Chapter 11: Sunflower Insect Pests

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Defoliators

During the growing season, more than one defoliating insect pest may be present within a sunflower field. Although most of these pests cause negligible injury to the plant, scouting should still be conducted to ensure that defoliation does not result in yield loss. Table 11.1 highlights the amount of defoliation that can occur on sunflower and the expected yield losses based on growth stage of the plant.

Cutworms

Introduction

In South Dakota, there are four species of cutworms that may negatively affect sunflower stands shortly after emergence. These species include the dingy cutworm *(Feltia jaculifera)*, darksided cutworm *(Euxoa messoria)*, redbacked cutworm *(Euxoa ochrogaster)*, and pale western cutworm *(Agrotis orthogonia)*. Cutworm caterpillars of these species can feed on both root tissue as well as foliage, which normally doesn't result in economic injury. However, their ability to cut off young seedlings can cause economic damage through significant stand reductions. Scouting for cutworm caterpillar activity in sunflower should begin at emergence and continue through V4 to V6. Earlier planted sunflower is at a greater risk for cutworm defoliation and stand losses.

Identification

Cutworm moths all can be distinguished from one another by examining the markings on their forewings. In general, these moths are a drab brown-gray color with brown-gray hindwings. The cutworm caterpillars are all similar but can be distinguished by the colorations or markings that are present on their bodies.

Dingy cutworms have dark brown forewings with lighter brown bean-shaped markings next to a light triangle marking (Figure 11.1). The dingy cutworm caterpillars are dull brown to cream mottled coloration (Figure 11.2). Broad diagonal gray markings on each abdominal body segment are "V" shaped. The dingy cutworm head capsule is light brown with dark brown markings. The last-instar caterpillars are 1 to 1 ¼ inches in length.

Figure 11.1. Dingy cutworm moth. Photo courtesy of Hanna Royals, Screening Aids, USDA APHIS PPQ, Bugwood.org.

Table 11.1. Estimated yield loss due to defoliation based on sunflower growth stage.

Growth Stage	Percent Defoliation									
	10	20	30	40	50	60	70	80	90	100
	Expected yield loss (percent)									
V4 to V5	0	1	2	2	4	4	5	9	14	21
V9 to V11	0	2	3	4	5	5	7	11	17	24
R1	2	4	6	6	7	9	16	24	34	47
R3	2	8	15	19	24	32	44	59	78	99
R5	1	3	7	10	16	25	37	49	67	90
R7	0	1	3	7	10	13	16	18	20	22
R8	0	1	2	3	5	7	8	9	10	11
Table adapted from North Dakota State University Extension Bulletin 25.										

Figure 11.2. Dingy cutworm caterpillar. Photo courtesy of Canadian National Collection, The Canadian National Collection (CNC) of Insects, Arachnids and Nematodes, Bugwood.org.

Redbacked cutworm moths have reddish brown forewings with mottled gray bean-shaped and circular markings that are closed on one end (Figure 11.3). The redbacked cutworm caterpillars are dull gray to brown in color with two dull red stripes running the length of their bodies (Figure 11.4). The caterpillars are approximately 1 ¼ inches when fully matured.

Figure 11.3. Redbacked cutworm moth. Photo courtesy of James Bailey, Bugguide.net.

Figure 11.4. Redbacked cutworm caterpillar. Photo courtesy of John Gavloski

Darksided cutworm moths (Reaper dart) have light-colored forewings with darker markings (Figure 11.5). The darksided cutworm caterpillars have gray to brown body with a narrow dark gray stripe on each side (Figure 11.6). The mature caterpillars are approximately 1 ½ inches in length.

Figure 11.5. Darksided cutworm moth (Reaper Dart). Photo courtesy of Carl Barrentine, Bugguide.net.

Figure 11.6. Darksided cutworm caterpillar. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Pale western cutworm moths are gray to tan with a light-colored circle on the forewings (Figure 11.7). The pale western cutworm caterpillars are pale yellow to gray in color with a distinct white line that runs down the middle of their back (Figure 11.8). The caterpillars head capsule is light brown with two vertical black lines that form an inverted V.

Figure 11.7. Pale western cutworm moth. Photo courtesy of John Capinera, University of Florida, Bugwood.org.

Figure 11.8. Pale western cutworm caterpillar. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Biology and Life Cycle

The cutworms observed in South Dakota sunflowers can be separated based on their activities in the field. The two categories are early season and late season. The dingy cutworm is an early season cutworm, whereas the redbacked cutworm, darksided cutworm and pale western cutworm are late season cutworms. Both the early and late season cutworms only produce a single generation per season.

Dingy cutworms and other early season cutworms overwinter as second or third instar caterpillars. When the weather begins to warm up in the spring, they start feeding on available plants and potentially crop seedlings. The dingy cutworm caterpillars will continue feeding until mid-June when they will pupate. The dingy cutworm moths emerge in August and are active until mid-October. Peak moth activity normally occurs in September. Female moths lay eggs onto plants in the Asteraceae family (e.g., sunflower, safflower, goldenrod, ragweed). When the caterpillars hatch, they begin feeding on the flower faces, which may include commercially grown sunflower. The dingy cutworm caterpillars drop off the plant when they reach the second or third instar and will overwinter in the soil.

The redbacked cutworm, darksided cutworm, pale western cutworm and other late season cutworms overwinter as eggs. The oviposition timing will vary depending on the species, but, in general, eggs are laid in late summer through fall. The eggs overwinter in the soil and young cutworm caterpillars hatch in the spring when the temperatures increase. The late season caterpillars feed from May to the end of June. The late season moths emerge in late summer and will deposit eggs into the soil of fields.

Injury

For dingy, redbacked and darksided cutworms, young caterpillars will leave small notches or holes in the leaves. In some cases, the caterpillars will not feed completely through the leaf, but will instead remove layers of the leaf tissue which results in transparent sections or windows of injury on the leaves. The dingy cutworm caterpillars feed primarily on leaf tissue but can also cut off plants at or just below the soil surface. Later stage redbacked and darksided cutworms will cut the plants from one inch below the soil surface to two inches above the soil surface. The pale western cutworm caterpillars are subterranean and will feed on the plants below the soil surface.

Scouting

Cutworm caterpillars are nocturnal feeders so they will hide under plant residue or under the soil surface during the day. Therefore, scouting efforts during the

day should be focused on finding defoliated plants or cut plants. When wilted, broken or obviously cut plants are observed, dig 1 to 6 inches deep around the cut plant and search for the presence of the caterpillars. Occasionally, cutworm caterpillars may be observed feeding even in daylight hours.

Management

Foliar insecticide management of cutworms in sunflower is recommended when the action threshold of 1 caterpillar per square foot is observed or when 25 to 30% of scouted plants are cut. Because cutworms are nocturnal feeders, apply insecticides late in the day or in the early evening to ensure adequate coverage. Foliar insecticides will provide only minimal management of palewestern caterpillars because they do not feed on aboveground tissues. Insecticide seed treatments may reduce cutworm feeding when limited populations are present. However, when large populations are present, stand reductions may still be observed.

Palestriped Flea Beetle

Introduction

The palestriped flea beetle *(Systena blanda)* is a common insect pest of sunflower fields throughout South Dakota. The adult palestriped flea beetles cause early season defoliation. When left unmanaged, early season defoliation can cause plant death and subsequent stand reductions. Late season sunflower can tolerate injury caused by flea beetle adults. If large populations of palestriped flea beetles are present in a sunflower stand, several management options are available.

Identification

The palestriped flea beetle is around 1/8 of an inch in length and are shiny black to brown in color with a broad, white stripe running down each elytron (hardened forewing) (Figure 11.9). They can also jump, like a flea, because of their enlarged hind legs. The larval stage is a small, white and slender. The larvae are easily distinguishable from other beetle species.

Figure 11.9. Palestriped flea beetle adult. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Biology and Life Cycle

Palestriped flea beetles overwinter as larvae in the soil and emerge in the spring. Adult palestriped flea beetles will start to emerge in June and are active for much of summer. Along with sunflower, other host plants of the palestripped flea beetle include bindweed, pigweed, and alfalfa.

Injury

The larval stage of the pale striped flea beetle can cause minor injury to sunflowers root systems but is rarely significant enough to warrant management. Large numbers of flea beetle adults, however, will kill or stunt sunflower seedlings by chewing on their cotyledons and young leaves. Injury from adult flea beetles will appear as small pits or irregular holes in the leaf (Figures 11.10 and 11.11).

Figure 11.10. Palestriped flea beetle leaf damage. Photo courtesy of Patrick Wagner.

Figure 11.11. Palestriped flea beetle hole damage. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Scouting

To scout for palestriped flea beetles, it is recommended to check newly emerged sunflowers every week until the sunflower stand reaches the V4 growth stage. Flea

beetles overwinter on nearby weed host plants and field residue of previous susceptible crops. Due to this overwintering activity, flea beetle populations may be sporadic throughout a sunflower stand.

Management

Foliar insecticide application is recommended when the economic threshold is reached. For palestriped flea beetles, the economic threshold is when 20% of sunflower stand in a field has visible injury from flea beetle feeding. Other management techniques include using insecticide seed treatments, managing the residue within the field, removing weed host plants in field margins, and rotating crops. In South Dakota, the use of insecticide seed treatments has greatly reduced early season pressure from palestriped flea beetles.

Thistle Caterpillar

Introduction

The thistle caterpillar *(Vanessa cardui)* is an occasional pest of sunflowers, especially when populations are present in sunflower fields during the vegetative stages. Damage from the thistle caterpillar is often minor and usually does not warrant management action.

Identification

Thistle caterpillars can vary in color between black, yellow or gray. However, all larvae will have long, black, white, or yellow spines on their body and four pairs of abdominal prolegs (Figures 11.12 and 11.13). The caterpillars are 1 ¼ to 1 ½ inches in length. Thistle caterpillars can also be identified by their presence in leaves that are curled and secured using webbing.

Figure 11.12. Thistle caterpillar larva. Photo courtesy of Lyle Buss, University of Florida, Bugwood.org.

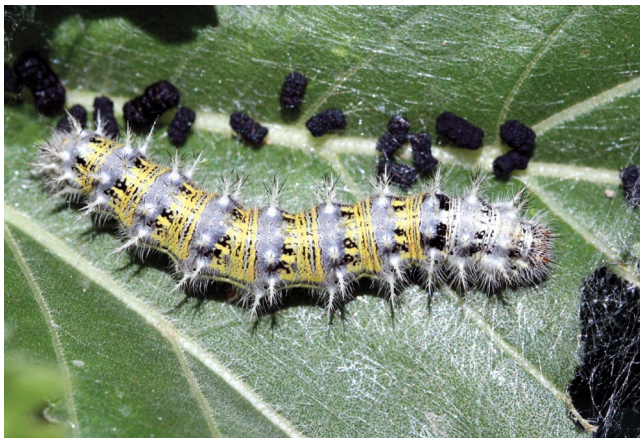

Figure 11.13. Thistle caterpillar larva. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

The adult form of the thistle caterpillar is the painted lady butterfly. Painted lady butterflies have orange and brown coloration on their wings with dark spots on the edges of the wings. The edges of the forewings are darker than the edges of the hindwings. They also have black, orange, and white markings on the inside of their forewings. The wingspan of a thistle caterpillar adult ranges from 2 to 2 ¾ inches (Figure 11.14).

Figure 11.14. Adult thistle caterpillar. Photo courtesy of Adam Varenhorst.

Biology and Life Cycle

The thistle caterpillar is a migratory species and overwinters in the southern US. The painted lady butterflies travel north in the spring and summer. Adults will lay eggs on Canada thistle, sunflower, soybean, and other hosts. Typically, thistle caterpillars will feed on early season sunflower in late June to early July and will have one to two generations per growing season.

Injury

Thistle caterpillar injury will appear as irregular holes and skeletonization on a leaf accompanied by webbing and fecal material. In most cases, the injury of the thistle caterpillar will not warrant management and should be considered along with other sunflower defoliators (Figure 11.15).

Figure 11.15. Thistle caterpillar larval damage to leaf. Photo courtesy of Adam Varenhorst.

Scouting

The easiest way to scout for thistle caterpillars in early season sunflower stands is to look for leaves that have been bound by silken webs or for irregular holes in leaves. Within these bound leaves will be fecal material and usually a thistle caterpillar. Scout by looking in an X pattern and examine 20 plants per sampling site for defoliation. Estimate the percent of defoliation present on the sampled plants. If the 20 sampled plants have an average of 25% defoliation and the thistle caterpillars are 1 ¼ inches long or less, management is recommended. However, if caterpillars are larger than 1 ¼ inches, most feeding injury has already occurred, and management is not recommended.

Management

Since the thistle caterpillar is a defoliating pest, it should be considered for management along with other sunflower defoliators. If the sunflower stand reaches the economic threshold of 25% defoliation, insecticide application may be necessary. Rarely does the thistle caterpillar, by itself, cause economic damage.

Silvery Checkerspot Caterpillar

Introduction

The silvery checkerspot caterpillar *(Chlosyne nycteis)* is an occasional pest of sunflower in South Dakota. This pest can cause rapid defoliation on sunflowers and will typically appear in June or July. Defoliation from the silvery checkerspot caterpillar is usually not enough to warrant management action and should be considered along with other sunflower defoliators.

Identification

Silvery checkerspot caterpillars are mostly black and may have several small white spots present. They have one broad yellow to orange stripe on the back and two thinner stripes along their sides. They have multiple branched spines present on their body, giving them a prickly appearance. The size of checkerspot caterpillars depends on their age, but they may grow up to 1 ½ inches in length (Figures 11.16 and 11.17).

Figure 11.16. Silvery checkerspot larvae. Photo courtesy of Patrick Wagner.

Figure 11.17. Silvery checkerspot larvae with damaged soybean leaf. Photo courtesy of Patrick Wagner.

Silvery checkerspot butterflies are pale orange with black boarders and markings. Like their name implies, they have a pattern of silvery patches and spots on the underside of the wings. The hindwings also have a large

white crescent at the margin. The wingspan of silvery checkerspot butterflies range from 1 ½ to 2 inches (Figure 11.18).

Figure 11.18. Adult silvery checkerspot larvae. Photo courtesy of Karan A. Rawlins, University of Georgia, Bugwood.org.

Biology and Life Cycle

The silvery checkerspot butterfly is native to South Dakota. There are one to two generations per year which occur between May and September. Female butterflies lay eggs in large clusters on their host plants, which include members of the daisy family (Asteraceae), especially sunflower. The caterpillars feed in groups after hatching and can cause rapid defoliation.

Injury

Silvery checkerspot caterpillars will skeletonize plants and produce concentrated areas of frass (waste) (Figures 11.19 and 11.20). Heavy defoliation can appear suddenly and may reduce yields if it occurs when plants are very young or during the early reproductive stages. Similar to the thistle caterpillar, management is not always necessary and should be considered along with other sunflower defoliators.

Figure 11.19. Silvery checkerspot caterpillars on a damaged sunflower. Photo courtesy of Patrick Wagner.

Figure 11.20. Silvery checkerspot caterpillars and associated leaf damage. Photo courtesy of Patrick Wagner.

Scouting

Check 10 random sunflower plants in an area and repeat the process in five different locations within a field. For each of the selected plants, evaluate the amount of defoliation that is present on the sunflower. The threshold for sunflower defoliation is approximately 25% and if most of the caterpillars are less than 1 ¼ inches long. If they are longer than 1 ¼ inches, management is unnecessary. When caterpillars are larger than 1 ¼ inches they are nearly fully grown and most of the feeding injury will have already occurred.

Management

If a sunflower stand reaches the defoliation threshold, insecticide application may be necessary. Depending on the size of an infestation, silvery checkerspot caterpillars may be managed using spot spraying in areas where defoliation is more severe (e.g., field edges).

Grasshoppers

Introduction

There are several species of grasshoppers that may feed on sunflowers in South Dakota. The three species that are most likely to be observed feeding on sunflower include the differential grasshopper *(Melanoplus differtialis)*, twostriped grasshopper *(Melanoplus bivittatus)* and the redlegged grasshopper *(Melanoplus femurrubrum)*. Typically, these grasshopper species are not present in large enough populations to cause substantial defoliation. However, sporadic grasshopper population outbreaks can result in rapid defoliation of sunflowers. Due to their size, the active movement and feeding habits of grasshoppers are easily observed in fields and on sunflower plants.

Identification

All species of grasshoppers have a similar morphology with hind legs that are used for jumping. However, the three species that were mentioned vary based on size, coloration and patterns that are present on the body.

The differential grasshopper adults have a large body that varies from 1 ⅛ to 1 ½ inches long. Their bodies are olive to light green and yellow in coloration. Although rare, some differential grasshoppers may have a black (melanistic) coloration. An important characteristic for identification is the black chevron markings that are present on the hind femurs of the adults (Figure 11.21).

Figure 11.21. Differential grasshopper adult. Photo courtesy of Adam Varenhorst.

The twostriped grasshoppers are also large with bodies that vary in size from 1 to 1 ½ inches long. They vary in color from brown to dark green. They have two light yellow stripes that run from the head to the tips of the wings. The stripes converge on the wings (Figure 11.22).

Figure 11.22. Twostriped grasshopper adult. Photo courtesy of Adam Varenhorst.

Redlegged grasshoppers are the smallest of the three commonly observed species with bodies that vary in size from ⅔ to 1 inch in length. The adults have a black and yellow-body coloration with red hind tibia. Occasionally, the hind tibia may be blue. Rare individuals may have a yellow and blue colored body (Figure 11.23).

Figure 11.23. Redlegged grasshopper adult. Photo courtesy of Adam Varenhorst.

Biology and Life Cycle

Although there is some variation by species, most grasshoppers will have a similar life cycle. Grasshoppers hatch and emerge in the spring or early summer. The timing of hatching will vary based on grasshopper species. Some grasshoppers hatch early in the spring while some will hatch much later. After emergence, the grasshopper nymphs will feed on the foliage of both wild and cultivated plants. The number of nymphal instars (stages) varies based on species. Most species will have 4 to 6 instars before they reach the adult stage. Adult grasshoppers will continue feeding on any available foliage or plant tissue until the first hard frost of the year. Grasshopper populations are favored by warm, dry weather conditions. These conditions improve the survival of the nymphal grasshoppers. Furthermore, warm falls with a late hard frost will extend the egg laying period for the adults. Typically, grasshopper populations will move to crops from adjacent road ditches, grassy areas or maturing small grains. In the late summer and fall, female grasshoppers lay eggs into the soil in field margins, pastures, or ditches.

Injury

As defoliating insects, the main injury caused by grasshoppers is the removal of foliage from the plants

(Figure 11.24). However, populations that arrive later in the season may also feed on the developing sunflower head, resulting in direct damage and yield reductions. The amount of defoliation and head feeding that may occur is dependent on the grasshopper populations that are being observed. Large populations can cause rapid defoliation within a field.

Figure 11.24. Grasshopper defoliation on sunflower plants. Photo courtesy of Aaron Hargens.

Scouting

The road ditches around a field can be scouted for grasshoppers using a sweep net. Surrounding road ditches are where scouting should start prior to grasshoppers being observed within the field. The best scouting method within sunflower fields is visual observation. This is due to the large size of grasshoppers and the potential damage caused by sweep netting to the sunflower plants. To determine the population size within a field, walk into the field and estimate the number of grasshoppers in one square yard. Repeat this process several times to determine the field average. An average of 30 to 45 grasshopper nymphs or 8 to 14 adults per square yard warrants an insecticide application for management. If extensive feeding on the developing sunflower heads is observed, management should occur as soon as possible to minimize yield loss. If extensive defoliation is observed but few grasshoppers are present, treatment is not recommended as the grasshopper populations have likely moved to a new area.

Management

If grasshopper populations exceed the recommended thresholds, a foliar-applied insecticide will be necessary to reduce their numbers. There are several products labeled for the management of grasshoppers in sunflower. If adult populations are present, it is recommended to use the highest labeled rate for the insecticide product. Adult grasshoppers are resilient and lower rates may result in inadequate population reductions.

Sunflower Beetle

Introduction

The sunflower beetle *(Zygogramma exclamationis)* is a defoliator insect of sunflower. It feeds exclusively on sunflower and is often confused with the Colorado potato beetle *(Leptinotarsa decemlineata)*. Both the larval and adult stages of the sunflower beetle can cause economic injury throughout the growing season.

Identification

Both the larval and adult stages of the sunflower beetle can cause economic injury to sunflower. Larvae range from white, yellow or green in color, and have a light brown head capsule. The larvae are similar in size to the adult life stage. Adults are around ⅓ of an inch in length and have unique coloration. The head is brown while the pronotum (segment directly behind the head) is also brown but with white margins towards the front. Each elytron (hardened forewing) is white with three lateral brown-black lines and one shorter brown-black line followed by a brown-black dot. One lateral brown line runs down the center of the elytra (Figure 11.25).

Figure 11.25. Sunflower beetle larva and two adults. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Biology and Life Cycle

The sunflower beetle overwinters as an adult. These adults emerge in late May and can live for up to eight weeks. After mating, each female can lay from 200 to 2,000 eggs. Larvae that hatch from these eggs will then feed on the underside of leaves during the night and hide within sunflower bracts and buds during the day.

Larvae will feed for two weeks before entering the soil to pupate. Because adult females lay eggs throughout the growing season, first generation larvae will be present for around six weeks in June through July. Second generation adults that emerge from pupation will feed for a short time on sunflower heads and upper leaves before re-entering the soil to overwinter.

Injury

Defoliation from the sunflower beetle is caused by both the larvae and adults. The feeding injury generally appears as irregular shaped holes. The entire leaf may be removed in early season sunflower and lace-like holes will appear in later season sunflower (Figure 11.26).

Figure 11.26. Sunflower beetle damage. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Scouting

Using the standard X pattern for scouting sunflower beetles is recommended. Five different sites should be scouted throughout the sunflower stand, and adults and larvae should be counted on 20 plants per site. Since the sunflower beetle is a defoliator, look for defoliation percentage as well. The economic thresholds for sunflower are 25% defoliation or an average of 1 to 2 adults or 10 to 15 larvae per plant during V2 to V6 growth stages. Beyond V6, sunflower plants are usually mature enough to tolerate sunflower beetle injury.

Management

There are many management tactics available for the sunflower beetle. The easiest tactic is relying on and promoting natural enemies and parasites of the sunflower beetle. Multiple predators like the melyrid beetle *(Collops vittatus)*, convergent ladybird beetle *(Hippodamia convergens)*, and green lacewing *(Chrysoperla carnea)* will eat sunflower beetle eggs and larvae. The pteromalid wasp *(Erixestus winnemana)* is a parasite of sunflower beetle eggs and multiple species of tachinid flies will parasitize sunflower beetle larvae. In some cases, natural enemies and parasites can reduce sunflower beetle populations by 70 to 100%.

If natural enemies and parasites are not present or aren't effectively reducing sunflower beetle populations, applying insecticides at the economic threshold is recommended. Also, if sunflower beetle populations are high within a sunflower stand, using insecticidal seed treatments the next growing season can reduce early season pressure.

Head Feeders

Red Sunflower Seed Weevil

The red sunflower seed weevil *(Smicronyx fulvus)* is a native pest of sunflower in the United States and is partially responsible for the historical decline in sunflower production acreage in Illinois and Missouri. It has been an annual economic pest of sunflowers in South Dakota since 1978. During severe infestations, approximately 50% of the total sunflower plants may have up to 80% of the achenes per head infested with red sunflower seed weevil larvae. Unlike many insect pests, large populations of the red sunflower seed weevil have been observed on an annual basis. When scouting sunflower after the onset of flowering, it is likely that red sunflower seed weevils will be observed on the flowering head. In South Dakota, field failure reports of pyrethroid applications for red sunflower seed weevil management have been received by SDSU Entomologists since 2017.

Identification

The adults of the red sunflower seed weevil are approximately 1/10 of an inch long and are a reddish-orange color. They have a black elongated snout with small bent antennae originating from the snout (Figure 11.27). The larvae of the red sunflower seed weevil are legless and cream-colored with a light brown head capsule (Figure 11.28). They often curl into a C-shape if disturbed. However, the larvae are seldom observed because they feed on developing seeds and are concealed by the achenes.

Figure 11.27. Red sunflower seed weevil adult. Photo courtesy of Adam Varenhorst.

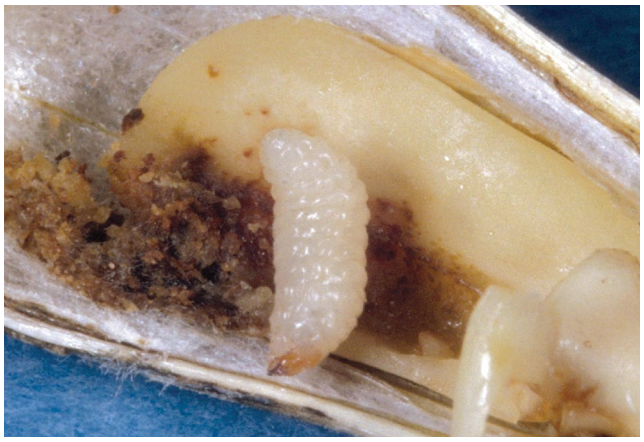

Figure 11.28. Red sunflower seed weevil larva. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Biology and Life Cycle

There is a single generation of red sunflower seed weevils each year. There are five larval instars that develop within the achenes. During late August and early September, the fifth-instar larvae exit the achenes and drop to the soil. The larvae will then burrow 2 to 6 inches into the soil to overwinter. The larvae remain in the soil until pupation occurs in June or July of the following year. The adults emerge from the soil and are active from late June to early September. Both male and female red sunflower seed weevils are attracted to both wild sunflower and commercial sunflower. Prior to flowering (R5), the adult red sunflower seed weevils feed on the stems, petioles or bracts. After the onset of flowering, the adults feed on pollen. Female red sunflower seed weevils require several days of pollen feeding before they are able to lay eggs. The female red sunflower seed weevils lay eggs during flowering. Typically, a female will lay only one egg per achene. When flowering is complete (R6) the adult red sunflower seed weevils are no longer attracted to the plants and their populations will decrease rapidly. Red sunflower seed weevil infestations are the highest in the outer achene rows. The larva will feed on the developing seed from July to September and then chew an exit hole to drop to the soil.

Damage

The adult red sunflower seed weevil feeding may leave noticeable marks on the bracts, but the adults do not cause economic levels of injury. The larvae of the red sunflower seed weevils will only partially feed on the developing seed. This feeding reduces the seed weight and oil content of the seeds. If infested sunflowers are harvested before the larvae drop from the infested

seeds, they may cause heating and moisture issues during storage.

Scouting

Scouting for red sunflower seed weevils should begin when more than 50% of the plants within a field between the stages of showing yellow ray petals (R5.0) to 30% of the head shedding pollen (R5.3). Scouting should continue until the majority of the plants within a field have reached 70% pollen shed (R5.7). Once the field has reached R5.7, it is unlikely that additional infestation by red sunflower seed weevils will occur. This is due to a reduction in oviposition and the fact that the achenes become hardened which also reduces oviposition rates.

To scout for red sunflower seed weevils, choose five sampling sites that are at least 75 feet from the field edge, with at least one site on each side of the field. At each sampling site, count the total number of adults present on five randomly selected plants (regardless of plant growth stage) for a total of 25 plants per field. To ensure that all of the adults are counted, spray each of the selected heads with an insect repellent containing DEET and wait for the red sunflower seed weevils to move to the surface of the head. Calculate the field average and compare it to the recommended threshold of 4 to 6 adults per plant.

Management

When populations of the red sunflower seed weevil exceed 4 to 6 adults per plant, it is recommended to treat the field with a foliar insecticide. Treatment should occur between R5.0 and a field average of 40% pollen shed (R5.4). Making treatment decisions between R5.0 and R5.3 provides a time window in case of inclement weather or scheduling difficulties. However, treating a population too early may result in field re-infestation and require additional treatment. Treatment should not occur at or after R5.7 as most of the oviposition would have occurred before this time. Fields should be re-scouted 48 hours after insecticide application to determine if red sunflower seed weevil populations have been reduced. Early planting dates can also reduce the levels of red sunflower seed weevil infestation.

Gray Sunflower Seed Weevil

Introduction

The gray sunflower seed weevil *(Smicronyx sordidus)* is less frequently observed than the red sunflower seed weevil in South Dakota. However, it is possible to have both species present on a single sunflower head. Unlike the red sunflower seed weevil, the gray sunflower seed weevil populations do not normally reach levels that require management.

Identification

The adults of the gray sunflower seed weevil can be up to 1/5 of an inch long and are noticeably larger than the red sunflower seed weevil. In addition, they are light gray in color and have a black elongated snout with small bent antennae originating from the snout (Figure 11.29). The larvae of the gray sunflower seed weevil are also legless and cream colored with a light brown head. When disturbed, the larvae curl up into a C-shape. Differentiation of the gray and red sunflower seed weevil larvae is very difficult.

Figure 11.29. Gray sunflower seed weevil adult. Photo courtesy of Adam Varenhorst.

Biology and Life Cycle

There is a single generation of gray sunflower seed weevils each year. Gray sunflower seed weevils emerge 5 to 10 days earlier than the red sunflower seed weevils. The adult gray sunflower seed weevils are observed in sunflower fields during the bud stages (R1 to R3). Gray sunflower seed weevil eggs are laid onto the reproductive buds that are within unopened florets. The populations of gray sunflower seed weevil adults decline at the onset of flowering. After hatching, the larvae migrate to the achene and begin feeding on the base of the seed. The presence of a larva results in the achene becoming enlarged and protruding from the head in comparison to nearby achenes. This enlargement is referred to as a gall and is likely a source of nutrients for the developing larva. Gray sunflower seed weevils have higher infestation rates of the middle achene rows. The last instar larvae emerge from the seeds and drop

to the soil where they overwinter 1 to 4 inches below the surface.

Damage

The larvae of the gray sunflower seed weevil consume the entire developing seed. The adults feed on developing flower buds beneath the bracts and on leaves. This feeding is considered minor.

Scouting

Scouting for gray sunflower seed weevils should begin at R1. Scouting should continue until the majority of the field has reached R4.

Management

There are no set management thresholds for gray sunflower seed weevils. The populations of gray sunflower seed weevils are typically lower than those of the red sunflower seed weevils. Occasionally the thresholds for red sunflower seed weevils are used to manage gray sunflower seed weevils. However, insecticide application for gray sunflower seed weevil management must occur prior to bloom or when 10 to 15% of the field has reached the R4 growth stage.

Banded Sunflower Moth

Introduction

The banded sunflower moth *(Cochylis hospes)* is a common sunflower seed pest throughout the growing season. The larval stage is the most damaging due to its feeding on sunflower bracts, florets, and seeds.

Identification

The most injurious life stage of the banded sunflower moth is its larval stage. The larvae differ in appearance as they progress through their five instars. Young larvae are off-white and will progress towards pinkish to red and then a blue-green color in the later instars (Figure 11.30). The head capsule of younger caterpillars is a dark brown to black color. More mature caterpillars have a light brown head capsule. Adult banded sunflower moths have a dark band across their yellowish-tan forewings. Typically, their wingspan is ½ of an inch (Figure 11.31).

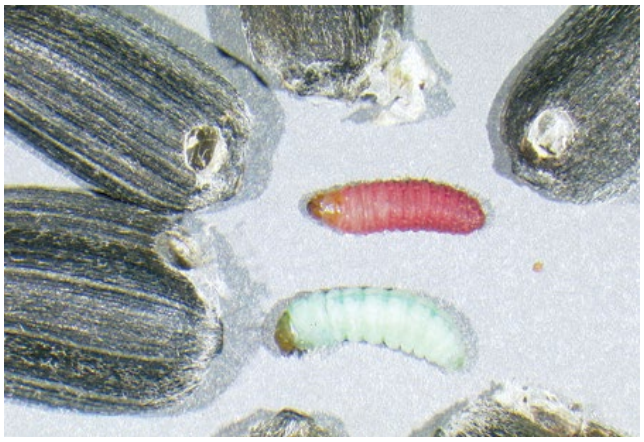

Figure 11.30. Banded sunflower larvae inside sunflower seed. Photo courtesy of North Dakota State University Extension.

Figure 11.31. Banded sunflower moth adult. Photo courtesy of Mark Dreiling, Bugwood.org.

Biology and Life Cycle

The banded sunflower moth's life cycle begins in mid-July when adults emerge from overwintering sites. These adults will then lay eggs on the outside of sunflower bracts and will continue doing so through mid-August. The eggs hatch five to eight days after being deposited on the bracts. The caterpillars are present in sunflower heads from mid-July to mid-September. They will feed until they reach the end of the last larval instar and will then drop to the soil to overwinter.

Damage

Damage from the banded sunflower moth is caused entirely by the larval stage. Newly emerged larvae will initially feed on bracts before moving into open florets. This early feeding reduces the total number of seeds present on the head. As the larvae mature, they will tunnel through the base of a floret and into the seed, consuming all of the contents (Figure 11.30). Each larva

can consume the entire kernel of six to seven seeds before dropping to the soil.

Scouting

From mid-July through mid-September, look for small patches of silken webbing on the face of sunflower heads. This webbing can indicate the presence of banded sunflower moth larvae. Scouting can also be done for the egg and adult life stages primarily during the R2 to R3 growth stages of sunflower. To scout for eggs, look over eight random sites consisting of five sunflower plants and count six outer bracts of a bud per plant (Figure 11.32). Using a magnifying lens is recommended. Calculate and compare the average amount of eggs per plant to the economic threshold of two to three eggs per six bracts. Treatment is recommended if above the economic threshold. When scouting for adults, one adult per 100 plants warrants insecticidal treatment.

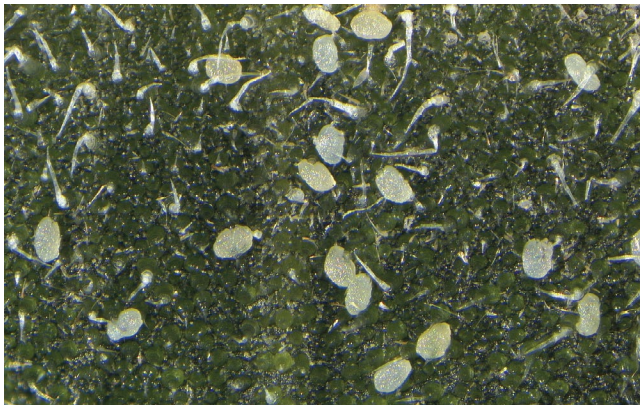

Figure 11.32. Banded sunflower moth eggs on a sunflower bract. Photo courtesy of K. Mundal, North Dakota State University Extension Service.

Management

Insecticide treatment to the sunflower heads is recommended when either the banded sunflower moth egg or adult thresholds are reached. Spraying in the earlier morning or late afternoon is recommended in order to avoid harming pollinators.

Sunflower Moth

Introduction

The sunflower moth *(Homoeosoma electellum)* is a common pest of sunflower that is present at the time of flowering. Sunflower moths are a migratory pest that overwinter in the southern United States and move north during the growing season. Adult moths can be observed on sunflower heads in the early flowering stages. The caterpillars cause injury to the plants by feeding on the pollen and seeds.

Identification

Caterpillars of the sunflower moth are black with light-colored stripes running the length of their bodies and have a distinctive orange head. As the caterpillars mature, they can become light brown with white stripes. The caterpillars vary in size based on their developmental stage but will reach approximately ¾ of an inch during their final instar (Figure 11.33). Adult sunflower moths are mottled gray. The wingspan of the sunflower moth ranges from ½ to 1 inch. The wings are tucked tightly to the body while at rest (Figure 11.34).

Figure 11.33. Sunflower moth caterpillar. Photo courtesy of Adam Varenhorst.

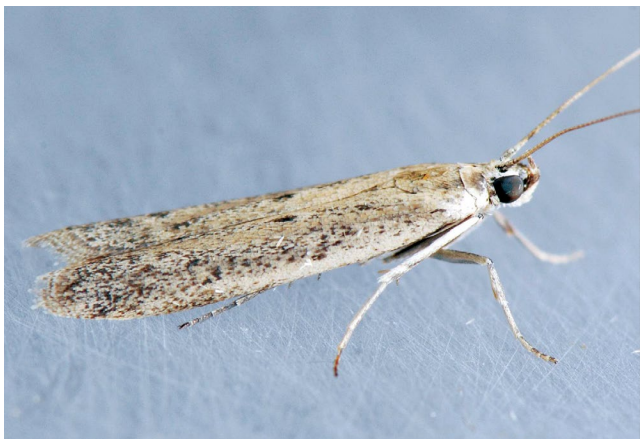

Figure 11.34. Sunflower moth adult. Photo courtesy of Mark Dreiling, Bugwood.org.

Biology and Life Cycle

Each year, sunflower moths migrate from the southern United States into South Dakota. The adult moths are attracted to blooming sunflowers and the females will lay their eggs on the sunflower heads, based on the presence of pollen (Figure 11.35). Female sunflower moths can lay up to 400 eggs near the base of florets. The caterpillars will hatch and feed on the sunflower head until they complete their development.

Figure 11.35. Sunflower moth on a sunflower head. Photo courtesy of Phil Sloderbeck, Kansas State University, Bugwood.org.

Damage

Caterpillars feed on the pollen, move on to the corollas, and eventually feed on the developing achenes (Figure 11.36). The caterpillars will tunnel into the sunflower head tissue which can lead to secondary infections of Rhizopus head rot. Rhizopus head rot is a fungus that is the main source of yield loss associated with the sunflower moth. However, each caterpillar also causes direct damage by feeding on 3 to 12 seeds within the head. The caterpillars spin silken webs that bind the drying florets and other debris, giving infested sunflower heads a "trashy" appearance. The webbing will typically cover the majority of the head.

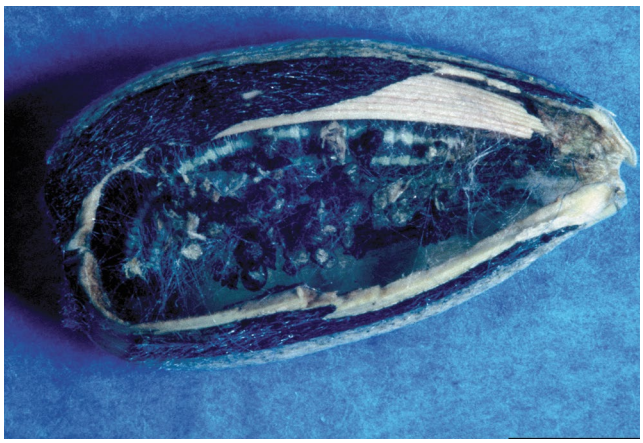

Figure 11.36. Damage to sunflower achene and seed caused by sunflower moth larva. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Scouting

Scouting for sunflower moth should begin at the R4 growth stage. Moths are most active in early morning or evening. The best way to scout for sunflower moths is to use a flashlight and examine fields 1 hour after sunset, when moth activity peaks. Count the number of moths on the heads of 20 sunflowers from five random locations throughout the field. The threshold for sunflower moth is 1 to 2 moths per five sunflower heads.

Management

Insecticides can be applied to sunflower heads once the adult sunflower moths reach threshold levels. If applying an insecticide, it is best to spray in the evening when moth activity is greatest. Spraying at this time will also reduce the impact on pollinators as these beneficial insects are less active during the evening hours. Later planting dates can be effective at reducing the likelihood of sunflower moths reaching economic threshold.

Sunflower Bud Moth

Introduction

Sunflower bud moth *(Suleima helianthana)* is a minor pest of sunflower in South Dakota. The caterpillars are the damaging stage and burrow into unopened heads. This feeding injury can result in deformed heads but has not yet been associated with economic loss.

Identification

Sunflower bud moth caterpillars have a smooth cream-colored body with a dark head capsule. They can range in size from approximately ¼ to ½ of an inch long at their final instar (Figure 11.37). Adult sunflower bud moths are gray in color with two dark traverse markings across the back of the forewings. Their wingspan is approximately 2/3 of an inch (Figure 11.38).

Figure 11.37. Sunflower bud moth larva. Photo courtesy of Adam Varenhorst

Figure 11.38. Sunflower bud moth adult. Photo courtesy of Mark Dreiling, Bugwood.org.

Biology and Life Cycle

There can be up to two generations of sunflower bud moth each year during the growing season. The female moths will lay eggs on various parts of the sunflower plants. Upon hatching, caterpillars will tunnel into the plant and leave behind frass around the entrance hole. Caterpillars will pupate inside the plant and emerge as new adults.

Injury

Feeding injury from sunflower bud moth caterpillars mostly occurs in the stalk but can also occur in the developing head (Figure 11.39). Deformed heads can occur when the caterpillars tunnel through unopened buds and disrupt head development.

Figure 11.39. Sunflower bud moth larva next to damaged achene. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Scouting

As this pest is not considered to be of economic significance, there are no established thresholds or scouting recommendations.

Management

Only a small proportion of plants in a field are affected by sunflower bud moth, so their impact is very minimal. Insecticide applications are not recommended for this pest because they have limited efficacy due to the caterpillars feeding within the plants.

Headclipping Weevil

Introduction

The headclipping weevil *(Haplorhynchites aeneus)* is an occasional pest of sunflower in South Dakota. Headclipping weevils typically appear in July and August during the reproductive stages of sunflower. They feed on the peduncle and leaf petioles which causes girdling. Injury from headclipping weevils can be easily identified by the “clipped” heads or leaves left hanging from infested plants. However, headclipping weevils typically only impact a small proportion of plants within a field and rarely require management.

Identification

Adult headclipping weevils measure approximately ⅓ of an inch long. The body is uniformly black in color and has a slight bronze luster which is characteristic of the species. Like other weevils, they have an elongated snout with antennae originating near the base of the snout (Figure 11.40).

Figure 11.40. Headclipping weevil adult. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Biology and Life Cycle

Adults begin emerging in July and remain active for 2 to 3 weeks. The weevils feed on pollen and nectar, and the females lay their eggs in the sunflower heads. Adults feeding on the peduncle will cause girdling and the heads will hang or fall to the ground. The larvae feed and develop within the detached heads where they eventually overwinter.

Damage

Headclipping weevils are most abundant around the field edges, making the border rows at highest risk of infestation. The main feeding injury associated with this pest involves the girdling at the peduncle which causes head clipping (Figure 11.41).

Figure 11.41. Damage caused by the headclipping weevil. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Scouting

Scout for headclipping weevils by checking several plants in different areas of a field (e.g., X pattern) and counting the adult weevils. The recommended thresholds for headclipping weevils are one adult for every two plants scouted or when the number of clipped heads exceeds 5% of the entire field.

Management

An insecticide may be applied to sunflower heads if the number of headclipping weevils or the percentage of clipped heads reaches threshold levels. However, this pest rarely causes economic injury.

Sunflower Midge

Introduction

The sunflower midge (*Contarinia schulzi* Gagné) has a wide distribution ranging from the northern Great Plains to Texas. Its populations are most abundant in North Dakota, South Dakota and Minnesota. Damage from the sunflower midge results in abnormal head shapes and sizes, which is caused entirely by its larval growth stage.

Identification

Both the adult and larval life stages are quite small and are not the best way to determine if sunflower midge is in a sunflower stand. The damage caused by the larval stage is the best indication. The tan colored, adult sunflower midge is approximately 7/100 of an inch in length with transparent wings. The adult wingspan is approximately 2/10 of an inch. The cream to yellowish orange larvae are 1/8 of an inch in length and are found primarily in the sunflower head.

Biology and Life Cycle

The sunflower midge overwinters as adults in the soil and emerges from June to July. Newly emerged adults only live for a few days, long enough to lay eggs on sunflower bracts. Larvae from these eggs will feed on the edge of the head before moving into the center of the sunflower head and causing the most economic injury to a sunflower. Once mature, these larvae will drop into the soil to overwinter or, if the life cycle started early enough, emerge for a second generation in August.

Injury

Injury caused by severe infestations of sunflower midge will appear as undeveloped heads or heads that are gnarled and twisted. Damage is usually sporadic and near field margins.

Scouting

There are no scouting methods developed for the sunflower midge. However, looking for damaged sunflower heads near field margins is a good way to determine if sunflower midge populations are present.

Management

There are no economic thresholds or chemical controls for the sunflower midge, however, crop rotations and varied planting dates can mitigate or reduce sunflower midge populations. Consult your local agronomist as some sunflower hybrids have been shown to tolerate sunflower midge better than others.

Sunflower Receptacle Maggot

Introduction

The sunflower receptacle maggot *(Gymnocarena diffusa)* is a minor pest of sunflowers in South Dakota. It earns its name by causing damage to the sunflower receptacle during its larval life stage.

Identification

Larvae of the receptacle maggot are yellowish white in color. Mature larvae are around 5/16 of an inch in length and are found within the sunflower head (Figure 11.42). The adult flies of the receptacle maggots are the same length as the larvae, 5/16 of an inch, and have

a wingspan of ¾ of an inch. The wings have a mottled brown pattern, the body is bright yellow, and the eyes are a bright, metallic green (Figure 11.43).

Figure 11.42. Sunflower receptacle maggot larva. Photo courtesy of Adam Varenhorst.

Figure 11.43. Sunflower receptacle maggot adult. Photo courtesy of Keith Roragen, BugGuide.net.

Biology and Life Cycle

The pupal stage of the receptacle maggot overwinters in the soil. In June and early July, adult flies emerge from the soil and lay eggs on sunflower bracts. Larvae hatched from these eggs will move into the sunflower head, feed on the receptacles, and will eventually drop to the soil to pupate. Most larvae will have dropped to the soil by late August and early September.

Injury

Injury to sunflower by the sunflower receptacle maggot is caused entirely by its larval stage. The mature larvae cut a small emergence hole on the underside of the receptacle when they are ready to drop to the soil for pupation.

Scouting

No scouting methods have been developed for the sunflower receptacle maggot. In general, monitor for adult presence in June and early July and look for exit holes in the sunflower receptacle throughout August and early September.

Management

Damage caused by the sunflower receptacle maggot has not been found to cause significant yield loss in sunflower. Therefore, chemical management is not considered necessary to manage this pest. Crop rotations can generally keep sunflower receptacle maggot populations in check.

Sunflower Seed Maggot

Introduction

The sunflower seed maggot *(Neotephritis finalis)*, commonly known as picture winged fly, is a minor sunflower pest in South Dakota that usually does not require management. Picture winged fly adults can be seen throughout the summer as there are two generations per year in South Dakota. The larval life stages cause damage to sunflower buds, resulting in deformed sunflower heads and a reduction in the number of developing seeds on deformed heads.

Identification

Larvae of the sunflower seed maggot are white and ⅕ of an inch in length when mature. Pupae are oblong in shape and range from yellowish-tan at first to reddish-brown when mature. The pupal life stage can be found in the sunflower receptacle during the first-generation lifecycle and in the soil to overwinter during the second generation.

The light brown adults of the sunflower seed maggot are ¼ of an inch in length. The wings are clear with mottled, brown-black markings that form a distinct “X” pattern. Their heads are light, yellowish-brown with green-red metallic eyes. The end of the abdomen is a dark, reddish-brown (Figure 11.44).

Figure 11.44. Sunflower seed maggot adult. Photo courtesy of Adam Varenhorst.

Biology and Life Cycle

The sunflower seed maggot has two generations per growing season. First generation adults emerge in late June while second generation adults emerge in mid-August. First generation adults lay eggs on the bracts and corolla of sunflower buds. Larvae from these eggs burrow into the sunflower heads, feeding on the florets and ovaries. Once these larvae are mature, they'll tunnel into the sunflower receptacle to pupate. Second generation adults will then emerge, lay eggs, and the hatched larvae will feed on developing seeds through August. The second-generation larvae then drop to the soil when mature to overwinter.

Damage

Damage caused by the sunflower seed maggot is different between its two generations. First generation larvae can feed on up to 10 to 12 ovaries and florets, resulting in undeveloped or lost seeds and deformed sunflower heads. The second-generation larvae feed directly on developing seeds.

Scouting

Scouting methods have not been developed for the sunflower seed maggot. However, adults can generally be looked for in late June and mid-August. Larvae and pupae can be found by looking for deformed sunflower heads and digging into the receptacle.

Management

Chemical management is not recommended for the sunflower seed maggot as adults are highly mobile and the larvae are too deep within the sunflower receptacle to be affected by insecticide treatment. However, planting sunflower later may help in avoiding peak emergence of the first-generation adults. Natural enemies (*Pteromalus* spp.) may also keep sunflower seed maggot populations below economic concern.

Sap Feeders

Aphids

Introduction

There are several species of aphids that may be observed on sunflowers in South Dakota. The most observed aphids are the sunflower aphid *(Aphis asclepiadis)* (Figure 11.45), cotton aphid *(Aphis gossypii)* (Figure 11.46), potato aphid *(Macrosiphum euphorbiae)* (Figure 11.47) and the green peach aphid *(Myzus periscae)* (Figure 11.48). In general, aphids are not considered a major pest of sunflowers in South Dakota as populations rarely reach levels that cause yield loss. However, under ideal conditions there is the potential for aphids to be a problem.

Figure 11.45. Sunflower aphid colony. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Figure 11.46. Cotton aphid. Photo courtesy of Jim Baker, North Carolina State University, Bugwood.org.

Figure 11.47. Potato aphid. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Figure 11.48. Green peach aphid. Photo courtesy of Jim Baker, North Carolina State University, Bugwood.org.

Identification

All of the aphid species will be small in size but will vary in color. They have soft bodies and will have two cornicles near the end of their abdomens that are often called “tailpipes” (Figures 11.45-11.48). A colony of aphids on a sunflower plant will consist of all life stages including both winged and wingless adults. On sunflower, these aphids will be reproducing asexually, which can lead to rapid population growth.

Biology and Life Cycle

The exact life cycles and alternative hosts will vary by aphid species. In general, aphid populations reproduce asexually during the summer months. This results in clonal populations comprised of only female aphids that give live birth. The reproduction strategy coupled with short generation times allows aphid populations to increase rapidly. However, these populations are often limited by predators that feed on the aphids.

Injury

Aphids feed on sunflowers using piercing-sucking mouthparts that remove phloem. Small populations of aphids may have little to no observable impact on sunflower health. However, larger populations may cause noticeable plant stress that is observed as yellowing or wilting of the sunflowers.

Scouting

While scouting fields, examine the underside of the sunflower leaves for aphid populations. As there are no set thresholds for aphids in sunflower, individual judgement on the sunflower health and estimates of the aphid populations will be necessary to make management decisions.

Management

Aphids are not considered an economic pest of sunflower and for this reason no management recommendations exist. However, if very large populations of aphids are present in a sunflower field, a foliar applied insecticide labeled for aphids and sunflower could be used to effectively reduce the populations.

Lygus Bugs

Introduction

Lygus bugs are commonly found on sunflowers in South Dakota. However, they are primarily considered to be a pest of confection sunflowers due to the very low threshold. As Lygus bugs feed, they inject digestive enzymes into the plant tissue so that they can easily extract nutrients. This feeding activity leads to scarring on the developing seeds. While it may not impact yields, Lygus bugs can significantly reduce the quality of confection sunflower seeds.

Identification

Adult Lygus bugs are approximately ¼ of an inch in length and pale green to reddish brown in color. There is a yellow triangle on the back and the tips of their wings bend downward at the end of the abdomen (Figure 11.49). Nymphs vary in size depending on their developmental stage. Instead of having fully developed wings, they have wing pads on the back that grow as the nymphs mature. Nymphs are initially pale green in color but develop markings in the later stages, including five characteristic black spots on the back (Figure 11.50).

Figure 11.49. Adult lygus bug. Photo courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

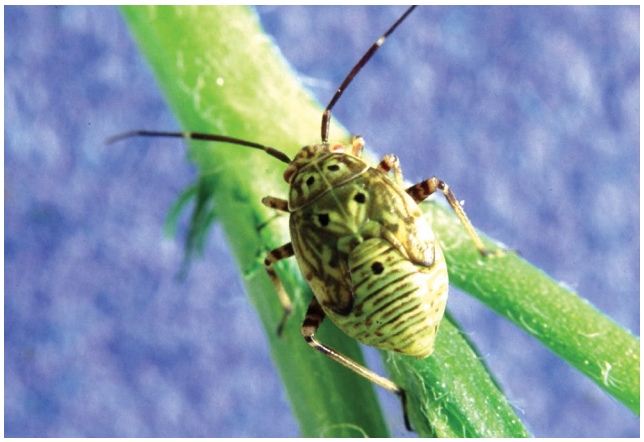

Figure 11.50. Lygus bug nymph. Photo courtesy of Scott Bauer, USDA Agricultural Research Service, Bugwood.org.

Biology and Life Cycle

Lygus bugs overwinter as adults and can have several generations throughout the growing season. Both nymphs and adults feed on sunflowers and will often move in from neighboring alfalfa fields after they have been harvested.

Damage

Kernel brown spot is the main injury concern with Lygus bugs. This occurs when the Lygus bugs inject digestive enzymes into the plant while feeding. The value of confection sunflowers can be severely impacted because the feeding activity causes a visible brown spot on the kernels and gives the seeds a bitter taste. Lygus bugs are capable of damaging over 30 seeds per adult.

Scouting

Monitor sunflower fields for Lygus bugs during flowering as this when the plants are susceptible to damage.

Count the number of adults on several plants at different locations within the field. Due to the low tolerance in confection sunflowers, the threshold is about one adult per ten plants.

Management

Insecticides can be used if Lygus bugs reach threshold levels in a confection sunflower field. This application can be planned when treating for other insect pests (e.g., red sunflower seed weevil, banded sunflower moth) that may be present on sunflowers at the same time. In some cases, a second insecticide application may be necessary to extend the protection of confection sunflower during the flowering stages.

Stem Borers

Dectes Stem Borer

Introduction

Dectes stem borer *(Dectes texanus)* infestations are common in South Dakota sunflower fields. However, this pest is not always readily observed as the larvae are present inside of the sunflower stem. Although this is a common pest, many infested fields will have little to no yield loss unless the larvae are able to girdle the stem and cause lodging. During dry years in South Dakota, we have observed the larvae girdling the stems earlier in the season. The risk of lodging from Dectes stem borer is also greater during dry years as the stem diameters are often reduced. Although the Dectes stem borer is a native insect pest, wild sunflowers are rarely infested. This is due to resistance present in the wild sunflower associated with a tougher epidermis and the production of resin when the females attempt to lay eggs. However, the increased resin production has been bred out of commercial sunflower varieties to reduce issues that it caused during harvesting. Alternative hosts of Dectes stem borer include ragweed *(Ambrosia spp.)*, cocklebur *(Xanthium strumarium)* and soybean *(Glycine max)*.

Identification

The Dectes stem borer adults are approximately ⅜ of an inch long and light gray in color. They will have antennae with alternating light gray and black segments. The antennae will also be much longer than the length of the body (Figure 11.51). Adult Dectes stem borer that emerge from soybean will be considerably smaller in size as soybean is not a high-quality host for their development.

Figure 11.51. Dectes stem borer adult. Photo courtesy of Adam Varenhorst.

Dectes stem borer larvae are ½ to ⅝ of an inch long and legless. They are white to cream colored and have an orange-brown head capsule (Figure 11.52). Due to their body segmentation the larvae are often described as being accordion-shaped. The larvae are present inside of the sunflower stems and their presence in the stem is often indicated by discoloration and the presence of a sawdust-like excrement (Figure 11.53).

Figure 11.52. Dectes stem borer larva. Photo courtesy of Patrick Wagner.

Figure 11.53. Dectes stem borer larva feeding in a sunflower stem. Photo courtesy of Adam Varenhorst.

Biology and Life Cycle

The Dectes stem borer adults emerge from infested plant material beginning in May with peak emergence in mid-June. This extended period of emergence makes it very difficult to manage this pest through reductions of the adult populations. The adults live for approximately 6 to 8 weeks but often don't disperse far from where they emerged. The females chew holes in the underside of the leaf petioles and then deposit eggs into the holes. When the larvae hatch, they bore through the petiole and into the central pith of the plant. The larvae will fight and cannibalize each other until only one larva remains in the plant. In the fall, the larva will descend to the base of the plant and girdle the stem. The larva then forms a chamber below the girdled point and will plug it to provide an overwintering site.

Injury

The stalk boring of the Dectes stem borer larvae has limited to no impact on sunflower yield. However, the girdling behavior can reduce yields by preventing the sunflower head from being harvested. The girdling behavior appears to be triggered by stalk desiccation, which explains why during dry years lodging often occurs earlier in the season when compared to years with adequate moisture. The larvae can only feed approximately ½ of an inch outward from the center of the stalk. For this reason, stalks with a diameter that is greater than 1 inch are less susceptible to lodging caused by Dectes stem borer.

Scouting

Although adults can be scouted for in fields, the best method of scouting is dissecting sunflower stems and determining if a Dectes stem borer larva is present. The presence of a larva can be determined by looking for discolored pith and evidence of a feeding tunnel. Following the tunnel will lead to the larva. Scouting for Dectes stem borer larvae will provide insight into the potential for nearby infestations during the following year. For infested fields, seed moisture should be monitored closely, and the fields should be harvested as early as possible to prevent yield losses due to lodging.

Management

Dectes stem borer adults have an extended emergence period, so it is not economical to manage them to reduce infestations. Similarly, there are no thresholds or remedial insecticide management recommendations for the Dectes stem borer. Delayed planting also doesn't appear to reduce infestations. The best approach is to reduce planting populations to ensure that stem diameters are large enough to prevent girdling.

Sunflower Stem Weevil

Introduction

The sunflower stem weevil *(Cylindrocopturus adspersus)* is a minor to severe sunflower pest throughout most of the Northern Plains. Damage caused by this pest may result in lodged sunflower and can be amplified by a dry growing season. Along with

direct damage caused by the sunflower stem weevil, this pest is also a vector of Phoma black stem and charcoal rot.

Identification

Sunflower stem weevil larvae appear as many of the other sunflower pests, white to yellow body with a dark brown head capsule. However, unlike many sunflower pests, the larvae will be found in the vascular tissue of the sunflower stem (Figure 11.54). The sunflower stem weevil adults are grayish brown in color with irregular white spots covering the body and black eyes. Adults will be ⅛ to 3⁄16 of an inch in length and have a long, beak-like mouthpart tucked under the head (Figure 11.55).

Figure 11.54. Sunflower stem weevil larva. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Figure 11.55. Sunflower stem weevil adult. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

Biology and Life Cycle

Sunflower stem weevils overwinter within chambers at the base of the previous year of sunflower stems. From mid to late June, adults emerge from these overwintering chambers and feed on the leaves of the current year of sunflower. Females will then lay eggs within the lower stems of sunflowers. Females will chew a small hole into the stem, deposit one egg, and cover the hole with frass. Larvae will then feed in the pith area of the stem until fully grown. In August, these larvae descend into the base of the sunflower stem to construct the overwintering chamber.

Injury

Direct injury caused by the sunflower stem weevil is done mostly by its larval life stage. Larvae feed on the vascular tissue of the sunflower stem which usually does not cause economic damage. However, this feeding weakens the stem and can result in lodging. Lodging caused by the stem weevil can become severe and will be worse during times of drought. Adult stem weevils do feed on sunflowers but never enough to cause economic damage. However, adult stem weevils are vectors of Phoma black stem and charcoal rot.

Scouting

Begin scouting for the sunflower stem weevil at adult emergence in mid to late June and continue until mid-July. Using the standard X pattern for scouting is recommended. Adults should be counted on 20 plants per X site. Five different sites should be scouted throughout the sunflower stand. If counts average one adult per three sunflower plants, management is recommended.

Management

If the economic threshold is reached, chemical management is recommended and is usually effective. However, other management tactics can be used to mitigate sunflower stem weevil populations. Planting sunflower from early to late June may help in avoiding the sunflower stem weevil adult emergence. However, lower yields should be expected due to the sunflower having less time to mature before harvest. Planting sunflower at lower populations may also help if sunflower stem weevils are known to have caused issues in previous years. The reason being that sunflowers will have more space and produce larger stems that are more resistant to lodging. Sunflower hybrids are also available that exhibit tolerance to the sunflower stem weevil.

Sunflower Maggot

Introduction

Although the sunflower maggot *(Strauzia longipennis)* is a widespread pest and can be found in most sunflower fields, it is not considered a major pest of sunflowers. This is attributed to the fact that the larvae of the sunflower maggot feed in the stalks of sunflowers and not on the heads or seeds. This feeding activity by the larvae has little to no impact on the development of the sunflower. For this reason, management strategies have not been developed for this pest.

Identification

The sunflower maggot adults are flies that are approximately ¼ to 5/16 of an inch long. The flies have a yellow head and legs, and their bodies are light orange (Figure 11.56). The wings are clear with dark yellow to black bands on them. Near the wing tip, the bands form a reversed "F" shape. The flies also have iridescent eyes that range in color from green to orange.

Figure 11.56. Sunflower maggot adult. Photo courtesy of Florida Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Bugwood.org.

The larvae of the sunflower maggot are white to cream in color. They do not have a head or legs. During the last larval stage, they are approximately ¼ to 1/3 of an inch long.

Biology and Life Cycle

There is only one generation of sunflower maggots each year. The adults begin emerging at the end of May and continue until mid-June. The sunflower maggot adults are attracted to sunflower and can be observed visiting sunflowers until the end of July. The female flies lay eggs near the growing point of the stalk. When the eggs hatch, the larvae burrow into the stalk and begin tunneling in the pith of the stem. The larvae exit the stalks in August and move into the soil near the exited sunflower stalk. Sunflower maggots overwinter as larvae and pupate during the following spring.

Injury

The larvae tunnel in the pith of the stalks but this activity is not associated with observed yield loss. The pith is important for stalk support but does not play a role in nutrient or water movement in the plant. When sunflower maggot infestations reach 8 to 10 larvae per plant, some breakage may be observed. Although in some fields, 100% of the plants may be infested, but the larvae are normally not present in high population densities. It is possible for the sunflower maggot tunnels to serve as an entry point for plant diseases.

Scouting

The sunflower maggot is not associated with economic losses, so no scouting protocol has been developed. Infestations are more common near road ditches or grass waterways. If lodging or stalk breakage is observed, examine the pith to determine if sunflower maggot larvae are present.

Management

No management recommendations exist for sunflower maggot. Insecticide applications are not recommended for this insect.

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