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for  
Commercial  
Fruits  
and  
Nuts

# Texas Guide for Controlling Insects and Diseases

Texas A&M University Texas Agricultural Extension Service  
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# TEXAS GUIDE FOR CONTROLLING INSECTS AND DISEASES ON COMMERCIAL FRUITS AND NUTS

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HEALTH AND VIGOR of trees and quality of fruit depend on a well-planned, well-executed control program. Insect and disease losses can be reduced with a spray program and by diligently following orchard sanitation practices.

## When and How to Spray

Proper timing of spray applications is essential to prevent insects and diseases from causing extensive injury. Amount of spray depends upon tree size. Thorough coverage is necessary for satisfactory control.

Commercial producers should be able to recognize the major insect and disease problems likely to occur in their orchard or grove. Detailed information on disease and insect recognition, potential damage and development or life history is in the following publications:

MP-313, *Pecan Diseases and Insects*

MP-685, *Peach and Plum Insects*

MP-283, *Diseases of Peaches and Plums*

L-726, *Controlling Fire Blight of Pear*

Each of these publications is available from your county Extension agent.

## Spraying Equipment

Sprayers that maintain a pressure of 300 to 400 pounds per square inch are recommended for peach trees and others of similar size. For pecans and other tall trees, 400 to 700 pounds pressure per square inch is needed.

## Precautions on Insecticide Use

Select recommended materials for most effective, safe, economical control. All materials recommended are poisonous, but they present little or no hazard when used properly. Comply with manufacturers' directions for handling insecticides or fungicides.

**Residues.** The Environmental Protection Agency has established pesticidal residue tolerances on fruit crops. These regulations state that certain chemicals should not be applied too near harvest. See the spray schedule for the time interval that should elapse from last application to harvest.

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

**Pesticide drift.** Avoid drift to adjoining forage crops or other produce ready for harvest. 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 insecticide 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 precautions to protect these beneficial pollinating insects. The following suggestions are effective in reducing bee poisoning:

1. Apply insecticides which are nontoxic to bees on blooming crops.
2. Mow or shred down orchard cover crop blooms before applying insecticide.
3. Apply selected moderately hazardous or nonhazardous insecticides *only* when bees are not foraging. Use relatively nonhazardous insecticides whenever possible.
4. Do not apply insecticides over wild bee nesting sites or honey bee colonies. Avoid drifting insecticides over nesting sites or 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 INSECTICIDES USED ON COMMERCIAL FRUITS AND NUTS

**Highly Toxic at any time**

Carbaryl (Sevin)	EPN
Diazinon	Azinphosmethyl (Guthion)
Dieldrin	Imidan
Dimethoate (Cygon, De-fend)	Malathion ULV
	Parathion

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

Malathion EC or WP

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

Carbophenothion (Trithion)	Ethion
Demeton (Systox)	Meta-Systox-R
Disulfoton (Di-Syston) EC	Toxaphene
Endosulfan (Thiodan)	Phosalone (Zolone)

**Nonhazardous at any time**

Disulfoton (Di-Syston) G	Oil sprays
Kelthane	Sulfur
Lime-sulfur	Tetradifon (Tedion)

Recommendations 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, animals and humans.

Suggested pesticides must be registered and labeled for use by the 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:  
 Leader-Agricultural Chemicals, Texas A&M University  
 (713) 845-1353

**PEACHES AND PLUMS**  
Commercial Orchard Recommendations

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	
			Peaches	Plums		
Dormant	San Jose scale	Dormant oil — 4 gal of a 97% oil emulsion	0	0	Apply oil spray during dormant season. Best control obtained from oil applications prior to bud swelling. If leaf curl has been a problem, apply a fungicide. All fungicides are compatible with miscible oil for scale control.	
	White peach scale					
	Leaf curl	Bordeaux mixture — 4-6-100 or Fixed copper — 2 lb. 45% WP or Ferbam — 2 lb. 76% WP	0 0 21	0 0 7		
Pink bud (see remarks)	Peach twig borer	Azinphosmethyl (Guthion) — 1 lb. 25% WP or Diazinon — 1 lb. 50% WP or Imidan — 1¼ lb. 50% WP	21 20 14	15 10 See Remarks	Apply pink bud spray to orchards in West Cross Timbers, Hill Country and Seminole areas only. Peach twig borer is not a problem in East Texas. IMIDAN — do not use on plums after blooming. CAPTAN does not irritate the eyes as sulfur does. COVERAGE SHOULD BE SUFFICIENT TO THOROUGHLY WET THE FOLIAGE AND FRUIT.	
		Brown rot	Wettable sulfur — 6 lb. or Captan — 2 lb. 50% WP	0 1		0 1
Full bloom	Brown rot	Same as PINK BUD			Use if brown rot has been a problem.	
Petal fall (When 75% of the petals have fallen)	Catfacing insects (thrips, stink and lygus bugs) Peach twig borer Plum curculio	Same as PINK BUD			In orchards where scale and lesser peach tree borer are serious, use azinphosmethyl in the regular spray program in addition to the oil spray applied in the dormant season.	
	Brown rot	Same as PINK BUD				
Shuck split (10 days after petal fall)	Catfacing insects Peach twig borer Plum curculio Oriental fruit moth	Same as PINK BUD or Carbaryl (Sevin) — 2½ lb. 50% WP	1	1	The oriental fruit moth is a major pest primarily in East Texas. CARBARYL — do not use with fixed copper fungicides. May result in mite buildup where used repeatedly. IMIDAN — do not use on plums after petal fall. KOCIDE 101 — use only on susceptible varieties of peaches that are sold in Texas. Do not use on plums.	
		Scab	Wettable sulfur — 6 lb. or Captan — 2 lb. 50% WP or Maneb — 2 lb. 80% WP	0 1 2		0 1 0
			Bacterial spot	Kocide 101 — ¼ lb. 50% WP		0
First cover spray (10 to 14 days following shuck split spray)	Same insects as SHUCK SPLIT	Same as SHUCK SPLIT			IMIDAN — see restrictions above.	
	Scab	Same as SHUCK SPLIT				
	Bacterial spot	Same as SHUCK SPLIT				

PEACHES AND PLUMS (Continued)

TIME OF APPLICATION	INSECTS AND DISEASES	SPRAY MATERIAL 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
			Peaches	Plums	
Second cover spray (14 days after first cover spray)	Same insects as SHUCK SPLIT Scab Bacterial spot	Same as SHUCK SPLIT Same as SHUCK SPLIT Same as SHUCK SPLIT			IMIDAN — see restrictions above. Growers should adhere closely to the required waiting period between last application and harvest.
Third cover spray (21 to 25 days after second cover or 30 days before harvest on late varieties)	Same insects as SHUCK SPLIT Scab Brown rot	Same as SHUCK SPLIT Same as SHUCK SPLIT Same as SHUCK SPLIT			IMIDAN — see restrictions above. Growers should adhere closely to the required waiting period between last application and harvest.
Preharvest	Miscellaneous insects Brown rot	Carbaryl (Sevin) — 2½ lb. 50% WP Botran — 1-1½ lb. 75% WP	1 1	1 See Remarks	Controls a variety of insects. BOTRAN — use only on peaches.
After harvest (PLUMS ONLY)	Rust and circular shot hole	Sulfur — 6 lb. WP	0	0	
Between October 15 and November 1	Bacterial spot Leaf curl Coryneum blight Bacterial canker	Kocide 101 — 2 lb. 50% WP	0	0	

**PEACH TREE BORER:** Adults lay eggs in summer on the tree trunk. Eggs hatch in about 10 days. Borers enter and feed on cambium and inner bark at or below soil level. This insect is not known to occur in the Trans-Pecos area of Texas. Use any of the following treatments:

1. Dieldrin spray — Apply twice, once in early June and in mid-August. Use 3 lb. of 50% dieldrin wettable powder per 100 gallons of water. Apply material to runoff point on tree trunk. **USE EXTREME CARE TO PREVENT CONTAMINATION OF FRUIT.**
2. Endosulfan (Thiodan) spray — Apply twice, once in early June and repeat in mid-August. Use 1½ lb. of 50% Thiodan wettable powder per 100 gallons water. Apply material to runoff point on tree trunk. Do not apply Thiodan to tree trunks within 21 days of harvest.
3. Parathion spray — Apply twice, once in early June and repeat in mid-August. Use 1½ gallons of 25% parathion emulsifiable concentrate per 100 gallons water. Apply 1 to 2 pints to the tree trunk. Use extreme care in mixing and handling parathion.
4. Paradichlorobenzene crystals (PDB) — Treat trees between October 20 and November 15 when the soil is dry and soil temperature is 55° F. or above. Remove weeds, loosen and level soil about 1 foot from the tree trunk. Place PDB crystals in a narrow circular band preferably in a groove about 2 inches from the trunk. Place several shovels of clean soil over the crystals and mound the earth into a cone-shaped pile about 6 inches high around the base of the tree. Avoid pushing material against the trees, since crystals can cause injury. Compact the soil with the back of the shovel. Remove earth mounds in early spring. For 2- and 3-yr. old trees, use ½ oz. of crystals; 4-5 yr. old trees, ¾ oz.; mature trees, 1 oz.

**LESSER PEACH TREE BORER:** Damage occurs above ground in the tree trunk and limbs. Borers commonly occur where trees are injured by implements, low temperatures or other means. Keep trees healthy and as free as possible from wounds, cankers and winter injury. Control borers in wounds by painting affected areas with PDB in oil, prepared by dissolving 2 lb. of PDB in 1 gallon of miscible dormant oil and diluting with 2 gallons of water. Treat only affected areas and do not circle the entire trunk or limb. Apply on a warm, sunny day after trees have shed all foliage.

For additional information on peach and plum insects, see MP-685, Peach and Plum Insects.

For additional information on peach and plum diseases, see MP-283, Diseases of Peaches and Plums.

**GRAPES — COMMERCIAL VINEYARD**

TIME OF APPLICATION	INSECTS AND DISEASES	SPRAY MATERIAL 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
Delayed dormant: Before buds swell	Grape mealy bug Grape leafhopper Scale	Parathion — 2 lb. 25% WP plus Dormant oil — 3 gal. 97% oil emulsion or Dormant oil — 4 gal. 97% oil emulsion	See remarks  0	Use only as indicated by insect problem. PARATHION — do not use after grapes are larger than buckshot.
Post-bud: When new shoots are 1 to 2 in. long	Black rot and other diseases	8-8-100 Bordeaux mixture or Ferbam — 1 lb. 76% WP or Zineb — 2 lb. 75% WP or Captan — 2 lb. 50% WP or Folpet — 2 lb. 50% WP or Maneb + zinc ion — 2 lb. 80% WP or Fixed copper — 2 lb. 50% WP	0 7 7 0 0 66 0	Black rot disease, common in wet seasons, affects vine, leaves and fruit. It appears in the leaves as reddish-brown, dead spots and in half-grown fruit as pale spots which turn brown, enlarge and soon involve the entire grape. Later, infected grapes may fall or remain in the cluster. Prune all infected vines. Rake together and burn fallen, mummied fruit and leaves in which the fungus may overwinter. Do not use copper materials where Sevin is also applied.
When shoots are 6 to 10 in. long	Black rot and other diseases	Same fungicides as POST-BUD		For downy mildew, use Bordeaux mixture or zineb.
Pre-bloom: When new shoots are 15 to 18 in. long	Red-banded leafroller Thrips	Azinphosmethyl (Guthion) — 1 lb. 25% WP or Carbaryl (Sevin) — 2 lb. 50% WP	10 0	AZINPHOSMETHYL — do not apply over 3 times per season. CARBARYL — do not use with fixed copper. Repeated applications may result in mite buildup. Grape berry moth larvae feed on pulp and seed of fruit, causing berries to discolor with purplish spots and shrivel. Grape leafhoppers suck juices from the leaves. Foliage becomes yellow and brown-blotched. Insects usually feed on the underside of leaves. Plants are greatly weakened and yields reduced. Grape berry moth and grape leafhoppers overwinter in rubbish or fallen leaves. Destroy these materials.
	Black rot	Same fungicides as POST-BUD		
Petal-fall:	Grape berry moth Grape leafhopper Red-banded leafroller Grapeleaf skeletonizer Foliage-feeding insects Black rot	Same insecticides as PRE-BLOOM    Same fungicides as POST-BUD		

GRAPES — COMMERCIAL VINEYARD (Continued)

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
First Cover: 7 to 10 days after petal fall	Same insects as PETAL FALL Black rot and other diseases	Same insecticides as PRE-BLOOM Same fungicides as POST-BUD			
Second Cover: 10 to 14 days after 1st cover	Red-banded leafroller Grape berry moth Black rot and other diseases	Same insecticides as PRE-BLOOM Same fungicides as POST-BUD			
Third Cover: 10 to 14 days after 2nd cover	Grape berry moth	Same insecticides as PRE-BLOOM			Continue cover sprays if needed to prevent fruit damage or repeat every 12 days where rain washes off application.

COTTON ROOT ROT, CROWN GALL, PIERCE'S DISEASE, MUSHROOM ROOT ROT, NEMATODES AND CHLOROSIS: These diseases may be problems in some areas. Contact your county agent for information.

COMMERCIAL APPLES AND PEARS

Dormant:	Scale Blister mite Red mite Rose aphid	Dormant oil — 4 gal. of a 97% oil emulsion	0	0	Apply emulsion spray as buds begin to swell, showing silver tip. Apply when temperature is between 50-85° F. and no freeze expected for at least 8 hrs.
Delayed dormant: After buds begin to break and show green	Scab (When disease has been serious)	ManeB + zinc ion — 2 lb. 80% WP	15	15	Scab causes small, olive-green leaf spots that later turn black with an indefinite margin. Small, dark, scabby spots occur on fruit. May be a problem during years of above-average rainfall. POLYRAM not cleared for use on pears.
		Dodine — ¾ lb. 65% WP	7	7	
		Polyram — 2 lb. 80% WP	7	See Remarks	
		Captan — 2 lb. 50% WP	8	0	
Pink Bud: When first pink shows in center bud	Aphids	Carbophenothion (Triethion) — 1 lb. 75% WP	30	30	Aphids cause leaves on terminal growth of twigs to curl, become deformed and frequently die. Injury to buds may develop from heavy aphid infestation. Use insecticides for aphid and mite control only as dictated by damage or pest population.
		Demeton (Systox) — ½ pt. 25% EC	21	21	
		Diazinon — ¾ lb. 50% WP	14	14	
		Dimethoate (Cygon or De-fend) — ¾ pt. 25% EC	28	28	
	Mites	Malathion — 2 lb. 25% WP	3	1	
		Demeton (Systox) — ½ pt. 25% EC	21	21	
		Dicofol (Kelthane) — 1 lb. 35% WP	7	7	
		Tetradifon (Tedion) — 1 lb. 25% WP	0	0	

DEMETON — use no more than 3 applications per season.  
TETRADIFON — use no more than 3 applications on apples or 4 applications on pears after petal fall.

**COMMERCIAL APPLES AND PEARS (Continued)**

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
			Apple	Pears	
	Scab	Same as DELAYED DORMANT			
	Cedar apple rust	Zineb — 2 lb. 75% WP or Ferbam — 2 lb. 76% WP	0 7	7 7	
Bloom spray:	Fire blight	Bordeaux mixture — 1-3-100 or Streptomycin (Agrimycin, Agri-Strep and Phytomycin — 50 ppm) or Fixed copper — 2 lb. 56% WP	0 50 See Remarks	0 90 0	Spray when 20 to 30% of blossoms are open and every 3 to 4 days during bloom period. Two sprays 4 days apart starting when 10% of blooms are open. Use at concentrations as manufacturer directs. Do not apply after fruit is visible. See fire blight discussion below. Do not use insecticides during bloom. <b>FIXED COPPER</b> — do not use on apples.
When 20 to 25% of petals have fallen	Scab Cedar apple rust Fire blight	Same as DELAYED DORMANT Same as PINK BUD Same as BLOOM SPRAY			In this period young plant parts are at highest susceptibility to disease. Do not use insecticides during bloom.
Petal fall: When all petals have fallen	Codling moth Curculio Catfacing insects Fruit tree leafrollers	Azinphosmethyl (Guthion) — 1¼ lb. 25% WP or Imidan — 1 lb. 50% WP or Diazinon — 1 lb. 50% WP	15 14 30	15 14 30	Proper timing of sprays is important. Codling moth larvae do little feeding before entering fruit. <b>AZINPHOSMETHYL</b> — may cause yield reduction when used at PETAL FALL or FIRST COVER on young bearing trees.
	Scab Cedar apple rust Fire blight	Same as DELAYED DORMANT Same as PINK BUD Same as BLOOM SPRAY			
First cover spray: Two wk. after petal fall	Codling moth Plum curculio Catfacing insects Red-banded leafroller	Same as PETAL FALL			If <b>CARBARYL</b> (Sevin) is used for fruit thinning on apples, no other insecticide is needed at this time, unless plum curculio is a problem. <b>CAUTION:</b> Carbaryl may cause early mite buildup. Use miticides only as needed.
	Mites Summer disease and scab Powdery mildew	Same as PINK BUD Same as DELAYED DORMANT Wettable sulfur — 6 lb. or Dinocap (Karathane) — ¾ lb. 22.5% WP	0 21	0 21	If heavy infestation of leaf diseases and fruit blotch appear or if dropped fruits show codling moth infestations, <b>APPLY TWO OR MORE SPRAYS AT 2 WK. INTERVALS.</b> Use only if powdery mildew is a problem.
Second cover spray: 10 to 14 days after 1st cover spray	Codling moth Plum curculio Red-banded leafroller Catfacing insects Summer disease Powdery mildew	Same as PETAL FALL or <b>Carbaryl</b> (Sevin) — 1½ lb. 50% WP Same as DELAYED DORMANT Same as 1ST COVER SPRAY	1	1	<b>CARBARYL</b> — see remarks above under 1ST COVER SPRAY.



**COMMERCIAL APPLES AND PEARS (Continued)**

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
			Apple	Pears	
Third cover spray: 10 to 14 days after 2nd cover spray	Codling moth Apple maggot Leafrollers Foliage feeding insects	Same as 2ND COVER SPRAY			
Additional cover sprays: 10 to 14 days after preceding cover spray	Same insects as 3RD COVER SPRAY	Same as 2ND COVER SPRAY			Use additional cover sprays based on need as determined by pest population variety, maturity date and history of damage in your area.
When present	Mites Aphids	Same as PINK BUD Same as PINK BUD			Use miticide or aphicide in cover spray when needed to suppress damaging population buildup.

**FIRE BLIGHT:** Prune out twigs and limbs during winter. Make cuts several inches below visible cankers. Sterilize cutting instruments after each cut by dipping in 10% household bleach. Coat pruning wounds with Bordeaux paint. Heavy pruning and over-fertilization of trees cause excessive growth, which is susceptible to fire blight. See L-726, "Fire Blight of Pear".

**MUSHROOM ROOT ROT:** The roots of orchard trees, particularly apple and pear, commonly are attacked by the oak fungus *Clitocybe* sp. Diseased trees usually die soon after symptoms become visible in the above-ground tree parts. Careful separation of bark from the wood in crown and large roots reveals fan-shaped growth of white strands—a distinctive characteristic of oak fungus. Control is difficult because wind spreads fungus spores which are produced in great numbers by fruiting bodies (mushrooms). Avoid planting new orchards in recently cleared land.

**NEMATODES, CROWN GALL, HAIRY ROOT AND OTHER SOIL DISEASES:** When planting where old trees have been removed, fumigate an area 10 feet by 10 feet with 1 lb. of methyl bromide (Dowfume MC-2). Transplant disease-free trees.

**PECAN**

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
Prepollination: (When leaves are ¼ grown and before pollen is shed)	Scab	Dodine — ¼ lb. 65% WP or Maneb + Zinc ion — 2 lb. 80% WP or Du-Ter — 0.4 lb. 50% WP or Polyram — 2 lb. 80% WP	See remarks	Spray susceptible varieties thoroughly, using 1 gal. of spray for each foot in height of tree. Do not graze meat or dairy animals in groves treated with fungicides. Dodine is phytotoxic to the Moore and Van Deman varieties and certain native trees. Do not apply after shucks split.
	Rosette	Zinc sulfate — 2-3 lb. 78% WP		ZINC SULFATE — foliar application only, soil applications are not economical and are seldom effective. Use 3 lb. where rosette is serious.

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Soon after pollination as eggs appear on tips of nutlets	Pecan nut casebearer	Azinphosmethyl (Guthion) — 1½ lb. 25% WP	21	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. ENDOSULFAN — do not graze livestock in treated groves. Do not apply after shuck split. MALATHION — no time or grazing restrictions. TOXAPHENE — do not allow dairy animals or animals within 6 weeks of slaughter to graze in treated groves. Because of the likelihood of fish kill, this material should not be used near rivers, lakes or streams.	
		or Endosulfan (Thiodan) — 1 lb. 50% WP	0		
		or Malathion — 3 lb. 25% WP	0		
		or Toxaphene — 5 lb. 40% WP	0		
Scab Powdery mildew Vein spot Rosette		Same as PREPOLLINATION	See remarks		
		Same as PREPOLLINATION	See remarks		
First cover spray: 14 days after casebearer spray	Scab Powdery mildew Vein spot	Same as PREPOLLINATION	See remarks		SEE RESTRICTIONS IN PREPOLLINATION REMARKS COLUMN ABOVE. Cover sprays are required if area is still receiving rainfall.
		Same as PREPOLLINATION	See remarks		
Second cover spray: 14 days after 1st cover spray	Scab Powdery mildew Vein spot	Same as PREPOLLINATION	See remarks	SEE RESTRICTIONS IN PREPOLLINATION REMARKS COLUMN ABOVE.	
		Disulfoton (Di-Syston) — 13.5 lb. 15% granules per acre or Disulfoton (Di-Syston) — 2¾ pt. 65.7% EC per acre	80		80
May or early June	Aphid		Disulfoton (Di-Syston) — 13.5 lb. 15% granules per acre or Disulfoton (Di-Syston) — 2¾ pt. 65.7% EC 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 band 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.
		80			
When present (Where disulfoton soil applications are not made)	Aphid Pecan spittlebug	Dimethoate (Cygon or De-fend) — 1 pt. of 30.5% EC	21	DIMETHOATE — do not graze livestock in treated groves. Apply only with ground equipment. 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	See remarks		

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When present	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 (Tri-thion), AZINPHOSMETHYL (Guthion), MALATHION, PARATHION or DEMETON (Systox). Repeated applications may be necessary for complete control.
When present	Sawfly larvae May beetles Fall webworms Walnut caterpillars Pecan catocalas	Endosulfan (Thiodan) — 1 lb. 50% WP or Toxaphene — 5 lb. 40% WP	See remarks  0 See remarks	Apply as foliar application to prevent excessive leaf loss. See remarks under pecan nut casebearer pertaining to grazing treated groves and other restrictions.
Mid-August	Hickory shuckworm	Azinphosmethyl (Guthion) — 2 lb. 25% WP or EPN — 2 lb. 25% WP	21 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 treated groves within 21 days of application.
	Pecan weevil	Carbaryl (Sevin) — 2 to 3 lb. 80% WP	0 See remarks	CARBARYL — do not apply after shucks split.  Adults emerge in late summer usually after rains. Begin checking during the first week in August by spreading a 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.
September 1	Downy spot Leaf blotch Brown leaf spot	Du-Ter — 0.4 lb. 50% WP or Cyprex — ¾ lb. 65% WP	See remarks  See remarks	SEE RESTRICTIONS IN PREPOLLINATION REMARKS COLUMN ABOVE.

WP = wettable powder; EC = emulsifiable concentrate; and G = granular.

For additional information see MP-313, Pecan Diseases and Insects.

