Kansas State University Agricultural Experiment Station and Cooperative Extension Service

KANSAS CROP PESTS

K-STATE Research and Extension

Sunflower Seed Weevils

Introduction

Two weevil species attack sunflower seeds in Kansas — the gray seed weevil, *Smicronyx sordidus*, and the red seed weevil, *Smicronyx fulvus*. Both maintain populations throughout the state and produce one generation per year, causing variable levels of yield loss in commercial production. Natural host plants are wild sunflower and other annual composite flowers. Although wild plants do host these pests, large and economically damaging populations usually occur in regions with a history of commercial sunflower cultivation.

Figure 1. Gray seed weevil adult

Figure 2. Gray seed weevil larva in seed

Figure 3. Bract removed to reveal gray seed weevil

Gray Seed Weevil

Identification

The gray seed weevil is about ¼ inch (8 mm) long and pale gray, with a gently curving snout about half as long as the body (Figure 1). Cream-colored, legless grubs enter developing seeds and consume contents (Figure 2), leaving the seed swollen and empty. Larvae normally leave seeds before harvest, and most affected seed is lost in the process of harvesting because of its low weight.

Life History and Behavior

Adults emerge in late spring and enter sunflower fields that are approaching bloom. Both sexes feed on flower buds underneath the bracts (Figure 3), causing only minor damage. Females favor flowers in the late bud stage for oviposition. They lay eggs singly at the base of developing seeds, focusing on those around the outer edge of the flower disk. After hatching, larvae bore into seeds at the base, destroying the ovaries. Mature larvae exit and drop to the ground and seek overwintering sites in the soil. Pupation occurs around late May of the following year, and adults emerge shortly thereafter.

Management

No economic threshold has been established for the gray seed weevil, and it is generally considered a less serious pest than its cousin, the red seed weevil, because females lay fewer eggs and damage fewer seeds. Postharvest downgrade due to infestation is less likely a result of gray seed weevil damage because most larvae exit seeds before harvest and damaged seeds either exit the harvester as 'pops' in the trash, or are removed during threshing. On the other hand, yield losses caused by gray seed weevil are difficult to estimate and can easily go unnoticed. Red seed weevil thresholds can be used for gray seed weevil, but insecticide treatments should target adults before eggs are laid. This would require a pesticide application before bloom, around the R-4 stage, which can be difficult to justify when farmers must budget for the likelihood of a later spray to control sunflower moth and/or red seed weevil.

Red Seed Weevil

This is a small, reddish-brown weevil that is ⅛ inch (3 to 4 mm) long with a snout less than half the length of the body (Figure 4). Adults are most easily seen on the faces of blooms, often covered with pollen, or hiding behind the flower bracts. Infested seeds are not noticeably different from healthy ones, and larvae do not completely consume the seed contents (Figure 5). Mature larvae abandon seeds via an exit hole chewed near the top.

Figure 4. Adult red seed weevil

Life History and Behavior

Mature larvae of red sunflower weevil overwinter in the soil and pupate the following summer. Adult emergence typically peaks mid-July to early August. Unlike gray seed weevil, adult red seed weevils seek sunflowers already in bloom. Females must feed on pollen

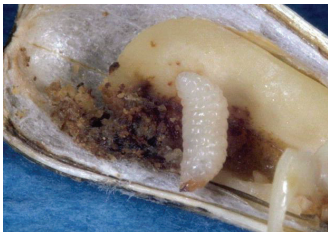

Figure 5. Larva of red seed weevil in seed

for at least four days before they can produce eggs. Because each egg is laid directly into a seed in the appropriate developmental stage, there is a narrow window of seed susceptibility. Few seeds are suitable for oviposition before the flower reaches R-5.4 (40% of florets shedding pollen), and most seeds are too hard once anthesis (flowering) is complete. Because adult activity on flowers tends to peak around R-5.5, most infested seeds occur in a band encircling the center of the flower disk. Those infested by gray seed weevil tend to be concentrated along the edges.

Developing larvae usually do not consume the seed completely, but reduce kernel weight and oil content. Usually only one larva per seed can be found, but sometimes two. Larval development timing is such that a percentage of larvae may still be present in seed at harvest, leading to temperature and moisture problems in storage. Because the weight of infested seed is not altered significantly, it is not removed by conventional threshing or cleaning. Although live larvae will eventually exit seeds, dead larvae remain and seeds, especially those for the confection market, may be downgraded. Small exit holes in seeds may indicate red seed weevil infestation postharvest, but similar damage may occur from sunflower moth feeding.

Management

Because the red seed weevil emerges relatively late, earlier planting dates may decrease damage, but early planting alone cannot be relied upon to provide control. Although tillage has been shown to reduce survival of overwintering weevils, it is not advisable in Kansas where soil moisture conservation usually is a priority. Insecticide treatments directed at sunflower moth typically coincide with periods of weevil activity and may provide simultaneous control of both pests. Scouting for red seed weevil is advisable when insecticides are not applied for sunflower moth, especially in confection cultivars. This should be done as 80% of plants in a field reach the R-5.4 stage (40% of pollen shed), and continue until a majority of flowers reach R-5.7 (70% of pollen shed), at which point most seeds are no longer suitable for oviposition. Walking in a large 'X' pattern is recommended. Ensure that samples are obtained at least 100 feet within the field; avoid field borders because these tend to collect higher numbers of weevils. Select five of the most mature flowers at each of five sites in the field and spray the faces with a DEET-containing mosquito repellent. This will cause weevils to exit flowers quickly so they can be counted more easily.

Detailed formulas have been developed to calculate economic thresholds for red seed weevil that factor in application costs and projected crop value. In general, the threshold for oilseed sunflowers falls somewhere between 10 and 15 weevils per flower. The threshold is much lower for confection varieties – usually 1 or 2 weevils per flower – because of industry standards that demand seed damage remain below 3 to 4% of kernels. Research suggests that approximately 27 damaged kernels result for every adult red seed weevil observed at the early bloom stage. Following an early treatment, scouting should continue at 2- to 3-day intervals as adult emergence continues over several weeks. In the case of a significant infestation, harvest may be delayed until a majority of larvae have left the seeds. Refer to the latest edition of the K-State Research and Extension publication *Sunflower Insect Management* (MF814) for a list of registered insecticides that include sunflower seed weevils on the label.

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Photo Credits

Figures 1 and 3, J.P. Michaud

Figure 2. National Sunflower Association

Figure 4. NDSU Extension Entomology

Figure 5. Frank Peairs, Colorado State University

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