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Managing Insect Pests of Texas Sunflower

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Insect pests are often a major limiting factor in Texas sunflower production. Of the 50 species of insects recorded on sunflower in Texas, about 15 are considered potentially major pests. The sunflower moth is the major pest of sunflower; stem weevils, seed weevils, the girdler complex and thistle caterpillar are of secondary importance.

Both oil seed and non-oil seed sunflower are grown in Texas. Seeds of oil seed sunflower contain 38 to 50 percent oil and are generally smaller than the non-oil seed varieties, which are used for human and bird food.

Because the sunflower has a short growing season, it is a suitable primary spring-planted crop or a second crop after wheat. Sunflower production can be an alternative where wind, sand, rain or hail has destroyed other primary plantings. Drought tolerance makes sunflower an attractive dryland crop and an alternative in areas with only limited irrigation. It also responds well under full irrigation.

Crop rotation, modified planting dates, weed control, volunteer and wild sunflower control and tillage are sound cultural practices that help reduce insect pest problems. However, judicious use of insecticides is often required for successful sunflower production in Texas. To improve their harvests, producers need to be able to identify insect pests that reduce sunflower yield, as well as their biology and control measures.

Insect pests infesting the head

Sunflower moth

The sunflower moth is the single most important insect pest reducing sunflower production in Texas. The adult is a small, slender, silver-to-buff gray moth about 1/2 inch long. It is most often seen resting on sunflower heads during the blooming period, especially in early morning and early evening.

Moths are highly attracted to plants just beginning to bloom. Nearly 80 percent of the eggs are laid on the plant within 4 to 7 days after buds begin to open (yellow ray petals first become visible). Eggs hatch in 24 to 72 hours. Newly hatched larvae are yellowish. As they mature, four cream to yellowish-green longitudinal stripes develop on the largely brown larvae.

For the first 5 to 6 days after hatching, young larvae are relatively exposed as they feed on pollen and floral parts on the flower surface. Older larvae tunnel into the seed and other head tissue. A single larva can destroy up to 12 seeds during the 15- to 19-day development period. Full-grown larvae are 3/4 inch long.

If larval feeding destroys florets before fertilization, seed development is prevented and pops (empty seed hulls) may develop. Heads infested with sunflower moth larvae look trashy. In addition to feeding damage, sunflower moth larvae predispose the sunflower head to *Rhizopus* head rot. This disease can significantly reduce yields, and seed oil content by 50 percent.

In Texas, insecticidal control is based on the percentage bloom and presence of moths in the field. Sunflower blooms rapidly once it begins. Count as blooming any head with any part of the flower exposed. Moths can lay eggs as soon as any part of the head is exposed. Start applying insecticide at 20 to 25 percent bloom when any moths are found in the field. One to two additional insecticide applications at 5-day intervals may be needed when sunflower moth populations are moderate to heavy. More northern sunflower production states recommend applying insecticide when an average of two moths per five heads are seen.

Sunflower bud moth (Suleima)

The appearance of deformed heads and black frass on head or stalk indicates the presence of sunflower bud moth. The adult is a gray-brown moth with two dark bands on wings. Wing spread is about 2/3 inch. The larvae are white with a dark head capsule and about 3/8 inch long.

Two generations of sunflower bud moth are produced each year. Moths lay eggs in terminals of immature sunflower, on receptacles of mature sunflowers or in leaf axils. Black frass surrounds the larval entrance hole into the sunflower plant.

Sunflower can be an alternative crop where wind, sand, rain or hail has destroyed other primary plantings.

In Texas, infestations have been light and feeding activity restricted to the fleshy part of the head and stalk. Yield losses have been minimal, occurring only when larvae burrow into small, unopened buds, thus preventing head formation.

Banded sunflower moth

The banded sunflower moth is about 1/4 inch long and straw-colored with a brown triangle area near middle of the forewing. At first, larvae are off-white, but as they grow to about 1/2 inch they change to light pink, then to red or purple and finally green. Larvae feed on disk flowers until they reach the third instar (growth stage), when they begin feeding on seeds. The economic threshold is considered to be one moth per two plants during the late bud to early bloom stage.

Headclipper weevil

Sunflower plants that are girdled about 1 to 2 inches below the head are likely to be infested with the headclipper weevil. The adult weevil is metallic black and about 1/4 inch long with a long "snout." It is usually in the field as an adult from mid-July to early August. As females prepare to oviposit, they girdle just below the head and lay eggs in the girdled head. The girdled head then falls to the ground, where larvae develop and overwinter. Economic infestations of this insect have not been noted in Texas.

Sunflower seed weevils

Two species of seed weevils have been detected in Texas. One is reddish-brown and about 1/8 inch long; the other is gray and about 1/4 inch long.

From late June through early July, adults emerge and begin feeding between the bracts of sunflower buds. As the sunflower matures, weevils begin feeding on pollen, and deposit eggs within the seed as it begins to mature. Mature larvae drop to the ground and overwinter in the soil. Completion of a single generation per year occurs in June when the larvae pupate.

Seed weevils have the greatest economic impact on confectionery and seed sunflower. Economic infestations most often occur on sunflower blooming after the first of July. The economic threshold for the red sunflower seed weevil is 14 per head for oil seed sunflower and one per head for confectionery. Gray sunflower seed weevils lay fewer eggs than red sunflower seed weevils and probably have a higher economic threshold; however, this has not been firmly established.

Insect pests infesting the stalk

Sunflower stem weevil

The stem weevil occasionally causes losses in sunflower. Adults are brown and white mottled and about 3/16 inch long. The single generation per year emerges in early May. Adults feed on leaves but cause no economic damage. Eggs are deposited in sunflower stalks 2 to 5 weeks after adults emerge. Young larvae burrow into the stalk, destroying pith, making the plant highly susceptible to lodging. As many as 100 1/4-inch, creamy-white larvae have been found in a single stalk. Stem weevil-infested plants can reduce yields by 50 percent. Nonrotated, early-planted fields are most likely to be damaged. Double-crop sunflower or those planted late (after mid-June) seldom develop severe stem weevil infestations. Evidence indicates that stalk infestation by this insect predisposes plants to charcoal rot. *Crop rotation and delayed planting until after mid-June has been effective in eliminating yield reduction from this pest.*

Apply insecticide to control stem weevil when two or more adults are found per plant from the third alternate leaf to the early bud stage. Recent Colorado research indicates that using a base of 43 °F stem weevil emergence will begin at about 300, plus or minus 30, growing degree days.

The black sunflower stem weevil (Apion) is black and about 1/10 inch long. Larvae are yellow and have been found among sunflower stem weevil larvae. This weevil causes very little damage.

Cocklebur weevil

The adult weevil is 1/4 to 3/8 inch long and is red with black spots. The large larvae leave a 1/4-inch tunnel in the pith as they burrow down to the roots. Oval feeding scars on the stalk and rather large larvae in the pith indicate the presence of this pest. Destroying stalks helps reduce this pest.

Girdlers

Several species of girdlers attack sunflower. Of the girdler species, the genus *Mecas* appears to pose the greatest potential to reduce yield. The adult is 1/2 inch long and gray. The adult female makes two girdles about one-third of the way down the stalk, causing the upper stalk to die and fall to the ground. Eggs are deposited just beneath the stem surface and above the lower girdle. After hatching, the larvae, which are white and 1 inch long when mature, burrow down the pith to the roots, where they overwinter as larvae. Destroying stalks helps reduce this pest.

Insect pests infesting foliage

Sunflower beetle

The adult sunflower beetle resembles the Colorado potato beetle. About 1/4 inch long, it is yellow with brown stripes. It attacks early in the season, defoliating seedlings. The yellowish, humped larvae hide in the bracts of the head during the day; at night, they move to feed on younger leaves, causing defoliation. The economic threshold is one adult per seedling, or 15 larvae per plant with about 25 percent defoliation.

Thistle caterpillar (painted lady butterfly)

The butterfly has a wingspread of 2 inches. Its upper wing surface is brown with red and orange mottling and white and black spots. The thistle caterpillar, larval stage of the painted lady butterfly, can cause significant defoliation. This colorful larva grows to 1 1/4 to 1 1/2 inches long and has prominent spines on the body. Larvae feed

under the webbing of a curled leaf in the plant's terminal area. The economic threshold is 25 percent defoliation with most of the larvae less than 1 1/4 inches long.

Saltmarsh caterpillar

A late-season pest, the saltmarsh caterpillar occasionally damages late-planted sunflower. The very hairy caterpillar varies from yellow to brown to black and is often referred to as the "woolly bear." The caterpillar, which can be as large as 2 inches, can cause economic damage by severe defoliation. The adult moth is white with black spots and has a wingspan of 1 1/2 to 2 inches. Weed-free fields before and after planting will reduce problems with this pest.

Beet armyworm

Heavy infestation of beet armyworm can cause severe defoliation. When mature, the armyworm can be 1 1/2 inches long and variable in color. The immature beet armyworm is light green with thin, white stripes; more mature worms have green and black stripes. These armyworms can best be identified by the black spot on the side of the larva above the second pair of true legs.

Pupation occurs in the soil. The adult moth has a wingspread of 1 inch. Forewings are grayish brown with a pale spot in the mid-front margin; hind wings are white with a dark anterior margin. Controlling pigweed in and around sunflower will reduce this pest.

Grasshopper

Heavy infestations of grasshoppers periodically develop and cause economic damage to sunflower. These insects can attack sunflower from May until first frost. Early in the season, check for immature grasshoppers in crop margins. Controlling grasshoppers in crop margins can often prevent movement into the crop. The presence of 11 or more grasshoppers per square yard in crop margins is likely to cause economic damage.

Insect pests infesting roots

Carrot beetle

The carrot beetle is occasionally very damaging to sunflower in sandy soils of the Texas Rolling Plains. The 1/2 inch long, brown "June bug" feeds on the sunflower roots, causing stunting, wilting and lodging. Carrot beetle infestations can often be detected by excavations near the base of the sunflower stalk. These excavations are made by skunks and other mammals foraging for the carrot beetles. Controlling pigweed in and around the sunflower field helps.

Sunflower root weevil (Baris)

The sunflower root weevil is about 1 1/4 inch long, dull black with a short, downward-projecting snout. Adults initially feed on foliage, causing little damage. Adults later congregate near the root zone of plants, feed and lay eggs underneath the callus tissue that has developed at adult feeding scars. Larvae feed near the area where they hatch, destroying root tissue and causing plants to wilt and lodge if infestations are severe.

Protecting bees and other pollinators from insecticides

Pollination is vital in producing many seed crops. Sunflower hybrids are self-fertile and depend less on insect pollination than earlier, self-incompatible varieties requiring insect pollination (primarily bees). Studies indicate that even current self-compatible hybrids benefit from insect pollination. Seed set, seed oil percentage, seed yields and oil yields increase when pollinators are present.

Many major insect pests attack sunflower crops during flowering. Applying insecticide to control pests also harms pollinators. To minimize hazards to honey bees, communicate and cooperate with beekeeper, producer and pesticide applicator.

Follow these guidelines to reduce bee losses:

- If practical, apply insecticide *before* moving bees into fields for pollination.
- Where insecticides are needed, use material least toxic to bees.
- Make all applications when bees are not visiting the field. Evening or early morning treatments, between 7 p.m. and 6 a.m., generally are most satisfactory. Evening applications,

after bees have left the field, are less hazardous than early morning.

- Use spray or granular formulations rather than dusts.
- Where using one of the insecticides in Groups 1 and 2 in the following list is necessary, notify the beekeeper so that necessary arrangements can be made to protect the bees.
- Avoid drifting or spraying on insecticide directly on colonies, which generally results in heavy losses. On hot evenings, bees often cluster on the front of the hives. Pesticide drift or direct spray at this time generally kills many bees.

Table 1.– Insecticides used on sunflower grouped according to their relative hazards to honey bees.

Insecticides	Remarks
Group 1 - Highly toxic Carbaryl Carbofuran Cyfluthrin Esfenvalerate Ethyl parathion Lambda-cyhalothrin Methyl parathion Tralomethrin	This group includes materials that kill bees on contact during application or for several days. With some exceptions, remove bees from the area if these are used on plants the bees visit.
Group 2 - Moderately toxic Endosulfan	Do not apply when bees are working in field. Apply in late evening.
Group 3 - Relatively nontoxic Bacillus thuringiensis	Apply in late evening or early morning when bees are not foraging.

Table 2.– Insecticide suggestions for sunflower insect pests.

Insects	Insecticide	Rate/Acre	Special Instructions
Banded sunflower moth	Carbofuran (Furadan® 4F)	1 pt	Do not re-enter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Chlorpyrifos (Lorsban® 4E)	1 - 1 1/2 pts	24-hour restricted entry interval. 42-day preharvest restriction.
	Cyfluthrin (Baythroid® 2)	2.0 - 2.8 fl. oz.	12-hour restricted entry interval. 30-day preharvest interval.
	Bacillus thuringiensis (Dipel® ES)	1.5 - 2.5 pts	4-hour restricted entry interval.
	Esfenvalerate (Asana® XL)	5.8 - 9.6 fl. oz.	12-hour restricted entry interval. 28-day preharvest interval.
	Tralomethrin (Scout® X-TRA)	2.0 - 2.33 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.
Grasshoppers	Carbofuran (Furadan® 4F)	1/4 - 1.2 pt	Do not reenter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Chlorpyrifos (Lorsban® 4E)	1 pt	24-hour restricted entry interval. 42-day preharvest restriction.
	Cyfluthrin (Baythroid® 2)	2.0 - 2.8 fl. oz.	12-hour restricted entry interval. 30-daypreharvest interval.
	Esfenvalerate (Asana® XL)	5.8 - 9.6 fl. oz.	12-hour restricted entry interval. 28-day preharvest interval.
	Lambda-cyhalothrin (Karate®)	2.56 to 3.84 fl. oz.	24-hour restricted entry interval. Do not apply within 45-days of harvest.
	Tralomethrin (Scout® X-TRA)	2.33 - 2.67 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.

Continued

Table 2.– Insecticide suggestions for sunflower insect pests (continued).

Insects	Insecticide	Rate/Acre	Special Instructions
Seed weevils	Carbofuran (Furadan® 4F)	1 pt	Do not reenter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Chlorpyrifos (Lorsban® 4E)	1 - 1 1/2 pt	24-hour restricted entry interval. 42-day preharvest restriction.
	Cyfluthrin (Baythroid® 2)	2.0 - 2.8 fl. oz.	12-hour restricted entry interval. 30-day preharvest interval.
	Esfenvalerate (Asana® XL)	5.8 - 9.6 fl. oz.	12-hour restricted entry interval. 28-day preharvest interval.
	Lambda-cyhalothrin (Karate®)	2.56 to 3.84 fl. oz.	24-hour restricted entry interval. Do not apply within 45 days of harvest.
	Parathion, methyl (4E)	2 pts.	48-hour restricted entry interval. 30-day preharvest restriction.
	Tralomethrin (Scout ®X-TRA)	2.0 - 2.33 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.
Stem weevils	Carbofuran (Furadan® 4F)	1 pt.	**Foliar.** Do not reenter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
		2.5 fl. oz./1000 ft. of row	**At-plant.** Do not reenter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Carbaryl (Sevin XLR®, 4F)	1 - 1 1/2 qts.	12-hour restricted entry interval. 30-day preharvest interval.
	Chlorpyrifos (Lorsban®4E)	1 - 1 1/2 pt	24-hour restricted entry interval. 42-day preharvest restriction.
	Esfenvalerate (Asana® XL)	5.8 - 9.6 fl. oz.	12-hour restricted entry interval. 28-day preharvest waiting interval.
	Lambda-cyhalothrin (Karate®)	2.56 to 3.84 fl. oz.	24-hour restricted entry interval. Do not apply within 45 days of harvest.
	Tralomethrin (Scout® X-TRA)	2.0 - 2.33 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.
Sunflower beetle	Carbaryl (Sevin® XLR, 4F)	1 - 1 1/2 qts.	12-hour restricted entry interval. 30-day preharvest interval.
	Carbofuran (Furadan® 4F)	1/4 - 1/2 pt	Do not reenter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Cyfluthrin (Baythroid® 2)	0.5 - 1.6 fl. oz.	12-hour restricted entry interval. 30-day preharvest interval.
	Esfenvalerate (Asana® XL)	2.9 - 5.8 fl. oz.	12-hour restricted entry interval. 28-day preharvest waiting interval.
	Lambda-cyhalothrin (Karate®)	1.92 - 3.20 fl. oz.	24-hour restricted entry interval. Do not apply within 45 days of harvest.
	Tralomethrin (Scout ®X-TRA)	0.71 - 1.42 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.

Continued

Table 2.– Insecticide suggestions for sunflower insect pests (continued).

Insects	Insecticide	Rate/Acre	Special Instructions
Sunflower moth	Carbofuran (Furadan® 4F)	1 pt	Do not re-enter treated field within 14 days without proper protective clothing. Do not harvest within 28 days of last application.
	Carbaryl (Sevin® XLR, 4F)	1 1/2 qts.	12-hour restricted entry interval. 30-day preharvest interval.
	Chlorpyrifos (Lorsban® 4E)	1 - 1 1/2 pts.	24-hour restricted entry interval. 42-day preharvest restriction.
	Bacillus thuringiensis Biobit® HP Dipel® 2X Dipel® ES	 0.5 - 1.0 lbs. 0.5 - 1.0 lbs. 1.5 - 2.5 pts.	 4-hour restricted entry interval. 4-hour restricted entry interval. 4-hour restricted entry interval.
	Cyfluthrin (Baythroid® 2)	2.0 - 2.8 fl. oz.	12-hour restricted entry interval. 30-day preharvest interval.
	Endosulfan (Thiodan® 3EC) (Phaser® 3EC)	 1 1/3 qts. 1 1/3 qts.	24-hour restricted entry interval. 1-day preharvest interval.
	Esfenvalerate (Asana® XL)	5.8 - 9.6 fl. oz.	12-hour restricted entry interval. 28-day preharvest. waiting interval
	Lambda-cyhalothrin (Karate®)	2.56 - 3.84 fl. oz.	24-hour restricted entry interval. Do not apply within 45 days of harvest.
	Parathion, ethyl (8E)	1/2 - 1 pt	72-hour restricted entry interval. 30-day preharvest restriction.
	Parathion, methyl (4E)	2 pts.	48-hour restricted entry interval. 30-day preharvest restriction.
	Tralomethrin (Scout® X-TRA)	2.0 - 2.33 fl. oz.	24-hour restricted entry interval. 21-day preharvest interval.

Policy statement for making chemical control suggestions

The information and suggestions included in this publication reflect the opinions of Extension entomologists based on field tests and use experience. Our management suggestions are a product of research and are believed to be reliable. However, it is impossible to eliminate all risk. Unforeseen or unexpected conditions or circumstances may result in less-than-satisfactory results even when these suggestions are used. The Texas Agricultural Extension Service assumes no responsibility for risks. Such risks shall be assumed by the user of this publication.

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