PECAN NUT CASEBEARER

Damage: Found in all pecan-growing areas of Texas, the pecan nut casebearer can cause serious crop loss almost every year if left uncontrolled. Casebearer larvae or caterpillars feed inside pecan nuts. First-generation larvae feed inside small nutlets from April to June. This generation is most damaging, as a single larva often destroys all the nutlets in a cluster. Larvae of later generations require just one or two nuts to complete their feeding, as pecans are larger at that time.

Biology: The adult casebearer is a gray moth about 1/3 inch long with a ridge of dark scales running across the forewings. The moths are active only at night when they mate and lay eggs on pecan nuts. Most eggs are found on the nutlet tips. Each female lays 50 to 150 eggs during her 5- to 8-day life. The greenish-white to white eggs change to pink or red before hatch.

Casebearer eggs hatch in 4 to 5 days; young larvae crawl to nearby buds below the nuts to begin feeding. The white empty egg shell remains on the nut. After feeding for a day or two on a bud below the nut cluster, the tiny larvae enter the pecan nut, often tunneling in at the base. Silk and black frass (excrement) are often visible on the outsides of infested nuts. Larvae feed inside pecan nuts for 3 to 4 weeks, depending on the temperature. They are olive gray and reach a length of about inch. Full-grown larvae pupate in the pecan nut; adult moths emerge about 9 to 14 days later.

The pecan nut casebearer completes several generations each year. Adults of the overwintering generation emerge in April and May and lay eggs on pecan nutlets soon after pollination. First-generation larvae mature to moths, which lay second-generation eggs in grooves on the tips or bases of nuts, or on buds. Second-generation larvae attack the nuts in midsummer about 42 days after nut entry by first-generation larvae.

Third-generation eggs are deposited on nuts from late July to early September. These larvae feed only in the shucks if the pecan shells have hardened to prevent penetration into the kernel. Many third- and later-generation larvae do not feed, but crawl to the base of a dormant bud and build tough, silken cocoons where they spend the winter.

Table 1. Suggested insecticides to control phylloxera.

Insecticide	Concentrate per		Remarks	
		100 gals.		acre
Dormant oil	4 gallons		Use in dormant season only.	
Chlorpyrifos:			Do not graze livestock in	

Lorsban®® 4E*		2-4 pts.	treated orchards.
Lorsban®® 50W	1 lb.		
Endosulfan			Do not graze livestock in treated orchards.
Thiodan®® 3 EC	0.66 - 1 qt.		
Thiodan®® 50 WP	1 - 1.5 lb.		
Lindane:			Do not graze livestock in treated orchards.
Lindane®® E-1 12.5%	1.5 pts.		Make only one application per season.
12.5% EC	1.5 pts.		
Malathion:			Grazing permitted.
Malathion®® 57% EC	1-2 pts.		
*Lorsban®® 4E. Make 2 applications at 7- to 10- day intervals using a minimum of 1 pt. per acre starting at bud swell.			

In spring, these immature larvae leave the cocoon, called a hibernaculum. They feed on buds and tunnel in developing shoots until they are full-grown. Larvae then pupate in shoot tunnels or in bark crevices. Casebearer moths soon emerge to lay first-generation eggs on nutlets.

Control: Time insecticide applications accurately to control newly hatched casebearer larvae before they enter the nuts. Once inside nuts, larvae are protected from insecticides.

To determine whether treatment is needed and when to apply insecticide, examine nuts carefully in spring for case-bearer eggs. Apply insecticides within 2 to 3 days after the first eggs hatch. At this time, the first larvae begin entering nuts. Infested clusters can be flagged to monitor egg hatch.

Delaying treatment until the first nut entry occurs maximizes the insecticide's residual activity. However, consider the time required to treat the orchard and possible weather delays so that insecticide is applied before significant nut entry occurs.

Often a single carefully timed insecticide application provides adequate control for first-generation casebearers. A second insecticide application may be required if unhatched eggs are found 7 to 10 days after the first application.

Peak egg lay often occurs during a 2-week period in late April to early May in the southern and coastal areas, or late May and early June in north Texas. Spring temperatures influence casebearer development; cool, rainy weather can delay moth activity and egg laying. Thus, the egg-laying period can vary as much as 2 weeks from year to year, depending on spring weather.

There are several ways to determine when to look for first-generation casebearer eggs. One approach is to predict egg-laying activity and nut entry based on spring temperatures and accumulated heat units. To calculate the number of heat units accumulated per day, add each day's high and low temperatures (F degrees) and subtract 38. Begin accumulating heat units 10 days before 50 percent budbreak occurs.

The first significant nut entry is expected to occur once 1,831 heat units have accumulated. Begin scouting for eggs at least a week before this anticipated date, as local weather conditions near the spray date can influence egg laying. Scout the orchard for eggs and nut entry to determine if infestations justify treatment and to confirm the predicted spray date. Monitoring moth flights with pheromone traps, as described below, is also effective in determining when to begin scouting the orchard for eggs and nut entry.

Inspect nuts to determine if casebearer infestations are large enough to justify treatment. A sampling plan has been developed to determine if infestations warrant an insecticide application. The plan is based on the assumption that treatment is justified when infestations are large enough to destroy 5 percent or more of the nuts expected to be harvested. The sampling plan, based on research in Texas, is as follows:

Begin searching for eggs 7 to 10 days before the predicted date of first nut entry or 7 to 10 days after the first moths are captured in pheromone traps. Tag egg-infested clusters to monitor egg hatch.

About 2 to 3 days before the date of first significant nut entry (or when 1,730 to 1,760 heat units have accumulated), examine 10 nut clusters per tree. A cluster is considered infested if it has a casebearer egg or nut entry. If, on this date, two or more infested clusters are found before 310 nut clusters are sampled, the casebearer population is large enough to damage more than 5 percent of the nuts expected to be harvested. Apply an insecticide within the next few days.

If you find fewer than two infested clusters, sample again 2 to 3 days later (when heat units total 1,831). If you find two or more infested clusters before 310 clusters are examined, apply an insecticide treatment without delay.

If no treatment is indicated, sample again 2 days later. A third sample is especially important if cold, rainy nights have occurred, which can delay egg-laying. If you find fewer than three infested clusters, no treatment is warranted. Infestations of three or more infested clusters at this time indicate some damage may occur. Consider the effect of rainy weather on egg laying and crop load in making treatment decisions at this time.

Table 2. Suggested insecticides to control pecan nut casebearer.

	Concentrate per		
Insecticides	**100 gals.**	**acre**	**Remarks**
B.t:			
Dipel®® ES, ES-NT		1-4 pts	Livestock grazing permitted.
Javelin®® WG		0.75-1.25 lb.	
Carbaryl:			
Sevin®® 80S	1.25 to 3 lbs.		Livestock grazing permitted.
Sevin®® 50W	2 to 5 lbs.		
Sevin®® 4F	1 to 2.5 qts.		
Sevin®® XLR	1 to 2.5 qts.		
Chlorpyrifos:			
Lorsban®® 4E		1.5-4 pts.	Do not graze livestock.
Lorsban®® 50W	l lb.		
Endosulfan:			
Thiodan®® 3 EC	1 qt.		Do not graze livestock.

Thiodan®® 50WP	1.5 lbs.		
Malathion			
Malathion®® 57% EC	1-2 pts.		Livestock grazing permitted.
Phosmet			
Imidan®® 70 WSB		1.5-2.0 lbs.	Do not graze treated orchards.
Note: Survey orchard for increases in aphid or mite infestations after using esfenvalerate, cypermethrin or carbaryl.			