Science Societies

Weevils galore: Monitoring and management of weevils in field crops

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May 5, 2026

A sweep net is essential for monitoring cabbage seedpod weevil adults, whose larvae later feed on developing seeds of canola and brown and wild mustards.

There were several species of weevils that were at quite high levels in crops in parts of the Canadian Prairie Provinces in 2025. This article will cover the diversity of weevils and some of the different types (subfamilies) of economic importance to agriculture. Cabbage seedpod weevil, pea leaf weevil, and alfalfa weevil will be profiled with explanations on how they damage the crops they feed on, how to monitor for them, and management tips.

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There were several species of weevils that were at quite high levels in crops in parts of the Canadian Prairie Provinces in 2025. Among these were the cabbage seedpod weevil [*Ceutorhynchus obstrictus* (Marsham)], pea leaf weevil, [*Sitona lineatus* (L.)], and alfalfa weevil, [*Hypera postica* (Gyll.)]. For all three of these weevils, it is the larvae that, at high enough levels, can do economic damage to crops, but they affect very different part of the plants.

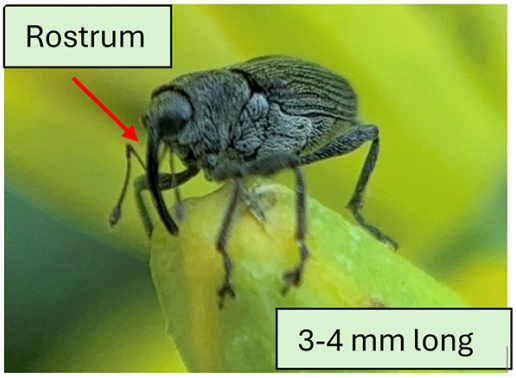
Weevils are one of the most diverse groups of any animal, and not all are considered potential pests. Some can be beneficial to agriculture, and many have important ecological roles.

This article will cover the diversity of weevils, and some of the different types (subfamilies) of economic importance to agriculture. Cabbage seedpod weevil, pea leaf weevil, and alfalfa weevil will be profiled with explanations on how they damage the crops they feed on, how to monitor for them, and management tips.

What is a weevil?

There are seven related families of beetles that collectively make up the weevils; these are grouped as the superfamily Curculionoidea.

Weevil adults



Cabbage seedpod weevil adult on the end of a canola flower bud.

Most adult weevils have an elongated snout (called a rostrum). Don't assume because they have a snout that they have piercing and sucking mouthparts. There is a pair of tiny mandibles at the end of the snout, so weevils have chewing mouthparts. In some groups of weevils, this snout can be broad and short. The largest family of weevils, called the true weevils (Curculionidae), usually have elbowed antennae while other families of weevils usually have straight antennae (Marshall, 2018).

Weevil larvae

Larvae of weevils are soft and legless, or almost legless. Many weevil larvae develop inside stems, seeds, roots, or other plant material although some feed on (rather than in) plant parts. In some foliage-feeding species of weevils, larvae have developed leaf-gripping appendages similar to the unsegmented prolegs of caterpillars and sawflies (Marshall, 2018).

Diversity and types of weevils

Weevils are an extremely diverse group of beetles with more than 60,000 named species (Marshall, 2018). To put this into perspective, there are just over 11,100 species of birds in the world (Clements et al., 2025). Thus, there are over five times as many species of weevils in the world that have been identified as there are birds. There are 963 species of weevils that are currently known from Canada with 826 of these belonging to the true weevils (Curculionidae) (Bunke et al., 2019). A lot of weevils have been introduced, and 107 of the 826 species of true weevils in Canada are non-native species. The true weevils, being a very diverse family, are divided into many subfamilies.

In this article we will cover three weevils, all of which are introduced, have larval stages that can be damaging to crops, but feed on very different parts of their host plants. All are true weevils, and for each, the subfamily of true weevils that they belong to will be introduced before covering feeding habits, monitoring, and management.

Aside from the three weevils profiled here, there are many others that will feed on field crops in North America. These include the sweetclover weevil (*Sitona cylindricollis*), whose feeding from the adult weevils can be economically damaging in sweet clover, and the lesser clover leaf weevil (*Hypera nigrirostris*), whose feeding from the larvae on stipules, buds, and flower heads can be damaging in clovers. There are several weevils

that will feed on sunflowers, including the red sunflower seed weevil (*Smicronyx fulvus*), gray sunflower seed weevil (*Smicronyx sordidus*), sunflower headclipping weevil (*Haplorhynchites aeneus*), and sunflower root weevil (*Baris strenua*). Some weevils have been released for weed control in western Canada. These include the scentless chamomile seed weevil (*Omphalapion hookeri*), the Canada thistle bud weevil (*Larinus carlinae*), the nodding thistle receptacle weevil (*Rhinocyllus conicus*), the purple loosestrife root borer (*Hylobius transversovittatus*), and the purple loosestrife flower weevil (*Nanaophyes marmoratus*).

Cabbage seedpod weevil

Minute seed weevils

Cabbage seedpod weevil belongs to a subfamily of weevils known as the minute seed weevils (Ceutorhynchinae). This group of weevils includes both potential crop pests as well as species that are biological control agents of weeds. There are 85 species of minute seed weevils in Canada and 36 species in Manitoba (Bousquet et al., 2013).

Host plants

Cabbage seedpod weevil larvae feed on canola and brown and wild mustards. Adults will feed on cole crops, flixweed, stinkweed, and hoary cress. Yellow mustard is not a host (Philip et al., 2018).

Cabbage seedpod weevil larva.

Feeding habits

Cabbage seedpod weevil adults feed on buds and flowers. This can cause bud blasting but generally does not affect yield. Larvae feed on developing seeds within the seedpods. In canola, larvae feed on five to six seeds, which reduces the yield of a

seedpod by approximately 18% (Williams & Free, 1978).

Monitoring

A sweep net is essential. Take sweep samples to look for the adult weevils from early bud stage through flowering. Ideally, take ten 180-degree walking sweeps at five locations along the field edge and five locations inside the field, spreading out where samples are taken. If this is not possible or practical, at the very minimum, take samples at two opposite corners of the field, taking two samples 50 m (≈55 yd) apart at each location, one along the edge and another inside the field. The economic threshold in canola is 25 to 40 weevils per 10 sweeps (Cárcamo et al., 2019).

Management options

In the spring, wild Brassicaceae (such as flixweed, stinkweed, and hoary cress) and volunteer canola provide a food source for adult cabbage seedpod weevils emerging from overwintering sites. Adults then migrate into canola crops at the bud to early flower stage (Dosdall & Moisey, 2004). Monitoring adult populations feeding on these non-economic hosts in spring could provide an indication of potential infestations.

Trap cropping, if practical, could be an option in areas with high cabbage seedpod weevil populations. Trap cropping involves planting a highly attractive crop to concentrate high numbers of a pest in an area where they can be sprayed with an insecticide. Research in Alberta found that earlier flowering borders of canola in large square fields (e.g., 1.6 km^2, or ≈395 ac) concentrated very large numbers of cabbage seedpod weevil (Cárcamo et al., 2007). Growers were able to control the weevils with an insecticide and prevent their movement into the main crop. However, smaller or narrow fields under heavy cabbage seedpod weevil attack could not be protected with a trap crop.

Insecticides are available for the management of cabbage seedpod weevil, but all products currently registered in Canada are broad spectrum and would be applied to a crop that has begun flowering. Although canola may still produce good yields in the absence of pollinators, pollinators result in improved yields and contribute to uniform and early pod setting.

Thus, it is important that insecticides only be applied if the threshold for cabbage seedpod weevil has been surpassed and applied as late in the day as possible. Damage can occur in several ways if this is not followed and insecticide is applied or tank-mixed with other applications at flowering, when economic thresholds for cabbage seedpod weevil have not been reached. Such applications can inadvertently result in reduced yield potential if the yield boost from pollinators is negated by the insecticide and can additionally reduce predator and parasitoid populations.

Pea leaf weevil

Broad-nosed weevils

"It is important that insecticides only be applied if the threshold for cabbage seedpod weevil has been surpassed and applied as late in the day as possible."

Pea leaf weevil belongs to a subfamily of weevils known as broad-nosed weevils (Entiminae). Weevils in this subfamily have a broad and short rostrum. There are 110 species of broad-nosed weevils in Canada and 18 species in Manitoba (Bousquet et al., 2013). Larvae of broad-nosed weevils usually occur in the soil, where they feed on the roots of plants. Adults feed along the edges of leaves, resulting in a notched or ragged appearance (Marshall, 2018).

Left panel: *Pea leaf weevil larva (left) and pupa (right).* ***Right panel:*** *Pea leaf weevil adult.*

Host plants

Larvae of pea leaf weevil feed on the nitrogen-fixing nodules of field peas and faba beans. In addition to these plants, adults will feed on other cultivated and wild legumes, such as alfalfa, clover, beans, lentils, lupins, and vetch (Philip et al., 2018).

Feeding habits

Notching to peas from pea leaf weevil adults. Photo by Abi Benson.

Adults of pea leaf weevil become active in the spring when temperatures rise above 0°C (32°F) and begin spring dispersal flights when daily average temperatures rise above 12°C (53.6°F) (Hamon et al., 1987). Adults feed on the margins of leaves of host plants, resulting in “u”-shaped notches. This is not usually economical; however, significant foliar feeding might have an impact when pea leaf weevil densities are quite high. Larval feeding on the nitrogen-fixing nodules can reduce nitrogen fixation by the plant, resulting in poor plant growth and low seed yields.

Monitoring

Examining the leaves of young plants for notches from the adult weevils can help determine abundance. Although nominal economic thresholds have been developed based on notching on the clam (or terminal) leaves, foliar insecticides currently registered for pea leaf weevil have not been very effective.

Management options

Crops grown in fields with sufficient nitrogen are at less risk of damage from pea leaf weevil. Seeding crops as early as practical and inoculating and fertilizing can result in more mature, vigorous plants better able to withstand feeding from pea leaf weevil.

Field peas or faba beans can be used as trap strips in the spring and late summer to concentrate adult weevils. Trap crops can then be sprayed with insecticides to reduce pea leaf weevil population densities before dispersal into spring-planted crops or before overwintering begins.

Seed treatments may provide some protection, but when pea leaf weevil levels are very high, they may not result in improved yields (Vankosky et al., 2011).

Alfalfa weevil

Cocoon weevils

Alfalfa weevil belongs to a subfamily of weevils that are sometimes commonly called cocoon weevils (Hyperinae). There are 12 species of cocoon weevils in Canada (Bousquet et al., 2013) and six species in Manitoba. Most larvae in this subfamily feed outside, rather than within, plant tissues. They construct mesh-like cocoons to pupate.

Alfalfa weevil entered North America on three separate occasions, resulting in three different strains in North America, referred to as the western, eastern, and Egyptian strains. Alfalfa weevil from the three Prairie Provinces in Canada (Alberta, Saskatchewan, and Manitoba) belong to the western strain (Soroka et al., 2024).

Alfalfa weevil adult.

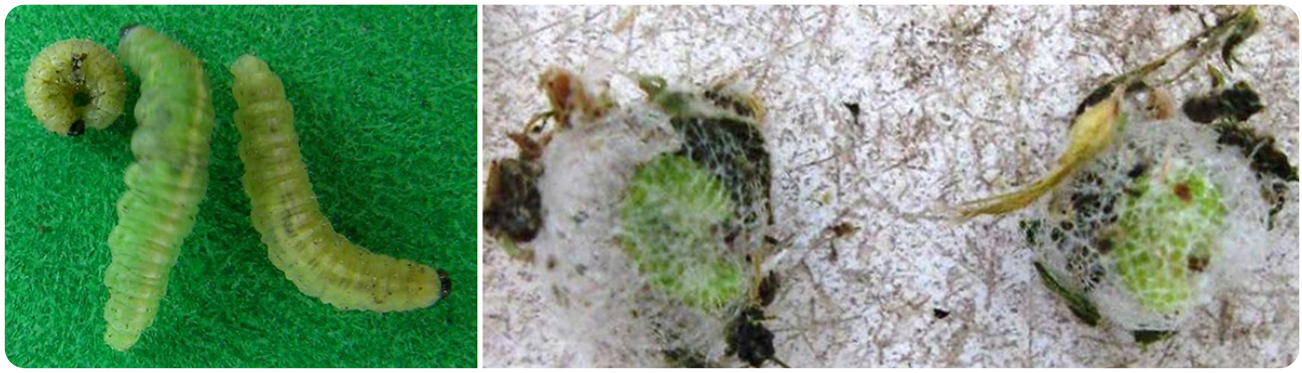
Host plants

Alfalfa is a host plant and occasionally clovers and vetches as well.

Feeding habits

Adults feed on alfalfa leaves, making round, elongate holes in the leaves. When females are ready to lay eggs, they chew a hole in the stem and deposit from 1 to 40 eggs.

It is feeding from the larvae that can potentially result in economic damage to alfalfa. Young larvae feed within the stem for three to four days and then move to feed on developing tips and buds. Older larvae skeletonize upper leaves. With extensive feeding, the crop may have a whitish sheen or frosted appearance when viewed from the field edge.



Left: *Alfalfa weevil larvae.* ***Right:*** *Alfalfa weevil pupae.*

Monitoring

In **hay crops**, alfalfa weevil levels are monitored using the shake-bucket method**.** To do this, walk in a "W" pattern, randomly collect 30 stems by cutting them at the base (pruning shears can be used for this). Invert each cut stem over a pail or bucket, and beat it against the side to dislodge any larvae. Alfalfa weevil larvae will drop to the ground when disturbed, so do not excessively disturb larvae while collecting plants to sample. Count the larvae, and measure and record average height of the crop.

Economic thresholds for hay crops vary with the height of the crop:

- < 30 cm plant height—one larva per stem
- 30 to 40 cm plant height—two larvae per stem

Three larvae per stem is commonly considered above the economic threshold for hay crops, regardless of plant height. On regrowth for the second crop, two or more active

larvae per crown (4 to 8 larvae per ft^2) may require control.

For **seed crops**, either damage assessments or sweep-net sampling can be used.

For damage assessments, randomly select stem terminals and assess the percentage of tips showing feeding damage. For sweep-net sampling, take ten 90-degree sweeps at each of several locations in the field using a 38-cm sweep net. Sweep-net sampling is only effective when alfalfa is at least 20 to 25 cm high.

The economic threshold in alfalfa seed crops is 35 to 50% of leaf tips showing damage, or 20 to 30 third or fourth instar larvae per sweep. The sweep net threshold is a nominal threshold, not backed up well by research, and research on economic thresholds in alfalfa seed crops is needed.

Management options

Hay fields can be cut in early bloom to manage high densities of alfalfa weevil larvae. Larvae are killed by desiccation or starvation.

Hay fields can be cut in early bloom to manage high densities of alfalfa weevil larvae. Larvae are killed by desiccation or starvation. Photo courtesy of Adobe Stock/imfotograf.

Several insecticides are registered for control of alfalfa weevil. In seed fields, insecticide use decisions must also consider activity of the alfalfa leafcutting bee, *Megachile rotundata*, and other pollinators. Resistance to synthetic pyrethroids has been noted in alfalfa weevil populations in southern Alberta (Mori, 2020) and is widespread in some western U.S. states (Rodbell et al., 2022).

The parasitic wasps *Bathyplectes curculionis* (Ichneumonidae), *Oomyzus incertus*

(Eulophidae), and *Microctonus colesi* (Braconidae) are present in some regions of the Canadian Prairies (Soroka et al., 2020) and can help regulate alfalfa weevil levels.

Conclusions

Weevils are a very diverse group of beetles. Although many species can be present in crops, not all are considered pests, and there are beneficial species of weevils. In canola, field peas, and alfalfa, it is advised to monitor levels of cabbage seedpod weevil, pea leaf weevil, and alfalfa weevil, respectively. Once levels are assessed, management strategies can then be planned if needed.

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1. For the weevils profiled in this article, which stage of the life cycle can cause economic damage to crops?

a. Eggs.

b. Larvae.

c. Pupae.

d. Adults

2. Which feature is common in most adult weevils?

a. Elongated snout.

b. Piercing-sucking mouthparts.

c. Enlarged hind legs.

d. Transparent wings.

3. Approximately how many named species of weevils are known worldwide?

a. 6,000.

b. 20,000.

c. 40,000.

d. More than 60,000.

4. Which of the following crops is the primary host for cabbage seedpod weevil larvae?

a. Field peas.

b. Canola.

c. Alfalfa.

d. Sunflower.

5. Where do cabbage seedpod weevil larvae feed?

a. On leaf surfaces of canola plants.

b. On plant roots below the soil surface.

c. Inside the main stems of mature plants.

d. On developing seeds inside the seedpods.

6. What is the recommended tool for monitoring cabbage seedpod weevil adults?

a. Light trap.

b. Sticky cards.

c. Pitfall trap.

d. Sweep net.

7. Pea leaf weevil larvae primarily feed on which plant structure?

a. Nitrogen-fixing nodules.

b. Leaves.

c. Seeds.

d. Flower buds.

8. Adult pea leaf weevils cause which type of feeding damage?

a. Shot-hole damage.

b. Skeletonized leaves.

c. Stem boring.

d. U-shaped notches.

9. What visual symptom may indicate heavy alfalfa weevil larval feeding?

a. Yellow striping.

b. Frosted or whitish appearance.

c. Leaf curling

d. Wilting at the base

10. What monitoring method is commonly used for alfalfa weevil in hay crops?

a. Sweep-net sampling.

b. Stem dissection.

c. Shake bucket method.

d. Soil cores.

This quiz was drafted with AI assistance and reviewed by humans for accuracy and appropriateness.

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