

# Alfalfa Weevil: Curculionidae

## Biology and Management Fact Sheet

**Background:** Alfalfa weevil (*Hypera postica* Gyllenhal, Coleoptera: Curculionidae) was first found in Canada in south eastern Alberta and south western Saskatchewan in 1954, but it wasn't until about 40 years later that it became a noticeable pest in alfalfa fields in other parts of Saskatchewan and into Manitoba. The weevil is now present in most alfalfa seed-producing areas of the prairies.

### Appearance and Biology:

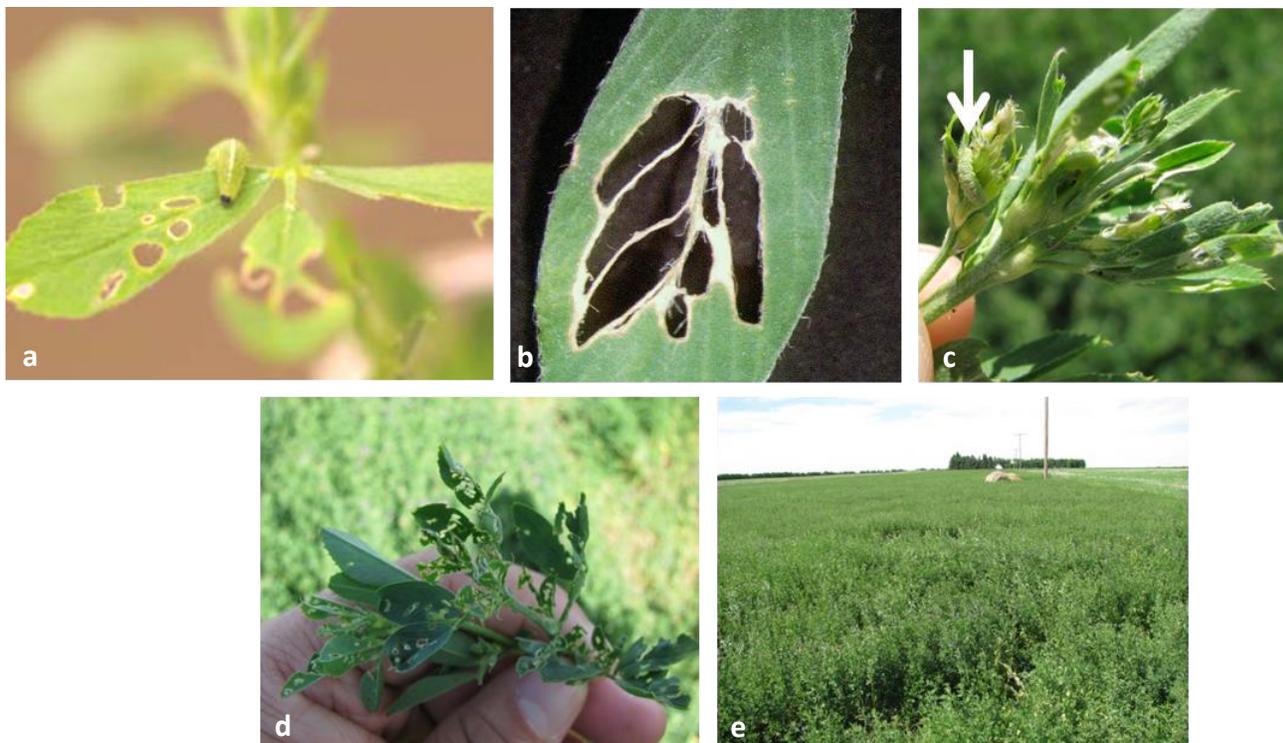
The alfalfa weevil adult is a brown snout beetle, 6 to 7 mm in length (Fig. 1a). It feeds on alfalfa (its main host), sweet clover, true clovers, and vetches. It overwinters as an adult within alfalfa crowns or crop debris in or near alfalfa fields. In spring, gravid female weevils lay eggs in clusters of five to 20 eggs per cluster, at first on alfalfa leaves, leaf sheaths, buds, petioles or in the surface litter, and later, in alfalfa stems (Fig. 1b). When laid, the oval eggs are creamy yellow in colour, and darken to brown just before hatching, which occurs 4-21 days after egg-laying. The worm-like larvae pass through four growth stages or instars (Fig. 1c). The first instar is about 1 mm long and light yellow or tan in colour, with a darker head. The second instar is yellowish-brown with the head darkening to black, while the third and fourth instars measure up to 9 mm long, are bright green with a shiny black head capsule, and have a white stripe down the center of their backs (Fig. 1d). The larvae have a characteristic curled 'C' position when feeding and drop to the ground when disturbed. Larval development takes three to four weeks, and peak larval activity occurs from late June to mid-July. The late fourth instar larvae spin lacy white cocoons attached to plant crowns or surface debris (Fig. 1e), within which pupation takes place (Fig. 1f, pupa). The pupal period lasts 1-2 weeks, after which new adults appear (Fig. 1g). These new adults are light brown in colour with a darker mid-back stripe; as the season ends the beetles become darker brown over their entire backs. Adults feed briefly in the late summer and then seek overwintering sites in and near alfalfa fields. There is one generation a year.



**Figure 1. Alfalfa weevil growth stages: a) overwintered adults; b) newly laid (left) and older (right) eggs; c) second, third, and fourth instar larvae; d) fourth instar larva; e) pupal cocoon; f) pupa; g) newly emerged summer adult. Photos AAFC.**

### **Damage:**

Both adult and larval alfalfa weevils are foliage feeders. Adults chew round holes in leaves or notches along leaf edges (Fig. 2a), while newly emerged larvae feed on the stem interior for 3-4 days, then move up the plant to feed on the growing plant tips and opening leaf buds, where they feed, concealed, for some time. Older larvae feed on interveinal areas of fully expanded leaves (Fig 2b), and heavy feeding can result in shredded leaves, with only stems and midribs remaining. This feeding on developing buds and skeletonization of leaves can stunt growth, reduce hay biomass and cause flower loss, reducing seed formation (Fig. 2 c-e). Heavy feeding can give an alfalfa field a silvery, frostlike sheen. Alfalfa weevil feeding is especially damaging to seedling alfalfa hay and seed crops.



**Figure 2. Alfalfa weevil injury to alfalfa: a, b) leaf notching and skeletonizing; c, d) injury to stem tips; e) growth stunted, blooming reduced, plant tips turning white. Photos a, b – AAFC; c-e – B. Biligetu, SK Ministry of Agriculture.**

### **Economic Thresholds and Control:**

Economic thresholds for alfalfa weevil vary with the alfalfa crop type (whether hay or seed) the advising body, and the measurable unit. In hay fields, forage losses can be economic if one or more of the following symptoms are noted:

- if 25-50 % of the leaves on the upper one-third of the stem show damage, or
- if 50-70% of the terminals are injured, or
- if 1 to 3 third or fourth instar larvae occur per stem (with shorter stems having lower economic thresholds and 3 or more larvae requiring treatment no matter what the alfalfa height), or
- 20-30 larvae per sweep occur when 12% leaf loss is acceptable.

Early cutting of the first growth of alfalfa or insecticide treatment will reduce alfalfa weevil populations. If the hay crop value is high and weevil injury is seen or 2 or more larvae per stem reappear in regrowth after cutting, insecticide may be necessary if a second cut is anticipated. In alfalfa seed fields, economic thresholds are 20-25 third to fourth instar larvae per sweep or 35-50%

of the foliage tips showing damage. Thresholds increase with the height of the alfalfa, and decrease in drought conditions. Several small wasps parasitize alfalfa weevil larvae and adults, and in the past these natural control agents kept the weevil in check in most years. One of these wasps, *Bathyplectes curculionis* (Thomson), (Fig. 3a-c), parasitizes alfalfa weevil in Alberta and Saskatchewan, and is now found in Manitoba.



**Figure 3.** Alfalfa weevil parasitoid *Bathyplectes curculionis* (Thomson); a) adult wasp parasitizing alfalfa weevil larva; b) wasp; c) pupal cocoon.  
 Photo a – T. Hsiao, U. of Utah; b-c – AAFC.

### Field scouting:

Crop monitoring determines if and when control measures should be undertaken. Degree day maps can provide producers with guidelines on when to start monitoring for the weevil. Alfalfa weevil adults are active above 9°C, and about 160 degree days (base temperature 9°C) are needed from egg laying to egg hatch (Table 1). Monitoring should commence well before numbers of second instars peak at about 220 -240 degree days, and if economic thresholds are surpassed, control should be initiated before numbers of third instar larvae peak, at about 260-280 degree days.

**Table 1.** Predicted degree day accumulations for peak numbers of alfalfa weevils.

Stage or event	Degree days (Base 9°C)*	Weevil activity
Egg hatch	155-167	
Instar 1	176-206	Light leaf feeding
Instar 2	218-243	
Instar 3	260-280	Major leaf feeding
Instar 4	306-331	

\* Peak alfalfa weevil developmental times from Harcourt (1981) and Beauzay et al. (2013)

Depending on spring conditions and field location, monitoring typically should be initiated in mid to late May, with increasing frequency of scouting in June as the crop develops. When the crop is short, stems should be inspected for signs of adult feeding to scout for weevil presence. Later on, sweeps should be taken in a pre-determined pattern – ten sweeps at 10 different stops in a field, covering various terrain features (knolls, dips, flat areas), is a minimum sweeping effort. First and second instar larvae often are tightly tucked into stem terminals and may be difficult to collect by sweeping; the bucket collecting method can give a better estimate of their numbers. At least 30 stems should be collected along a pre-determined sampling pattern by holding the tip of each stem and gently severing the bottom, then placing the stem in a white bucket and beating all 30 stems against the bucket sides to dislodge the larvae. Because larvae often drop down into the canopy when disturbed, leaf damage may be a better indicator of weevil presence than weevil numbers.

### Acknowledgements



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**References:**

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