

Larinus carlinae (Olivier)

INVASIVE SPECIES ATTACKED: Bull thistle (*Cirsium vulgare*)
Canada thistle (*C. arvense*)
Nodding thistle (*Carduus nutans*)
Plumeless thistle (*C. acanthoides*)

PREVIOUSLY KNOWN AS: *Larinus planus* (F.)

OPERATIONAL FIELD GUIDE : *Larinus planus* – Operational Field Guide, Ministry of Forests and Range.

TYPE OF AGENT: Seed feeding beetle (weevil)

COLLECTABILITY: Mass

ORIGIN: Adventive

DESCRIPTION AND LIFE CYCLE

Adult:

Larinus carlinae adult weevils are oval shaped, 5-10mm long. Wing covers are slightly pock-marked with greyish-white tufts of hair. Their rostrum (nose) is long and narrow. Adults emerge from leaf litter in mid-June before Canada thistle has set bud and begin feeding in 2-3 days. Mating begins when temperatures reach 22°C, which occurs with bud formation, usually 14-26 days after they have emerged. Females seek out flowers for prime floral buds, choosing male or female flowers; acceptable bud sizes range from 5-7mm, ideal is 6mm; when buds enlarge over 7mm they are past suitability. Specific size is important for larvae development and coincides with the onset of rapid bud growth. A female chews cavities into unopened floral buds, deposits a single egg in each, and seals them with fecal material. A summer brood of adults emerge from buds in August and September, which feeds for a short time and prepare to overwinter. Adults disperse by walking or taking to flight.



Fig. 1. *L. carlinae* adult (credit Powell et al. 1994)

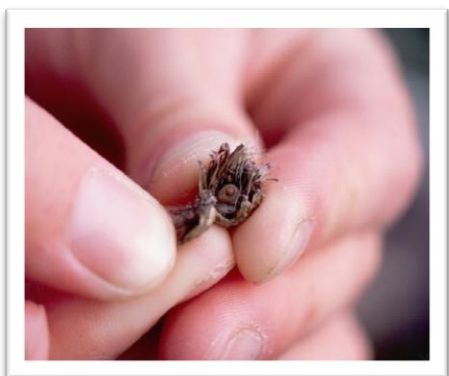


Fig. 2. *L. carlinae* larva



Fig. 3. *L. carlinae* female ovipositing in Canada thistle floral bud

Egg:

The black "pin-prick" size oviposition point turns brown and an obvious distorted dimple can be observed. Eggs incubate over four days.

Larva:

The larvae have segmented white bodies with brown heads and typically are 'C' shaped. Upon hatching the larvae feed on the entire seedhead contents, consuming developing reproductive plant parts. If multiple eggs are deposited in a bud, only one larva will survive.

Pupa:

In mid-summer pupation occurs inside a loose cocoon made from pappus and chewed bud material. New adults emerge through the top of the floral buds in August and September.



Fig. 4. Floral bud damage caused from *L. carlinae* larva feeding

Overwintering stage:

The summer adults overwinter in plant litter and debris near the plants' bases.

EFFECTIVENESS ON HOST PLANT

A single larva consumes floral bud contents, destroying most or all of the seeds. Large *L. carlinae* populations can reduce seed production by 95%, greater than other seedfeeders. Seed reduction is most important on plumeless thistle, a biennial that reproduces strictly by seed. Adult feeding can be quite impressive, but provides less control than the larvae. Sites require a long time to develop populations large enough to show results.

HABITAT AND DISTRIBUTION

Native:

Native distribution in southwest England and throughout Europe; also commonly found in Morocco, Asia Minor, Caucasus Mountains, and central Asia. It is absent in central and northern Scandinavia.

North America:

L. carlinae is capable of inhabiting wide geographic areas where Canada thistle exists. It prefers the dryer range of the invasive plant's habitat, however it adapts and slowly increases at moist sites. It prefers open sunny sites with coarse or well drained soils. Shaded locations or sites that flood or acquire water pooling are not ideal. Areas that are mowed or receive irrigation discourage establishment. It prefers Canada thistle over other thistles.

British Columbia:

L. carlinae has been released into many biogeoclimatic zones including the following: Bunchgrass, Boreal white and black spruce, Coastal Douglas-fir, Coastal western hemlock, Engelmann spruce-sub-alpine fir, Interior Cedar hemlock, Interior Douglas-fir, Montane spruce, Ponderosa pine, and Sub-boreal spruce. Establishment has been confirmed in the following: Bunchgrass, Coastal Douglas-fir, Coastal western hemlock, Interior cedar hemlock, Interior Douglas-fir, Montane spruce, and Ponderosa pine.



Fig. 3. Established *L. carlinae* release in Kamloops (Bunchgrass zone)



Fig. 4. *L. carlinae* dispersal site near Sparwood (Montane spruce zone)



Fig. 5. *L. carlinae* dispersal site north of Barriere (Interior Douglas-fir zone)



Fig. 6. *L. carlinae* dispersal area near Chase (Ponderosa pine zone)



Fig. 8. *L. carlinae* dispersal area at Malakwa (Interior cedar hemlock zone)

BRITISH COLUMBIA RECORD

Origin:

This native European insect found its way to North America before 1968. *L. carlinae* releases in B.C. descend from adventive populations found in 1988 in the Fraser Valley.

History:

In 1988 *L. carlinae* was discovered in Burnaby. As a result of these findings, screening started and was completed in Alberta. Approval occurred in 1988 and distribution began in 1989 into the southern interior. Assisted redistribution is still ongoing.

Field results:

L. carlinae has been found browsing on bull thistle and nodding thistle, however it is not known if full development occurs on these plants. It has been slow to accept B.C.'s northern climates. *L. carlinae* does not drop away and feign death as easy as most weevils. This may contribute to predation. Additionally, Canada thistle is highly attractive to black aphids and ants, which have been seen attacking *L. carlinae* adults.

Collection for redistribution:

Aspirate adults from plants in June. Release into new locations which do not have a high ant population. Sites need to be exempt from activities that damage or remove flower buds.

NOTES

- Two generations of adults are present at one time, the spring-emerged mating adults and the August summer brood.

REFERENCES

1. Harris, P. 2005. Classical biological control of weeds established biocontrol agent *Larinus planus* (F.) (=carlinae). Flower-head weevil. Agriculture and Agri-Food Canada. Updated August 3, 2005. http://res2.agr.ca/lethbridge/weedbio/agent/alaripla_e.htm. (Accessed February 7, 2007).
2. Manitoba Agriculture. 1993. Canada thistle biocontrol insect profile Canada thistle seed head weevil. Biofacts. Govt. of Manitoba.
3. McClay, A. S. 1989. Biology and host specificity of *Larinus planus* (F.) (Coleoptera: Curculionidae), a potential agent for Canada thistle, *Cirsium arvense* (L.) Scop. Govt. of Canada, Alberta Environ. Centre.
4. Powell, G. W., A. Sturko, B. Wikeem and P. Harris. 1994. Field guide to the biological control of weeds in British Columbia. B.C. Min. For. Res. Prog.
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