

Biological Control of Canada Thistle 2012 - 2015

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Also known as *Hadroplontus litura*, the stem mining weevil was introduced from Europe to Canada in 1965 and to the USA in 1970 to feed on Canada thistle. It is a biological control agent that attacks Canada thistle stems and rosettes. The weevil restricts its feeding to this weed and a few close relatives. It attacks rosettes of Canada Thistle in early spring, before the thistle bolts.

The weevil has a single generation each year. The adults spend winter in the soil (generally in the upper 5cm). They emerge in early spring as the first thistle rosettes begin to appear. The adults are present for several weeks, mating and feeding on young foliage of the Canada thistle; unfortunately, adult feeding appears to have little adverse effect on weed vitality. Even at high densities, the adults are difficult to find in the field, as they fall off the host plant when disturbed and remain motionless on the ground where they are well camouflaged. They also spend much of their time on or near the ground. When ready to lay her eggs, a female weevil chews a hole (1/10" in diameter) in a thistle leaf on a young rosette, generally in the main vein. She turns around and lays one to five eggs in the hole. When the larvae hatch a week or so later, they tunnel through the leaf in the lower stem and root collar; when several larvae are present, the main vein turns black from the tunnelling and, several days later the leaf dies. In the stem and root collar, the larvae mine the pith; they avoid the vascular bundles, however, and hence generally do not cause the stem to die during the growing season. In early summer when they have fed fully, the larvae emerge from the thistle shoot through small exit holes that they chew near or just below ground level. They work their way into the soil, and enter the pupal stage in which they transform into adults. After two to three weeks, adults emerge from the soil in late June and July and feed on the thistle foliage until heavy frost occurs in fall. They may feed intensely at high densities, with attacked leaves bearing many small feeding punctures.



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The weevils tend to aggregate in dense patches of Canada thistle and upon release at new locations they spread slowly and at the same time, level of infestation at the sites of release slowly increase. Larval mining does not prevent vigorous growth of attacked thistle stems under favourable conditions for the weed. Female weevils tend to lay their eggs in early developing stems; and these stems



generally grow taller than those developing later in the season. Consequently, under otherwise favourable conditions for thistle growth, stems mined by weevils are generally taller on average at the end of the growing season. When attacked by only one or two weevil larvae, vigorous thistle stems are often able to kill these larvae by surrounding them with gall tissue. But when the weevil attacks a Canada thistle growing under less favourable conditions, the weevil can adversely

affect weed vigor during the growing season. Initial field studies in Canada suggested that weevil feeding may also aid in the spread of the thistle rust, but this was not confirmed in subsequent research. However, weevil feeding may allow a variety of other micro-organisms to enter the thistle

stem, with adverse consequences for the thistle: field studies in Montana indicated that underground parts of stems are much more subject to winter kill if the aboveground stem is attacked by weevils during the growing season. It is presently unclear how effective the weevil will be in causing decline in thistle densities. Fluctuation in thistle density could not be consistently associated with varying levels of weevil attack in field studies performed in Canada. But ranchers in Montana have reported sharp declines in Canada thistle in some instances, apparently associated with release and subsequent population build-up of weevils. Research to date suggests that population reduction of the thistle is unlikely until the weevil reaches high numbers and infest a very high percentage (90-95%).

FFGA is participating in a province wide project, coordinated by the ARECA Environmental Team. Objectives of the project are:

- a) Determine if the weevils work, and if native populations can be established in Alberta.
- b) Determine if weevils are a cost effective method of Canada thistle control.
- c) Determine if additional weevils need to be added to a site in consecutive years following initial release.

The success of *Hadropontus litura* on suppression of Canada thistle will demonstrate:

- a) Use of biological control as an alternate means of pest control
- b) A possible reduction in chemical use
- c) Weed control in sensitive areas where other traditional methods are not able to be utilized.

Two sites were selected, one near Strathmore the other near High River. Both had a minimum of 50 Canada thistle plants. On September 7, 2012 five dishes of weevils each containing 105 weevils were released at each site. At both locations there is a control site with no application of weevils several feet from the weevil site for comparison. When monitoring the sites in June 2013 the presence or absence of weevils was inconclusive. No actual larvae or adults were observed yet at the High River site the thistle under the weevil treatment did not look as tall and healthy as the control thistles. Stem rot was observed at both the control and weevil sites, however it appeared to be more prolific in the thistles which had weevils applied to them. One thought is that the weevils have played a part in weakening the plant by the larva mining down to the root collar making it more susceptible to disease, however we can't be sure that what we observed was caused by the weevils. We will continue to monitor the site for larvae, weevils and the health of the thistle stand over the next few years.



Releasing the weevils, Sept 2012