SUGGESTIONS FOR CONTROLLING ROSETTE, INSECTS AND DISEASES ON COMMERCIAL PECANS

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Health and vigor of pecan trees plus satisfactory nut quality and yield depend on a well-planned and executed pest control program. Losses from insects and diseases can be greatly reduced by using effective grove management practices and by following suggested control procedures.

Zinc Nutrition

Pecans require zinc for normal stem and leaf growth. Trees not receiving zinc cannot produce the plant growth hormone, indoleacetic acid, and short clustered stems with small leaves result. This disorder is known as zinc rosette. To correct zinc deficiency, spray zinc on the foliage. Several zinc applications early in the season are required for optimum stem elongation and leaf expansion.

When and How to Spray

Preventing disease and insect losses requires strict adherence to properly timed spray applications. Table 1 specifies when to apply sprays in relation to tree development or pest occurrence. Thorough coverage of trees with each application is essential. With conventional, high-volume hydraulic sprayers, ½ to 1 gallon of spray mixture per foot of tree height is a general rule for the volume of finished spray required.

Maintain sprayer pressure at 300 to 400 pounds per square inch. Low volume sprayers (mist blowers, air blast sprayers, speed sprayers, etc.) utilize forced air as the carrier to deliver a concentrated spray mix and require proportionately less water. Concentrated spraying saves water and time but not pesticides since the same amount of pesticide is needed for each tree to obtain control. *Dilutions in the accompanying table of pesticide suggestions are for conventional hydraulic sprayers and aerial application. Adjustments in water/pesticide ratios are necessary for other types of equipment. Carefully follow the sprayer manufacturer's directions for mixing spray materials and calibration.*

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Commercial pecan producers must be able to recognize zinc rosette and major insect and disease pest problems. Detailed information on pest recognition, potential damage and development of life history can be found in the Extension Service publications, B-1238, *Pecan Insects of Texas* or MP-1272, *Pecan Diseases* which are available from your county Extension agent.

Chemical Use Precautions

Select suggested materials for most effective, safe, economical control. All suggested materials are poisonous, but proper handling reduces the hazards associated with use. Comply with manufacturers' label directions for handling all toxic chemicals.

Residues. The Environmental Protection Agency (EPA) has established pesticidal residue tolerances on pecans. These regulations establish the amount of a specific chemical that can be present in or on pecans at harvest. Always consult the product label for specific restrictions, and be sure the pesticide used is registered for use on pecans and is used only in accordance with specific application instructions.

Caution. All pesticides are poisonous to something; some are poisonous to man, animals and nontarget crops, etc. They should be used with caution and stored out of reach of children, irresponsible persons, livestock and household pets. Properly dispose of leftover spray materials and containers.

Pesticide Drift. Avoid drift to adjoining agricultural lands and take precautions against pond and stream contamination.

Symptoms of Poisoning. Some symptoms of pesticide poisoning are headaches, nausea, cramps, blurred vision, weakness, muscular twitching and diarrhea. If any of these symptoms occurs during or following the handling of any pesticide, consult a physician immediately.

Pollination and Bee Poisoning. Many agricultural and horticultural crops depend upon insects for pollination. Honey bee colonies are rented for pollination of fruit trees, many vegetables, legume seeds and

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other crops. Bumble bees, alkali bees, alfalfa leafcutting bees and other wild bee species provide essential pollination in certain areas of Texas. Growers must take special precautions to protect these beneficial insects. The following suggestions are effective in reducing bee poisoning:

- Apply only "nonhazardous" pesticides to blooming crops where bees are foraging.
- Mow or shred orchard cover crop blooms before applying pesticide.
- Apply hazardous pesticides only when bees are not foraging. Use relatively nonhazardous pesticides whenever possible.
- Do not apply or allow pesticides to drift over wild bee nesting sites or honey bee colonies.
- Establish holding yards for honey bees at least 3 miles from orchard.
- Contact the beekeeper to remove bees from the area where bee losses are likely.
- Do not dump unused quantities of pesticides where they might become a bee-poisoning hazard.

Relative Bee Hazard of Pesticides Suggested for Commercial Pecans

Group 1 — Highly toxic at any time
azinphosmethyl (Guthion®)
carbaryl (Sevin®)
diazinon (Spectracide® or Diazinon®)
dimethoate (Cygon® or De-Fend®)
lindane
parathion

Group 2 — Hazardous if applied when bees are actively foraging. Apply in late evening, preferably when bees are not foraging.
endosulfan (Thiodan®)
fenvalerate (Pydrin®)
malathion
phosalone (Zolone®)

Group 3 — Relatively nontoxic. Make applications in the late evening or early morning when bees are not foraging.

Insecticides:
disulfoton (Di-Syston®) granules
oil sprays
sulfur

Fungicides:
benomyl (Benlate®)
dodine (Cyprex®)
thiophanate-methyl (Topsin - M®)
triphenyltin hydroxide (Du-Ter®, Super Tin 4L® and Triple Tin®)

Foliar nutrients:
zinc sulfate
NZN
NZS

Aerial Application of Fungicides and Insecticides. Aerial application of fungicides and/or insecticides either by fixed wing or rotary aircraft has not proven as effective as ground applications. It can be used during unfavorable weather conditions which prevent use of ground equipment. When weather conditions improve, respray the area with ground equipment if disease is severe. Aerial applications are generally not successful on pecans because of tree height, density of leaf canopy and requirements for maximum coverage to achieve satisfactory control.

Alternate Fungicides in the Spray Program

To avoid the possibility of developing races of fungi that cannot be controlled with a particular fungicide, rotate fungicides during the season. Because of the extensive use of Benlate® in the southeastern states for controlling pecan scab, fungicide-resistant strains have developed. To prevent this from occurring in Texas, rotate fungicides such as Du-Ter®, Super Tin 4L®, Triple Tin® or Cyprex® with Benlate® or Topsin-M®.

Suggestions made by the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station on the use of pesticides are based on:

- Effectiveness under Texas conditions
- Avoidance of residues in excess of allowable tolerances
- Avoidance of toxicity to desirable vegetation, animals and humans
- Avoidance of adverse side effects upon beneficial predators, parasites, honey bees, fish and other wildlife, plants, animals and humans.

Suggested pesticides must be registered and labeled for use by the EPA and the Texas Department of Agriculture (TDA). Pesticides listed in this publication reflect use and restriction information from company labels at the time of printing. County Extension agents and appropriate specialists are advised of changes as they occur. The USER always is responsible for the effects of pesticide residues on livestock and crops, as well as problems that can arise from drift or movement of the pesticide from the user's property to that of others.

Three of the insecticides listed in this publication — lindane, fenvalerate and azinphosmethyl — are classified as restricted-use pesticides by the EPA. Restricted-use pesticides can only be applied by or under the direct supervision of a certified applicator. Persons who need to become certified should contact their county Extension agent or the TDA regarding training and certification procedures.

Always read and carefully follow the instructions on the container label. For further information, contact your county Extension agent or the Extension agricultural chemist, Texas A&M University (409) 845-3849.

Table 1. Suggestions for controlling rosette, insects and diseases on commercial pecans.

Time of application	Insects and diseases	Pesticide and formulation[1]	Concentrate per 100 gal water unless otherwise stated	Number of days from last application to harvest	Remarks
dormant (winter)	scale and phylloxera (galls)	dormant oil 97% oil emulsion	4 gal	0	For phylloxera, spray tree trunk and branches thoroughly with dormant oil emulsion.
bud break	phylloxera (Where a history of phylloxera damage indicates a need for control, apply a labeled insecticide at bud break when growth is 1 to 2 in long.)	endosulfan (Thiodan®) 50% WP 33.7% EC	1 to 1 1/2 lb 2/3 to 1 qt	See remarks	*Endosulfan*—Do not graze livestock in treated groves. Do not apply after shuck split.
		or			
		lindane (Lindane E-1®) 12.5% EC	1 1/2 pt	See remarks	*Lindane*—(restricted-use pesticide)—Do not graze treated areas. Make only one application. Do not apply more than 450 gal of finished spray per acre.
		or			
		malathion 25% WP	3 lb	0	*Malathion*—No grazing restrictions. May be applied up to the day of harvest.
		or			
		phosalone (Zolone®) 34.4% EC	1 1/3 pt	See remarks	*Phosalone*—Do not graze livestock in treated groves. Do not apply after shuck split.
	pecan scab, vein spot and downy spot	benomyl (Benlate®) 50% WP	Ground: 1/2 to 1 lb/acre Aerial: 1 lb/acre	See remarks	*Benomyl*—Use the higher rates on trees more than 30 feet in height. Repeat application at 3- to 4-week intervals. Use close intervals during prolonged periods of high humidity. Benomyl is also registered for use against fungal leaf scorch. Do not apply after shucks begin to open.
		or			
		dodine (Cyprex®) 65% WP	Ground: 1/2 to 1 lb Aerial: 2 to 4 lb/20 gal water/acre	See remarks	*Dodine*—May cause foliage burn on Moore, Van Deman and Burkett varieties when used in combination with certain phosphate insecticides. Also registered for use against leaf blotch. Repeat at 2- to 3-week intervals. Do not apply after shucks begin to open. Do not graze treated areas.
		or			
		thiophanate-methyl (Topsin-M®) 70% WP	Ground: 8 to 16 oz/acre Aerial: 16 oz/acre	See remarks	*Thiophanate-methyl*—Use higher rate on trees more than 30 feet in height. Apply at 3- to 4-week intervals. Do not apply when shucks begin to open.
		or			
		triphenyltin hydroxide (Du-Ter® or Triple Tin®) 47% or 47.5% WP	Ground: 3.2 to 9.6 oz Aerial: 3/4 to 1 1/2 lb/ 20 gal water/acre	See remarks	*Triphenyltin hydroxide*—Use lower rate when disease pressure is not severe. Repeat application at 2- to 4-week intervals. During prolonged periods of high humidity use the shorter interval. Do not apply after shucks begin to open. Results from other states indicate that this group of materials is the most effective against downy spot. Also cleared for use on sooty mold and leaf blotch. Do not graze treated areas.
		or			
		triphenyltin hydroxiide (Du-Ter Flowable 30®) 19.7% F	Ground: 7 to 19 fl oz Aerial: 24 to 48 fl oz/20 gal water/acre	See remarks	
		or			
		triphenyltin hydroxiide (Super Tin 4L® or Triple Tin 4L®) 40% F	Ground: 3 to 9 fl oz Aerial: 11.4 to 22.8 fl oz/20 gal water/acre	See remarks	
	rosette	zinc sulfate 36% WP	2 to 3 lb	0	The bud break spray of zinc is extremely important in Texas. In far West Texas, increase zinc sulfate absorption by adding 3 pt of a 32% liquid nitrogen per 100 gal water when zinc sulfate is used. Do not use any zinc product at higher strength since foliage burn can result.
		or			
		NZN® 5.5% liquid	1 1/4 to 2 1/2 qt	0	
		or			
		NZS® 6.25% WP	2 to 3 lb	0	
Prepollination (when leaves are one-third grown and before pollen is shed)	sawfly larvae, May beetles, pecan catocala, fall webworm, walnut caterpillar	See remarks			An insecticide may be required some years to control spring foliage feeders. If present in damaging numbers, select an appropriate insecticide from those listed for the casebearer spray below. For pest identification refer to B-1238, *Pecan Insects of Texas.*
	Diseases (same as bud break)	Fungicides same as bud break			Same as bud break
	rosette	Zinc formulations same as bud break			Same as bud break
Casebearer (soon after pollination)	First generation pecan nut casebearer (Eggs are deposited on tips of nuts. Examine nutlet clusters for greenish white eggs. Spray trees thoroughly when egg hatch is occurring.)	azinphosmethyl (Guthion®) 50% WP 22.2% EC 22% EC (2S)	3/4 to 1 1/8 lb 1 1/2 to 2 1/4 pt 1 1/2 to 2 1/4 pt	See remarks	*Azinphosmethyl*—(restricted-use pesticide)—Do not apply after shuck split. Do not graze livestock in treated groves for 21 days following treatment.
		or			
		diazinon 50% WP 48% EC	2 to 6 lb/acre 1 to 4 qt/acre	See remarks	*Diazinon*—Do not apply after shuck split.
		or			
		endosulfan (Thiodan®) 50% WP	1 to 1 1/2 lb	See remarks	*Endosulfan*—Do not graze livestock in treated groves. Do not apply after shuck split.

Table 1. Suggestions for controlling rosette, insects and diseases on commercial pecans (continued).

Time of application	Insects and diseases	Pesticide and formulation[1]	Concentrate per 100 gal water unless otherwise stated	Number of days from last application to harvest	Remarks
Casebearer (soon after pollination)	First generation pecan nut casebearer	or			
		fenvalerate (Pydrin®) 30% EC	2 2/3 fl oz	See remarks	*Fenvalerate*—(restricted-use pesticide)—Do not graze livestock in treated orchards. Do not exceed four sprays per season.
		or			
		malathion 25% WP	3 lb	0	*Malathion*—No grazing restrictions. May be applied up to the day of harvest.
		or			
		phosalone (Zolone®) 34.4% EC	1 1/3 pt	See remarks	*Phosalone*—Do not apply after shuck split. Do not allow livestock to graze treated grove.
	Diseases (same as bud break)	Fungicides same as bud break			Same as bud break
	rosette	Zinc formulations same as bud break			Same as bud break
First cover spray: 14 days after casebearer spray	Foliage and nut diseases (scab, liver spot, powdery mildew and brown leaf spot)	Fungicides same as bud break			This application may be required in areas of moderate to high rainfall.
	rosette	Zinc formulations same as bud break			Same as bud break
Second cover spray: 14 days after first cover spray	Diseases (same as first cover spray)	Fungicides same as bud break			This application may be required in areas of moderate to high rainfall.
	rosette	Zinc formulations same as bud break			Same as bud break
Early to mid-July (approximately 42 days after the first generation pecan nut casebearer spray)	Second generation pecan nut casebearer	Insecticides same as for first generation pecan nut casebearer		See remarks under first generation pecan nut casebearer spray	Growers should survey nut clusters for eggs. Apply insecticide when eggs begin hatching. Inspect a minimum of 400 clusters and spray if 1% or more of the clusters have eggs on them.
	Diseases (same as second cover spray)	Fungicides same as bud break			Same as bud break
	rosette	Zinc formulations same as bud break			Same as bud break
When present in damaging numbers. Yellow aphids usually require treating when they exceed 15 per compound leaf in the arid west and eight per compound leaf in the humid east. Treat black aphids when they exceed three per compound leaf.	aphids	dimethoate (De-Fend or Cygon®) 30.5% EC 43.5% EC	1 pt/acre 2/3 pt/acre	21	*Dimethoate*—Do not graze livestock in treated groves. May be applied by air in minimum of 5 gal finished spray per acre.
		or			
		fenvalerate (Pydrin®) 30% EC	2 2/3 fl oz	See remarks	*Fenvalerate*—(restricted-use pesticide)—Do not graze livestock in treated orchards. Do not exceed four sprays per season.
		or			
		malathion 25% WP	3 lb	0	*Malathion*—No grazing restrictions. May be applied up to the day of harvest.
		or			
		phosalone (Zolone®) 34.4% EC	1 1/3 pt	See remarks	*Phosalone*—See remarks under first generation pecan nut casebearer spray.
Water stage (late July)	Foliage and nut diseases (same as first cover spray)	Fungicides same as bud break		See remarks	Time this application with the liquid endosperm stage of nut development. Do not apply any fungicide after shuck split.
Third cover spray: (early to mid-August)	Fall foliage and nut diseases (scab)	Fungicides same as bud break		See remarks	May be required during years of high rainfall or periods of excessive fog, dew or high humidity. Do not apply any fungicide after shuck split.
Shell hardening stage	Damaging populations of hickory shuckworm generally observed in mid-August. Begin applications at half-shell hardening. Sample shell hardening beginning in early August for a cross section of varieties. Spray when more than half the varieties have reached the half-shell hardening stage. Make a second application 10 to 14 days later.	azinphosmethyl (Guthion®) 50% WP 22.2% EC (2L) 22% EC (2S)	3/4 to 1 1/8 lb 1 1/2 to 2 1/4 pt 1 1/2 to 2 1/4 pt	21	*Azinphosmethyl*—(restricted-use pesticide)—See remarks under first generation pecan nut casebearer spray.
		or			
		fenvalerate (Pydrin®) 30% EC	2 2/3 fl oz	See remarks	*Fenvalerate*—See remarks under first generation pecan nut casebearer spray.
		or			
		phosalone (Zolone®) 34.4% EC	1 1/3 pt	See remarks	*Phosalone*—See remarks under first generation pecan nut casebearer spray.
Gel stage	Pecan weevil adults emerge in late summer usually after rains. Begin checking after the first week in August by spreading canvas beneath trees and jarring lower branches. When adult weevils are found, apply a spray. Repeat application as needed at 10- to 14-day intervals. Cone emergence cages can also be used to indicate time of adult emergence. See L-1808, *Sampling for Adult Pecan Weevils in Texas.*	carbaryl (Sevin®) 80% S (80S) 43.4% F (XLR) 43% F (SL)	2 to 3 lb 1 to 2 1/2 qt 1 to 2 1/2 qt	See remarks	*Carbaryl*—Do not apply after shuck split. Applications of carbaryl may cause flare-ups in aphid and mite populations. Survey orchards for aphids and mites 7 to 14 days following carbaryl applications.

[1]Pesticides listed alphabetically
WP—wettable powder EC—emulsifiable concentrate G—granular F—flowable S—sprayable
For additional information, see B-1238, *Pecan Insects of Texas* or MP-1272, *Pecan Diseases.*

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