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SUGGESTIONS FOR CONTROLLING INSECTS AND DISEASES ON COMMERCIAL PECANS

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HEALTH AND VIGOR of pecan trees and satisfactory nut quality and yield depend on a well-planned, well-executed insect and disease control program. Insect and disease losses can be reduced with sound grove management and sanitation practices and by following suggested spray schedules.

Zinc Nutrition

Pecans require zinc for normal stem growth. Trees not receiving zinc can not produce the plant growth hormone, indole acetic acid, and short clustered stems result. This disorder is known as "zinc rosette." Texas soils are predominantly alkaline and do not contain "available" zinc; therefore, zinc must be applied to the foliage. Frequent application of zinc is important early in the season in order to obtain optimum stem elongation and leaf expansion.

When and How to Spray

Prevention of losses to most diseases and some insects requires strict adherence to properly timed spray application schedules. The accompanying table specifies when applications should be made in relation to tree development or at specific times during the season. Thorough spray coverage of the trees with each application is essential for effective control.

With conventional high-volume hydraulic sprayers, 1/2 to 1 gallon of spray mixture per foot of tree height normally is required for proper coverage. Pressure should be maintained at 300 to 400 psi. Low volume sprayers (mist blowers, air blast sprayers, speed sprayers, etc.) utilize forced air as the carrier to deliver the spray mix, and proportionately less water is required to deliver the recommended amount of pesticide per tree. When using such air delivery sprayers, follow carefully the manufacturer's directions for mixing spray materials and for calibrating the sprayer. *Dilutions in the accompanying table of pesticide suggestions are for conventional hydraulic sprayers; adjustments in water ratios are necessary for other types of sprayers.*

Commercial producers need to be able to recognize the major insect and disease problems likely to occur in their grove. Detailed information on disease and insect recognition, development of life history, and potential damage is in MP-313, *Pecan Diseases and Insects*, a publication available from your county Extension agent.

Precautions on Chemical Use

Select suggested materials for most effective, safe, economical control. All materials suggested are poisonous, but proper handling reduces hazards associated with use. Comply with manufacturers' directions for handling pesticides or fungicides.

Residues. The Environmental Protection Agency has established certain pesticidal residue tolerances on pecans. These regulations require that certain chemicals should not be applied near harvest. Always consult the product label for specific restrictions.

Caution. Most pesticides and fungicides are poisonous. Use them with caution, and store them out of reach of children, irresponsible persons, livestock and household pets. Properly dispose of left-over spray material and containers. Observe explicitly all precautions on labels.

Pesticide Drift. Avoid drift to adjoining crops or other produce. Take precautions against pond and stream contamination to prevent fish mortality. Avoid pesticide drift on bee hives, wild bee nesting sites and plants in bloom.

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

Pollination and bee poisoning. Many agricultural and horticultural crops are dependent upon pollinating insects for production. Honey bee colonies are rented for pollination service in tree fruits, cucurbits, vegetables, legume seeds and 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

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precautions to protect these beneficial pollinating insects. The following suggestions are effective in reducing bee poisoning:

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

Relative Bee Hazard of Pesticides Suggested for Commercial Pecans

Highly toxic at any time

Carbaryl (Sevin®)
Dimethoate (Cygon®, De-Fend®)
Parathion
EPN
Azinphosmethyl (Guthion®)

Hazardous if applied in early morning or during the day. Apply in late evening after bees have quit foraging.

Malathion

Hazardous if applied during the day. Not hazardous in early morning or late evening when bees are not foraging.

Endosulfan (Thiodan®)
Phosalone (Zolone®)
Toxaphene

Nonhazardous at any time

Insecticides
Disulfoton (Di-Syston®) G
Oil Sprays
Sulfur
Fungicides
Benomyl (Benlate®)
Dodine (Cyprex®)
Hydroxytriphenyltin (Du-Ter®)
Metiran (Polyram®)
Zinc sulfate

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

- 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, and animals and humans.

Suggested pesticides must be registered and labeled for use by the U. S. Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide label clearances is subject to change, and may have changed since this publication was printed. 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 his livestock and crops, as well as problems that could arise from drift or movement of the pesticide from his property to that of others.

Always read and follow carefully the instructions on the container label.

For further information, contact your county Extension agent or: Project Leader in Pesticide Chemicals, Texas A&M University (713)845-1353.

SUGGESTIONS FOR CONTROLLING INSECTS AND DISEASES ON COMMERCIAL PECANS

Time of application	Insects and diseases	Spray material and amount per 100 gal. water unless otherwise stated (Where preferred, emulsifiable concentrate formulations can be used at the same rate of active ingredient.)	No. days from last application to harvest	Remarks
Dormant (winter)	Scale and phylloxera (galls)	Dormant oil - 3½ gal. of a 97% oil emulsion	0	For phylloxera, spray tree trunk thoroughly with dormant oil emulsion. If dormant oil is not applied, use 3 lb. of malathion wettable powder per 100 gal. water when leaves are one-third grown.
Prepollination: (When leaves are ½ grown and before pollen is shed)	Scab	Benomyl (Benlate®) 50% WP ½ -1 lb./A Hydroxytriphenyltin (Du-Ter®) 47% WP - ½ lb. or Dodine (Cyprex®) - 0.75 lb. or Metiram (Polyram®) 80% WP 2.0 lbs.		Cyprex may cause foliage burn on Moore and Burkett varieties when used with Guthion. Benlate used at the rate of ½ lb./A on small trees and 1 lb./A on trees greater than 30 ft. in height. Polyram has performed well in the West Cross Timbers area and west. Due to intense disease pressure, it may not perform as well in South Central, East Texas and Gulf Coast areas.

Time of application	Insects and diseases	Spray Material and Amount Per 100 Gal. Water Unless Otherwise Stated (Where preferred, emulsifiable concentrate formulations can be used at the same rate of active ingredient.)	No. days from last application to harvest	Remarks
	Rosette	Zinc Sulfate 78 % WP - 2 lbs.		Zinc sulfate - foliar application only. Zinc absorption can be increased by adding 3 pints of a 32 % ammonium nitrate: urea solution per 100 gal. of water. Do not use at higher strengths, since foliage burn results.
Soon after pollination as eggs appear on tips of nutlets	Pecan nut case-bearer	Azinphosmethyl (Guthion®) 25 % WP - 1 1/2 lb.	See Remarks	Eggs usually are deposited on tips of nuts. Examine nutlet clusters for greenish white eggs. Spray nutlet clusters thoroughly when eggs are present. Banding is valuable in timing applications and in indicating need for repeat applications. (See L-702) AZINPHOSMETHYL - do not apply after shuck split. Do not graze livestock in treated groves for 21 days after treatment. CARBARYL - do not apply after shuck split. ENDOSULFAN - do not graze livestock in treated groves. Do not apply after shuck split. MALATHION - no time or grazing restrictions. PHOSALONE - do not apply after shuck split. Do not allow livestock to graze treated groves. TOXAPHENE - do not allow livestock to graze in treated groves. Because of the likelihood of fish kill, this material should not be used near rivers, lakes or streams.
		or Carbaryl (Sevin®) 80 % WP 2 lbs.	See Remarks	
		or Endosulfan (Thiodan®) 50 % WP - 1 lb.	See Remarks	
		or Malathion 25 % WP - 3 lbs.	0	
		or Phosalone (Zolone®) 25 % WP 2 lbs.	See Remarks	
		or Toxaphene 40 % WP - 5 lbs.	0 See Remarks	
First cover spray: 14 days after case-bearer spray	Scab	Same as Prepollination		Same as Prepollination
	Rosette	Same as Prepollination		Same as Prepollination
	Scab	Same as Prepollination		This application may be required in areas of moderate to high rainfall and others when rain is frequent.
	Rosette	Same as Prepollination		Same as Prepollination
Second cover spray 14 days after 1st cover spray	Scab	Same as Prepollination		This application may be required in areas of moderate to high rain and when rain is frequent.
	Rosette	Same as Prepollination		Same as Prepollination
May or early June	Aphids	Disulfoton (Di-Syston®) - 13.5 lb. 15 % granules per acre	80	Season-long control where properly applied and where soil moisture is adequate for uptake. Irrigate immediately after application, where possible. Apply in 6-foot bands on two or four sides of trees. Locate bands in tree's main "drip area." Work into upper 2 to 3 inches of soil in clean tilled groves and beneath grass roots (6-8 inches) in sodded groves. One application per season.
		or Disulfoton (Di-Syston®) - 2 3/4 pt. 65.7 % EC per acre	80	
When present (Where disulfoton soil applications are not made)	Aphids Pecan spittlebug	Dimethoate (Cygon® or De-Fend®) 1 pt. of 30.5 % EC	21 See remarks	DIMETHOATE - do not graze livestock in treated groves. Apply only with ground equipment. PHOSALONE - see remarks above on pecan nut casebearer. Black pecan aphid sucks juices from leaves. Bright yellow spots appear around feeding punctures. Spots turn brown and cause leaves to drop prematurely. Black pecan aphids do not feed in crowded colonies. Honeydew - producing aphids cause leaves to curl and turn brown. Considerable honeydew and sooty mold growth occur when bright yellow aphids occur in numbers. Spittlebug control seldom is required in Texas.
		or Malathion - 3 lb. 25 % WP	0	
		or Phosalone (Zolone®) 25 % WP 2 lbs. (aphids only)	See remarks	

Time of application	Insects and diseases	Spray Material and Amount Per 100 Gal. Water Unless Otherwise Stated (Where preferred, emulsifiable concentrate formulations can be used at the same rate of active ingredient.)	No. days from last Application to harvest	Remarks
When present in damaging numbers	Mites	Sulfur - 2 lb. WP	0	Tiny pale green mites in webs are on the underside of leaves. Heavy infestations make leaves look scorched and cause leaf shedding. If mite control with sulfur is difficult, use CARBOPHENOTHION (Trithion®), AZINPHOSMETHYL (Guthion®), MALATHION, PARATHION OR DEMETON (Systox®). Repeated applications may be necessary for complete control
When present in damaging numbers	Fall webworm Walnut caterpillar	Endosulfan (Thiodan®) - 1 lb. 50% WP or Toxaphene - 5 lb. 40% WP or Malathion - 3 lb. 25% WP	See remarks 0 See remarks 0	Apply as foliar application to prevent excessive leaf loss. ENDOSULFAN - do not graze livestock in treated groves. Do not apply after shuck split. TOXAPHENE - do not graze livestock in treated groves. Do not contaminate fish-bearing waters. MALATHION - observations indicate that satisfactory control can be obtained with this material and that it is an acceptable alternate for use where livestock graze.
When present in damaging numbers	Sawfly larvae May beetles Pecan catocola	These insects normally do not occur in large numbers and control is seldom necessary. When damaging infestations occur, pesticides suggested for fall webworm and walnut caterpillar will provide adequate control.		
Last of July (approximate)	Fall foliage and nut disease (scab, downy spot, brown leaf spot)	Benomyl (Benlate®) 50% WP ½ to 1 lb./A or hydroxytriphenyltin (Du-Ter®) 47% WP - ½ lb/100 gal.		This should be timed with the occurrence of the liquid endosperm period. Do not apply any fungicides after shuck split.
Mid-August	Hickory shuckworm	Azinphosmethyl (Guthion®) 25% WP - 2 lbs. or EPN 25% WP - 2 lbs. or Phosalone (Zolone®) 25% WP	See remarks 21 See remarks	Damaging populations generally are observed around mid-August. Begin application about Sept. 1 or as soon as shells harden. Make 2 applications at 10 to 18 day intervals. AZINPHOSMETHYL - See remarks under casebearer above for grazing restrictions. EPN - Do not graze livestock in treated groves. PHOSALONE - See remarks for pecan nut casebearer.
	Pecan weevil	Carbaryl (Sevin®) 80% WP 2 to 3 lbs.	See remarks	Adults emerge in late summer usually after rains. Begin checking during the first week in August by spreading canvas beneath trees and jarring lower branches. When three or more weevils per tree are found, apply spray. Repeat application as needed at 10 to 14 day intervals. Pyramid emergence cages also can be used to indicate time of adult emergence. CARBARYL - Do not apply after shuck split.
2nd application (2 weeks after 1st application)	Fall foliage and nut disease (scab, downy spot)	Same as 1st application		
3rd application (2 weeks after 2nd application)	Fall foliage and nut diseases (scab, downy spot)	Same as 1st application		May be required during years of high rainfall or during periods of excessive fog, dew or high humidity.

WP - wettable powder

G - granulate

EC - emulsifiable concentrate

The mentioned products do not guarantee or warrant the standard of the product, and do not imply approval of the product to the exclusion of others which may be equally suitable.

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