

# Red Sunflower Seed Weevils in South Dakota



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**Adam J. Varenhorst**, Associate Professor and SDSU Extension Field Crop Entomologist

**Aaron Hargens**, SDSU Graduate Student

**Shelby Pritchard**, former SDSU Extension IPM Specialist

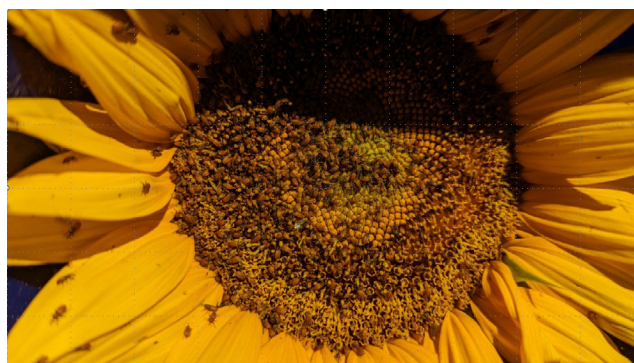
**Patrick Wagner**, SDSU Extension Entomology Field Specialist

**Bradley McManus**, SDSU Extension IPM Specialist

**Philip Rozeboom**, SDSU Extension IPM Coordinator

## Introduction

The red sunflower seed weevil, *Smicronyx fulvus* LeConte (Coleoptera: Curculionidae), is an annual pest of sunflower in South Dakota. This pest is native to North America and is one of the factors that led to the historical decline of sunflower production in Illinois and Missouri (Satterthwait 1946). Since 1978, the red sunflower seed weevils have been reported as economic pests in South Dakota (Gednalske 1983). During a severe infestation, 50% of the sunflowers in a field may have as many as 80% of the achenes infested by red seed weevil larvae (Cobia and Zimmer 1978). Since 2017, pyrethroid field failures have been reported from several counties in South Dakota (Varenhorst et al. 2024). In addition, very large sunflower seed weevil populations have been observed throughout much of South Dakota since 2016 (Figure 1). Recent surveys in South Dakota indicate that the red sunflower seed weevil is the most economically damaging insect for sunflower production, with populations that continue to increase (Prasifka et al. 2021). In addition, researchers at South Dakota State University have determined that populations of red sunflower seed weevils in South Dakota are highly resistant to the active ingredients lambda-cyhalothrin, esfenvalerate, deltamethrin, and beta-cyfluthrin (Varenhorst et al. 2024).



**Figure 1.** Sunflower head severely infested with red sunflower seed weevil adults. Photo courtesy of Philip Rozeboom.

## Identification and Biology of Red Sunflower Seed Weevils

**Description.** Red sunflower seed weevil adults are approximately 2.5-3 mm long. They have a reddish-orange color due to the presence of small hairs on their body (Figure 2) (Satterthwait 1946). The adults have an elongated snout with small bent antennae that originate from the snout. The females are approximately twice as large as the males. The larvae of the red sunflower seed weevil are legless, cream colored, and have a slight curve in their bodies (Oseto and Braness 1979a). They have a light brown head capsule (Figure 3). The larvae are not commonly observed as they are present within the pericarp. They may be observed when sunflowers are harvested, and seeds are dissected or when heads or seeds are harvested and left in a bag.

**Lifecycle.** Red sunflower seed weevils undergo a single generation in South Dakota. The adults emerge from the soil of the previous year's sunflower fields **starting** in late June through July and remain active until September (Oseto and Braness 1979b). The adult red sunflower seed weevils begin emerging when 850-900 soil degree days have accumulated (Pantzke et al. 2024). Male red sunflower seed weevils are attracted to sunflowers and arrive before females during the bud stages (Peng and Brewer 1995a). The female weevils arrive later and are attracted to a pheromone that is produced by the males (Roseland et al. 1990). Before the flowering stage (R5) weevils feed on stems, petioles, and bracts of the plants, but do not cause significant injury. At the onset of flowering (R5), adults will feed on pollen. The adults begin mating after flowering (Kandel et al. 2020). The female red sunflower seed weevils must feed on pollen for four to seven days before they are able to lay eggs (Korman and Oseto 1989). After enough pollen is consumed to produce viable eggs, the female weevils chew a small hole in the achene wall and then lay a single egg per achene (Brewer 1991). In rarer cases, more than one egg may be laid per achene.



**Figure 2.** Red sunflower seed weevil adult. Photo courtesy of Adam Varenhorst.



**Figure 3.** Red sunflower seed weevil larva. Photo courtesy of Frank Peairs, Colorado State University, Bugwood.org.

The larvae hatch approximately one week later and feed on the kernel until they reach larval maturity (August-September) (Oseto and Braness 1979b). Red sunflower seed weevils go through five instars or larval growth stages (Oseto and Braness 1979b). When larvae reach the end of the fifth instar, they will chew an exit hole approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  of the distance between two ends of the seed and drop to the soil (Peng and Brewer 1995b). Their emergence from the seeds begins in mid-August through September (Oseto and Braness 1979b). Because the larvae are not highly mobile, when they drop from the sunflower head, they become concentrated in the soil (Oseto and Charlet 1981). The majority of the larvae then burrow into the soil to a depth between 0-7.5 cm (Gednalske and Walgenbach 1984). A smaller percentage of the larvae will overwinter at depths between 7.6-15 cm (Gednalske and Walgenbach 1984). The larvae will overwinter in the soil for approximately 10 months and pupate during the following spring from June to July (Oseto and Charlet 1981, Oseto and Braness 1979b).

### Scouting and Threshold

Scouting for red sunflower seed weevils should begin when fields are between R5.0 (50% of the plants in the field have yellow ray petals) to R5.3 (30% of the head is shedding pollen) and the rest of the plants are still in the bud stage (Peng and Brewer 1995a). Scouting should continue until either the economic threshold is reached, or most of the field has reached R5.7 (70% of the head is shedding pollen). After R5.7, the likelihood of additional seed infestation is decreased due to reduced egg laying and hardening of the seed coats (Varenhorst et al. 2021). In addition, red sunflower seed weevil females display a preference for laying eggs in the achenes that are at an intermediate maturity (i.e., the outer edge of the sunflower head) (Brewer 1991).

To determine the population of red sunflower seed weevils in a field, evaluate five heads from five different sampling sites throughout the field (total of 25 plants scouted in each field). The sampling sites should be 75 feet from the edge of the field and cover each side of the field and an area towards the middle. At each sampling site, five randomly selected plants should be examined to determine the number of red sunflower seed weevil adults present. To ensure that all the adults are counted, it is recommended to spray the selected head with an insect repellent containing DEET. This will cause the beetles to move out of the head and make them much easier to count. Once 25 heads are examined, calculate the field average (total seed weevils divided by 25 plants) and compare it to the recommended threshold of four to six weevils per

head for oilseed and one weevil per head for confection sunflowers. (Charlet and Oseto 1982).

## **Damage to Sunflowers**

Adult red sunflower seed weevils may feed on the bracts prior to flowering; however, this defoliation injury does not cause yield loss. The feeding activity of the larvae are the main source of economic loss attributed to red sunflower seed weevils. Although the larvae of the red sunflower seed weevil do not consume entire seeds, they are still capable of causing considerable yield loss (Peng and Brewer 1995b). Sunflower seeds that are partially consumed or destroyed by the larvae have lower oil content and seed weight. In addition, if infested sunflowers are harvested too early, the larvae may still be present in the seeds. This can lead to storage issues caused by heating and excess moisture. It can also lead to lower grain quality during inspection due to the presence of the larvae. In some rare instances, observation of small wasps emerging from the sunflower seeds while in storage may occur. Although this typically is observed during the following spring, warm falls may cause an earlier emergence of the wasps. These wasps are parasitoids of the red sunflower seed weevil larvae and were present in the larvae when the seeds were stored. The wasps do not pose a direct threat to the sunflower seeds, but may lead to heating, moisture, and docking due to their presence in the grain.

## **Management Options**

When red sunflower seed weevil populations exceed the economic threshold, foliar insecticide management is recommended. Insecticide treatment should occur between R5.0 and R5.4 growth stages to reduce red sunflower seed weevil damage (Peng and Brewer 1995a). Although red sunflower seed weevils are present in the field prior to R5.0, treatment that occurs too early in the season can result in re-infestation and additional treatments may be necessary (citation needed). Insecticide applications should not occur after R5.7 as the majority of eggs have already been laid and treatment will not reduce infestation levels (citation needed). Fields should be scouted 48 hours after insecticide application to ensure that the weevil populations were successfully reduced. If red sunflower seed weevil populations persist after 48 hours, additional treatment is necessary. The second application should not be the same active ingredient or same class of insecticides. For South Dakota, we do not recommend using pyrethroid insecticides alone or in a tank mix for red sunflower seed weevil management (Varenhorst et al. 2024).

Alternatively, planting earlier in the season reduces red sunflower seed weevil infestation and damage. This is achieved by the sunflower being beyond the susceptible growth stages when the weevils emerge. Historical data and recent research in North Dakota and South Dakota indicate that planting in early May can significantly reduce the damage caused by red sunflower seed weevils when compared to sunflower planted within one week of the crop insurance date (Oseto et al. 1987, Prasifka et al. 2025).

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