oz	12	14
	MODE-OF-ACTION GROUP NUMBER ¹ : 9B			
	COMMENTS: A selective feeding blocker. Low toxicity to beneficial insects, but do not apply when bees are actively foraging.			
F.	DIMETHOATE (Dimethoate E267)	1 pt	48	21
	MODE-OF-ACTION GROUP NUMBER ¹ : 1B			
	COMMENTS: Ground application only. Do not spray directly or allow to drift onto blooming crops or weeds where bees are foraging.			
G.	POTASSIUM SALTS OF FATTY ACIDS# (DES-X, M-Pede)	Label rates	12	0
	MODE-OF-ACTION GROUP NUMBER ¹ : unknown			
H.	AZADIRACHTIN# (Neemix 4.5)	Label rates	4	0
	MODE-OF-ACTION GROUP NUMBER ¹ : un			
	COMMENTS: For larval stages.			
I.	NARROW RANGE OIL#	Label rates	See label	0
	MODE OF ACTION: Contact including smothering and barrier effects.			
	COMMENTS: Although research has not been done in pecans, in other tree crops oil is used to suppress populations of aphids, while preserving beneficials. In organic crops, check with certifier to determine which products are organically acceptable.			

‡ Restricted entry interval (REI) is the number of hours from treatment until the treated area can be safely entered without protective clothing. Preharvest entry interval (PHI) is the number of days from treatment to harvest. In some cases the REI exceeds the PHI. The longer of these two intervals is the minimum time that must elapse before harvest.

* Permit required from county agricultural commissioner for purchase or use.

¹ Rotate chemicals with a different mode-of-action group number, and do not use products with the same mode-of-action group number more than twice per season to help prevent the development of resistance. For example, the organophosphates have a group number of 1B; chemicals with a 1B group number should be alternated with chemicals that have a group number other than 1B. Mode-of-action group numbers (un = unknown or uncertain mode of action) are

assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their website at <http://irac-online.org/>.

Acceptable for use on organically grown produce. Check with your certifier if use is permissible.

Nematodes (12/15)

Scientific Names:

Southern root-knot nematode: *Meloidogyne incognita*

Root-knot nematodes: *Meloidogyne* spp.

DESCRIPTION OF THE PESTS

Nematodes are microscopic roundworms that live in diverse habitats. Plant parasitic nematodes live in soil and plant tissues and feed on plants by puncturing and removing cell contents with a spearlike mouthpart, called a stylet.

Nematode problems in pecan have not been reported in California. The following genera of plant parasitic nematodes have been detected in pecan orchard soils in other states: *Meloidogyne*, *Mesocriconema* (formerly *Criconemella*), *Trichodorus*, *Paratrichodorus*, *Helicotylenchus*, *Pratylenchus*, *Tylenchorhynchus*, *Hoplolaimus*, *Gracilacus*, *Longidorus*, and *Xiphinema*. Of these only *Meloidogyne incognita* is considered likely to be pathogenic.

In other states root-knot nematode causes galling on some rootstocks; galls vary in size from 0.0625 to 0.25 inch. Aboveground symptoms include chlorotic foliage, stunted trees with sparse foliage, and some trees may be barren. If you suspect nematodes are causing a problem in pecans, contact your farm advisor

Precautions for Using Pesticides

Pesticides are poisonous and must be used with caution. READ THE LABEL BEFORE OPENING A PESTICIDE CONTAINER. Follow all label precautions and directions, including requirements for protective equipment. Apply pesticides only on the crops or in the situations listed on the label. Apply pesticides at the rates specified on the label or at lower rates if suggested in this publication. In California, all agricultural uses of pesticides must be reported. Contact your county agricultural commissioner for further details. Laws, regulations, and information concerning pesticides change frequently. This publication reflects legal restrictions current on the date next to each pest's name.

Legal Responsibility

The user is legally responsible for any damage due to misuse of pesticides. Responsibility extends to effects caused by drift, runoff, or residues.

Transportation

Do not ship or carry pesticides together with food or feed in a way that allows contamination of the edible items. Never transport pesticides in a closed passenger vehicle or in a closed cab.

Storage

Keep pesticides in original containers until used. Store them in a locked cabinet, building, or fenced area where they are not accessible to children, unauthorized persons, pets, or livestock. DO NOT store pesticides with foods, feed, fertilizers, or other materials that may become contaminated by the pesticides.

Container Disposal

Dispose of empty containers carefully. Never reuse them. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways. Consult your county agricultural commissioner for correct procedures for handling and disposal of large quantities of empty containers.

Protection of Nonpest Animals and Plants

Many pesticides are toxic to useful or desirable animals, including honey bees, natural enemies, fish, domestic animals, and birds. Crops and other plants may also be damaged by misapplied pesticides. Take precautions to protect nonpest species from direct exposure to pesticides and from contamination due to drift, runoff, or residues. Certain rodenticides may pose a special hazard to animals that eat poisoned rodents.

Posting Treated Fields

For some materials, *restricted entry intervals* are established to protect field workers. Keep workers out of the field for the required time after application and, when required by regulations, post the treated areas with signs indicating the safe re-entry date. Check with your county agricultural commissioner for latest restricted entry interval.

Preharvest Intervals

Some materials or rates cannot be used in certain crops within a specified time before harvest. Follow pesticide label instructions and allow the required time between application and harvest.

Permit Requirements

Many pesticides require a permit from the county agricultural commissioner before possession or use. When such materials are recommended, they are marked with an asterisk (*) in the treatment tables or chemical sections of this publication.

Maximum residue levels

Before applying pesticides to crops destined for export, check maximum residue levels (MRLs) of importing country at <https://globalmrl.com>.

Processed Crops

Some processors will not accept a crop treated with certain chemicals. If your crop is going to a processor, be sure to check with the processor before applying a pesticide.

Crop Injury

Certain chemicals may cause injury to crops (phytotoxicity) under certain conditions. Always consult the label for limitations. Before applying any pesticide, take into account the stage of plant development, the soil type and condition, the temperature, moisture, and wind. Injury may also result from the use of incompatible materials.

Personal Safety

Follow label directions carefully. Avoid splashing, spilling, leaks, spray drift, and contamination of clothing. NEVER eat, smoke, drink, or chew while using pesticides. Provide for emergency medical care IN ADVANCE as required by regulation.

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