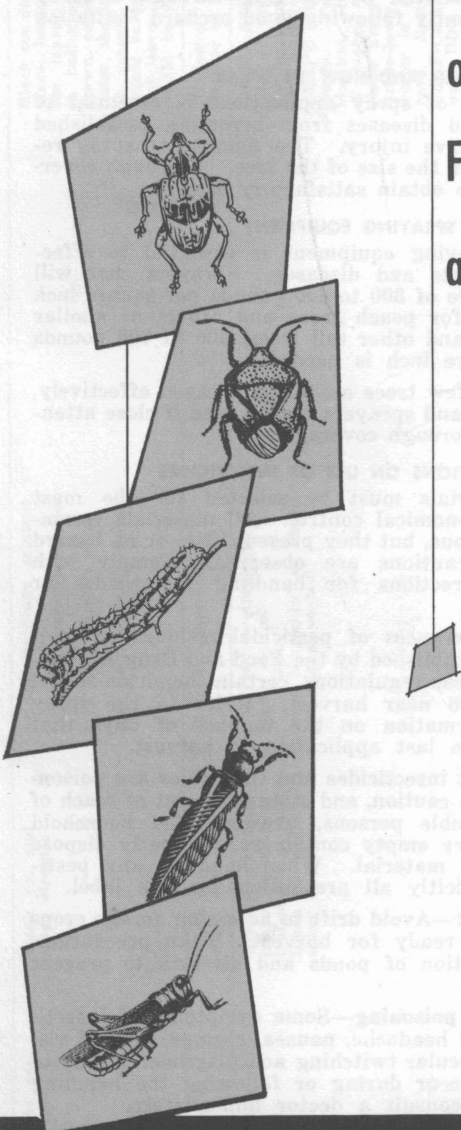


# Texas Guide for Controlling INSECTS and DISEASES

on  
Fruits  
and Nuts



# Texas Guide for Controlling Insects and Diseases on Fruits and Nuts

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**I**NSECT AND DISEASE CONTROL is important in the production of fruit and nuts. Health and vigor of trees and quality of fruit depend on a well-planned and well-executed control program. Losses due to insects and diseases can be reduced by carrying through a spray program and diligently following good orchard sanitation practices.

## WHEN AND HOW TO SPRAY

Proper timing of spray applications is essential to prevent insects and diseases from becoming established and causing extensive injury. The amount of spray required depends upon the size of the tree. Thorough coverage is necessary to obtain satisfactory control.

## SPRAYING EQUIPMENT

Adequate spraying equipment is essential to effectively control insects and diseases. Sprayers that will 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.

When only a few trees are to be sprayed effectively, smaller power or hand sprayers can be used if close attention is given to thorough coverage.

## PRECAUTIONS ON USE OF INSECTICIDES

Correct materials must be selected for the most effective, safe, economical control. All materials recommended are poisonous, but they present little or no hazard when proper precautions are observed. Comply with manufacturers' directions for handling insecticides or fungicides.

**Residues**—Tolerances of pesticidal residues on fruit crops have been established by the Food and Drug Administration. Due to these regulations, certain chemicals should not be applied too near harvest. Refer to the spray schedule for information on the number of days 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. When handling any pesticide, observe explicitly all precautions on the label.

**Pesticide Drift**—Avoid drift to adjoining forage crops or other produce ready for harvest. Take precautions against contamination of ponds and streams to prevent fish mortality.

**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.

## PREVENTIVE SPRAY PROGRAM FOR SMALL ORCHARDS

For a home owner with only a few peach or plum trees, here is a suggested simplified spray schedule. Apply methoxychlor or malathion. See the dilution chart for mixing small quantities of spray. Spray trees according to the following schedule:

1. Petal fall spray (when 75% of blossom petals have fallen)
2. Shuck split (10 days after petal fall)
3. First cover spray (10 to 14 days after shuck split)
4. Second cover spray (14 to 21 days after first cover)

If infestations of fruit-damaging insects occur following the completion of the above schedule, carbaryl (Sevin) can be used effectively up to within one day of harvest.

Listed below are the number of days that should elapse between last application and harvest:

Methoxychlor—	Peaches	21 days
	Plums	7 days
Malathion—	Peaches	7 days
	Plums	3 days
Carbaryl—	Peaches	1 day
	Plums	1 day

If bacterial spot is a problem, add fixed zinc, starting with the shuck split spray.

## FORMULATIONS

Insecticides may be purchased as emulsifiable concentrates or wettable powders. Either may be used to spray fruit trees. However, in commercial orchards, wettable powders usually are preferred.

In many instances, it is necessary to mix insecticides and fungicides for insect and disease control. Fungicides usually are sold as wettable powders and should be mixed only with insecticides which are also in the wettable powder form.

## DILUTION CHART FOR MIXING SMALL QUANTITIES OF SPRAYS

Fungicide or insecticide	Amount per 3 gal. of water
BHC	1 tbsp.
Bordeaux mixture:	
Copper sulfate	4 tbsp.
Hydrated lime	6 tbsp.
Captan—50% W.P.	4½ tbsp.
DDT 50% W.P.	3 tbsp.
Dichlone 50% W.P.	¾ tbsp.
Dieldrin 50% W.P.	1 tbsp.
Doline	1 tbsp.
Fixed copper 45% W.P.	3 tbsp.
Fixed zinc	6 tbsp.
Ferbam 76% W.P.	7½ tbsp.
Kelthane 18% W.P.	3 tbsp.
Malathion 25% W.P.	3 tbsp.
Maneb 75% W.P.	4 tbsp.
Methoxychlor 50% W.P.	3 tbsp.
Miscible oil 97%	¾ pt.
Carbaryl (Sevin) 50% W.P.	2 tbsp.
Toxaphene 40% W.P.	5 tbsp.
Wettable sulfur	9 tbsp.
Zinc sulfate 36%	3 tbsp.
Zineb 75% W.P.	4 tbsp.

tbsp. = tablespoon, pt. = pint, W.P. = wettable powder

# PEACHES AND PLUMS

(For commercial orchards only)

TIME OF APPLICATION	INSECTS AND DISEASES	SPRAY MATERIAL AND AMOUNT PER 100 GAL. WATER UNLESS OTHERWISE STATED	NO. DAYS FROM LAST APPLICATION TO HARVEST	REMARKS
Dormant	San Jose scale Peach leaf curl	4 gal. 97% miscible oil 4-6-100 Bordeaux mixture or 45% fixed copper plus adhesive — use as manufacturer directs.	0	Apply oil spray during dormant season in Dec. or Jan. If peach leaf curl has been a problem, apply this spray with a miscible oil.
Pink Bud (see remarks)	Peach twig borer Brown rot	3 lb. 50% wettable DDT 6 lb. microfine wettable surfur or ¾ lb. 50% dichlone (Phygon XL)	30	Apply pink bud spray to orchards in West Cross Timbers and Hill Country areas only. Peach twig borer is not a problem in East Texas. Apply in areas where brown rot was serious the previous season.
BLOOM (optional)	Brown rot	½ lb. 50% dichlone (Phygon XL) plus 3 lb. microfine wettable sulfur		Spray at 3 to 4-day intervals during bloom where brown rot was extremely serious in previous season.
Petal Fall (When 75% of the petals have fallen)	Catfacing insects (stink and lygus bugs) Peach twig borer Brown rot	½ lb. 50% wettable dieldrin plus 3 lb. 50% wettable DDT or 1¼ lb. 25% wettable parathion or 1 lb. 25% wettable Guthion 6 lb. microfine wettable surfur or ¾ lb. 50% dichlone (Phygon XL)	30 (Dieldrin) 14 (Parathion) 30 (DDT) 21 (Guthion) Peaches 15 (Guthion) Plums	In orchards where scale and lesser peach tree borer are serious, use parathion or Guthion in the regular spray program in addition to the oil spray applied in the dormant season for scale control. DDT is added to dieldrin to control peach twig borer. Do not apply dichlone later than petal fall.
Shuck Split (10 days after petal fall)	Catfacing insects. Peach twig borer, Plum curculio, Oriental fruit moth Scab Bacterial spot (optional)	Same insecticides as in PETAL FALL 6 lb. microfine wettable sulfur 4 lb. fixed zinc (NuZ)	Same as in PETAL FALL	DDT is added to dieldrin to control the peach twig borer and oriental fruit moth. The oriental fruit moth is a pest in the East Texas area only. Where bacterial spot was a problem on susceptible varieties, apply a minimum of 3 applications at 2-week intervals.
First Cover Spray (10 to 14 days following shuck split spray)	Same insects as SHUCK SPLIT Scab	Same insecticides as in PETAL FALL 6-8 lb. microfine wettable sulfur	Same as in PETAL FALL. In no case should dieldrin be applied to plums after first cover spray (3 weeks after petal fall)	If rainy weather persists, make extra applications of fungicide as often as necessary to maintain coverage of the fruit and dosage of sulfur should be increased from 6 to 8 lb. Protection from scab is important during the first 30 days following the shuck split spray.
Second Cover Spray (14 days after first cover spray)	Same insects as in SHUCK SPLIT Brown rot and Scab	1¼ lb. 25% wettable parathion or 2½ lb. 50% wettable carbaryl (Sevin) or 1 lb. 25% wettable Guthion 6 lb. microfine wettable sulfur	14 (Parathion) 1 (Carbaryl) 21 (Guthion) peaches 15 (Guthion) plums	Dieldrin plus DDT may be used on late-maturing varieties of peaches. Do not apply dieldrin on peaches within 30 days of harvest or DDT within 30 days. Make at least two applications — one about 30 days, the other 14 days before harvest. It also may be necessary to apply before or during harvest.
Third Cover Spray (21 to 25 days after second cover or 30 days before harvest on late varieties)	Same insects as in SHUCK SPLIT plus brown rot.	Same as SECOND COVER	Same as SECOND COVER	Same as SECOND COVER.
Preharvest	Miscellaneous insects Brown rot	2½ lb. 50% wettable carbaryl (Sevin) 5 lb. microfine wettable sulfur or 2 lb. 50% captan	Peaches and plums (1)	Will control a wide variety of insects. Use if rain occurs during the last 2 weeks before harvest.
After harvest (plums only)	Rust and circular shot hole (Septoria)	2 lb. 75% zineb		Make 2 applications, one at 4 weeks after harvest and the other 8 weeks after harvest.

This is an eradication procedure which has been

(Septoria)

No more than 2 weeks  
after first killing frost  
(for susceptible  
varieties only)

Bacterial spot  
leaf curl and  
Coryneum blight

4 lb. copper sulfate (bluestone)  
followed by 4 lb. hydrated lime

This is an eradicated procedure which has been effective in several states. It has certain limitations, including incompatibility between lime and other chemicals applied during early season. Damage can occur if lime does not follow the copper sulfate in the prescribed length of time. Apply separate applications of copper sulfate and hydrated lime the same day. Allow at least 1-hour interval between copper sulfate and lime sprays. Always apply the lime following the copper sulfate to avoid serious damage to trees.

**PEACH TREE BORER:** Adults lay eggs in the summer on the tree trunk. Eggs hatch in about 10 days. Borers enter the bark and feed on the cambium and inner bark at or below soil level. Any of the following treatments may be used:

1. Dieldrin spray — Make two applications, one in early June and the second in mid-August. Use 3 lb. of 50% dieldrin wettable powder per 100 gal. water. Apply material to runoff point on tree trunks. TAKE EXTREME CARE TO PREVENT CONTAMINATION OF THE FRUIT.

2. Thiodan spray — Make two applications, one in early June and the second in mid-August. Use 1½ lb. of 50% Thiodan wettable powder per 100 gal. water. Apply material to runoff point on tree trunk. Do not apply Thiodan to the trunks of trees within 21 days of harvest.

3. Parathion spray — Make two applications, one in early June and the second in mid-August. Use 1½ gallons of 25% parathion emulsifiable concentrate per 100 gal. water. Apply 1 pt. to 1 qt. to the tree trunk. Use caution in mixing and handling parathion.

4. Paradichlorobenzene crystals (PDB) — Treat between October 20 and November 15 when the soil is dry and soil temperature is 55° F. or above. Remove weeds and loosen and level soil about 1 ft. from the tree trunk. Place PDB crystals in a narrow circular band, preferably in a groove about 2 in. from the trunk. Place several shovels of clean soil over the crystals and mound the earth into a cone-shaped pile about 6 in. high around the base of the tree. In placing the first few shovels of soil, avoid pushing any of the material against the tree, since crystals in contact with the tree cause injury. Compact the soil with the back of the shovel. Remove earth mounds in early spring. For 2 and 3-year-old trees, use ½ oz. of crystals; 4 to 5-year-old trees ¾ oz.; mature trees; 1 oz.

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

For additional information on peach and plum insects and diseases, see MP-283, "Peach and Plum Diseases" and MP-685, "Peach and Plum Insects."

## GRAPES

WHEN TO SPRAY	INSECTS AND DISEASES	SPRAY MATERIAL AND AMOUNT PER 100 GAL. WATER UNLESS OTHERWISE STATED	NO. DAYS FROM LAST APPLICATION TO HARVEST	REMARKS
When new shoots are 1 to 2 inches long	Black rot and other diseases	8-8-100 Bordeaux mixture		Black rot disease, common in wet seasons, affects vines, leaves and fruit. The disease 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, the infected grapes may fall to the ground or remain in the cluster. All infected vines should be pruned, and the fallen mummified fruit and leaves, in which the fungus may overwinter, should be raked together and burned.
		2 lb. 76% wettable ferbam	7	
		2 lb. 75% wettable zineb	7	
		2 lb. 50% wettable captan		
When shoots are 6 to 10 inches long	Black rot and other diseases	Same as above		If downy mildew is a problem use Bordeaux mixture or zineb.
Just before blooms open	Grape-berry moth, grape leafhopper, leaf-chewing insects Black rot and other diseases	2 lb. 50% wettable DDT for insect control plus same fungicides as above for disease control	40	GRAPE-BERRY MOTH larvae feed on pulp and seed of the fruit, passing from one grape to another and causing berries to become discolored 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 are reduced. Grape-berry moth and grape leafhoppers overwinter in rubbish or fallen leaves in the vineyard. Destroy these materials. LEAF-CHEWING INSECTS can be controlled with DDT as recommended for the grape-berry moth and leafhopper.
Just after fruits set	Same as above	Same as above	Same as above	Same as above.
About 2 weeks after fruits set	Black rot and other diseases	Use same fungicides as above		During frequent rains, repeat sprays at about 12-day intervals until 1 month before harvest.

**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.

## APPLES AND PEARS

WHEN TO SPRAY	INSECTS AND DISEASES	SPRAY MATERIAL AND AMOUNT PER 100 GAL. WATER UNLESS OTHERWISE STATED	NO. DAYS FROM LAST APPLICATION TO HARVEST	REMARKS
WINTER	Scale	4 gal. of a 97% oil emulsion		Apply emulsion spray while trees are fully dormant.
Delayed dormant (after buds begin to break and show green)	Scab (When disease has been serious)	2 lb. 76% wettable ferbam 5 gal. liquid lime-sulfur	7	Scab causes small, olive-green, leaf spots that later turn black with an indefinite margin. Small, dark, scabby, spots occur on fruit. More apt to be a problem during years of above-average rainfall.
WHEN FIRST PINK SHOWS IN CENTER BUDS	Aphids	1¼ lb. 25% wettable parathion or 2 lb. 25% wettable malathion for insect control plus ½ lb. 65% wettable dodine (Cyprex) and 1 lb. 50% wetable Captan	14  3 (apples) 1 (pears) 7	Aphids cause leaves on the terminal growth of the twigs to curl, become deformed and possibly die. Injury to the buds may develop also from heavy aphid infestation.  See discussion below for cedar-apple rust control.
	Scab, leaf spots	2 lb. 50% wettable Captan		
Bloom spray	Fire blight (on susceptible varieties)	1-3-100 Bordeaux mixture or Streptomycin (Agrimycin, Agri-Strep and Phytomycin)		2 sprays 4 days apart starting when 10% of blooms are open. Use at concentrations as manufacturer directs. Spray when 20-30% of bloom is open and every 3 to 4 days during blossom period. Do not apply after fruit is visible. See fire blight discussion below.
When 20-25% of the PETALS HAVE FALLEN	Scab, leaf spots (When diseases have been serious)	½ lb. 65% wettable dodine (Cyprex) plus 1 lb. 50% wetable Captan or 2 lb. 50% wettable Captan	7	This is the period in which young plant parts are at their highest susceptibility to diseases.
WHEN 90% OF THE PETALS HAVE FALLEN	Codling moth, Curculio	1¼ lb. 25% wettable parathion or 2 lb. 25% wettable malathion plus 2 lb. 50% wettable DDT	14  30	Proper timing of sprays is important. Codling moth worms do little feeding before entering the fruit.
	Scab, leaf spots	Same fungicides as when 20% to 25% of petals have fallen		
TWO WEEKS AFTER 90% OF THE PETALS HAVE FALLEN	Same as above plus fruit blotch	Same as above		If heavy infestation of leaf diseases and fruit blotch appear or if dropped fruits show codling moth infestations, apply two or more sprays at 2-week intervals.
When present	Mite	1½ lb. 18½% wettable Kelthane or 1 lb. 25% wettable parathion		

**FIRE BLIGHT:** Prune out twigs and limbs during winter. Make all cuts several inches below visible cankers. Sterilize cutting instruments after each cut by dipping in formaldehyde (1 part in 25 parts water). Coat pruning wounds with Bordeaux paint. Heavy pruning and overfertilization of trees cause excessive growth which is susceptible to fire blight. See USDA Leaflet No. 187, Blight of Pears, Apples and Quinces.

**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 parts of the trees. Careful separation of the 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 the fungus spores, produced in great numbers by the fruiting bodies (mushrooms), are spread over large areas by wind. Avoid planting new orchards in recently cleared land.

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

**CEDAR-APPLE RUST:** Where cedar trees grow near apples or pears, rust may be a problem. Spray with 2 pounds of 76% wettable ferbam or 2 pounds 75% zineb in 100 gal. of water when first pink shows in center buds, when 20-25% of the petals have fallen and when 90% of the petals have fallen. To avoid undesirable residues do not use ferbam near harvest.

# PECANS

TIME OF APPLICATION	INSECTS AND DISEASES	SPRAY MATERIAL AND AMOUNT PER 100 GAL. WATER UNLESS OTHERWISE STATED	NO. DAYS FROM LAST APPLICATION TO HARVEST	REMARKS
Dormant (winter)	Scale and phylloxera (galls)	3½ gal. 97% oil emulsion		If dormant oil is not applied, use 2 pt. of nicotine sulfate plus 6 lb. of soap; 3 lb. of 25% malathion wettable powder; or 2½ lb. of 12% gamma isomer BHC wettable powder per 100 gal. water when the leaves are one-third grown.
Prepollination (when leaves are ½ grown and before pollen is shed)	Scab, downy spot and vein spot	2 lb. 75% wettable zineb or ½ to 1 lb. Dodine	45	Susceptible varieties should be sprayed thoroughly, using 1 gal. of spray for each foot in height of the tree. Do not graze meat or dairy animals in treated groves. Dodine is phytotoxic to the Moore variety and certain native trees.
Soon after pollination or about the time the tips of tiny nuts turn brown. Eggs usually are deposited on tips of nuts. Examine tips of nuts for greenish-white eggs. Spray thoroughly when eggs are present.	Pecan nut casebearer	Endosulfan (Thiodan)—1 lb. 50% wettable powder	See remarks	Do not graze livestock in treated groves. Do not apply after shuck split. Addition of 6 lb. wettable sulfur to DDT usually prevents mite infestation for remainder of season. Do not apply after shuck split. Do not graze livestock in treated groves. Do not apply within 15 days of harvest or after shucks open. Do not allow animals to graze in treated groves until 15 days after application. Do not allow animals to graze in treated groves until 5 days after application.
		DDT — 3 lb. 50% wettable powder	See remarks	
		Parathion — 2 lb. 15% wettable powder	See remarks	
		Malathion — 3 lb. 25% wettable powder	See remarks	
		Toxaphene — 5 lb. 40% wettable powder	See remarks	
For control of rosette see MP-313, "Pecan Diseases and Insects and Their Control"	Scab, down spot, vein spot, leaf blotch, brown leaf spot	Nicotine sulfate — 1 pt. 40% plus 2 qt. summer oil	See remarks	Do not allow dairy animals or animals being finished for slaughter to graze in treated groves. Remove all livestock for 3 days. Remove cattle from groves during spraying operations. No other limitations. Do not apply after husk-split.
		Carbaryl (Sevin) — 2 lb. 80% wettable powder	See remarks	
		Guthion — 1½ lb. 25% wettable powder	See remarks	
		Add 2 lb. 75% wettable zineb or ½ to 2 lb. Dodine for scab and other foliage diseases	45	Do not apply after husks split. Do not graze livestock in treated groves within 21 days after treatment. During years of above-average rainfall 3 to 4 additional spray applications will be needed at 3 to 4-week intervals for scab control. Do not graze meat or dairy animals in groves treated with Dodine.
When present	Aphid	1 lb. 12% gamma BHC or its equivalent	Do not apply after shucks begin to open.	BLACK PECAN AND HONEYDEW — PRODUCING APHIDS suck juices from the leaves. Bright yellow spots appear around feeding punctures. These spots turn brown and cause leaves to drop prematurely. Black pecan aphid does not feed in crowded colonies. HONEYDEW — PRODUCING APHIDS usually feed in crowded colonies, causing leaves to curl and turn brown. In regard to grazing cattle in treated orchards, refer to "remarks" under casebearer.
		1 pt. 40% nicotine sulfate plus 3 lb. soap	0	
		2 lb. 15% wettable parathion	15	
		3 lb. 25% wettable malathion	0	
When present	Mite	2 lb. wettable sulfur (see remarks)		Tiny pale green mites in webs may be found on the underside of the leaves. Heavy infestations produce a scorched appearance of the leaves and cause leaf shedding. If mite control with sulfur is difficult, use carbophenothion (Trithion), Guthion, malathion, parathion or demeton (Systox). Repeated applications may be necessary for complete control.
Late summer	Pecan weevil	6 lb. 50% wettable DDT	Do not apply after shucks begin to open.	Adults emerge in late summer, usually after rains. Where the weevil is a pest, begin checking during the first week in August by spreading a canvas beneath trees and jarring the lower branches. When three or more weevils are found per tree, apply spray. Refer to casebearer remarks regarding cattle grazing in treated orchards.
		2-3 lb. 80% carbaryl (Sevin) wettable powder	Do not apply after husk split.	

For additional information obtain a copy of MP-313, Pecan Diseases and Insects and Their Control.



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