

Larinus obtusus Gy.

INVASIVE SPECIES ATTACKED: Black knapweed (*Centaurea nigra*)
Brown knapweed (*C. jaceae*)
Diffuse knapweed (*C. diffusa*)
Meadow knapweed (*C. debauxii*)
Short-fringed knapweed (*C. nigrescens*)
Spotted knapweed (*C. biebersteinii*)

Operational Field Guide: *Larinus obtusus* – Operational Field Guide, B.C. Ministry of Forests and Range

TYPE OF AGENT: Seed feeding beetle (weevil)

COLLECTABILITY: Mass

ORIGIN: Romania

DESCRIPTION AND LIFE CYCLE

Adult:

Larinus obtusus adults are 4.5 - 6.5 mm long, mottled brown-black coloured with a line of short yellowish hairs on their wing covers. Their rostrum (nose) is short, bent and blunt. They are strong fliers and readily take flight on hot days. Overwintered adults emerge in late spring before the plants have set bud and feed on foliage, stems and seedlings. Females require sufficient feeding on knapweed to develop mature ovaries. Mating occurs from late morning through to mid-afternoon, beginning from the onset of the flowering period (usually four weeks after emergence). Females oviposit into fresh flowers that have just opened. They chew holes into the center of the bud, damaging 3 - 4 florets and lay a single egg which they cover with a protective secretion. If the flower is large enough to support more larvae, the females will lay up to five eggs into spotted knapweed. An average of 130 eggs are laid over seven weeks, usually at a rate of seven eggs per day. Their life span is 97 days for males and 58 days for females. Although males have a longer life span, more females are found in the field during knapweed flowering. Some adults will hibernate a second year, but it is not known if they will reproduce the following summer. They browse on plant foliage until hibernation.

Egg:

Eggs are yellow, oval, and measure 1.28 x 0.84 mm. They require a minimum temperature of 13°C for development. At 32°C they hatch in 1.5 days and at 25°C they will hatch in 2.5 days.

Larva:

Larvae are small, white, slightly yellow and "C" shaped, with light brown heads. There are three larval instars that complete develop within the flower. Head capsule measurements are used to determine each instar. Newly hatched larvae feed on pappus and thereafter the flowers and seed. At the early stage, multiple larvae will compete against each other, killing others until a number is achieved that the bud can support. Larvae mature in 17 days.

Pupa:

L. obtusus pupate in an upright hard cocoon that measures 5 - 8 mm x 8 - 9 mm. Pupation lasts nine days and new adults emerge by chewing through the pupal case, moving upward and out and leaving behind a dark cavity.

Overwintering stage:

Adults overwinter in cracks and crevices in the soil and in plant litter.

EFFECTIVENESS ON HOST PLANT

Larvae feeding in flowers cause significant decreased seed production. Adults are reported to be heavy feeders on the early emerging spring seedlings and rosettes, thus adding to the control of knapweed species.



Fig. 1. *L. obtusus* adult on spotted knapweed flower (credit Powell et al. 1994)



Fig. 2. *L. obtusus* larva feeding damage (credit Powell et al. 1994)

HABITAT AND DISTRIBUTION

Native:

Its native geographic distribution is from Central Europe east to the Caucasus mountain region.

North America:

L. obtusus shares similar habitat requirements as *L. minutus*, attacking several knapweeds, but shows a preference for spotted knapweed. It favours moister sites with lower temperatures than those tolerated by *L. minutus*. It establishes on south and west slopes with well drained coarse soils, often near water. Excess competing vegetation may discourage establishment.

The first releases in North America began in 1992. Populations in the U.S.A. came from Serbia and Romania, whereas Canadian populations only came from Romania. In the U.S.A, imported populations were initially released on both diffuse and spotted knapweed in Colo., Idaho, Mont., Oreg., Wash., and Wyo. *L. obtusus* naturalized itself on meadow knapweed and in 1999 field collections began for redistribution to additional meadow knapweed sites in Calif., Oreg., and Wash. By 2004, *L. obtusus* was found to self-disperse onto black and brown knapweed.

British Columbia:

L. obtusus has been released into the Bunchgrass, Coastal Douglas-fir, Coastal western hemlock, Engelmann spruce-subalpine fir, Interior cedar hemlock, Interior Douglas-fir, Montane spruce, Ponderosa pine and Sub-boreal spruce biogeoclimatic zones. Establishment at release sites or at dispersal locations has been confirmed in all these zones.

Since the first field releases were made in 1992, *L. obtusus* was identified by federal entomologists to be the species that self-dispersed onto other knapweed species in the Shuswap area. It was identified on meadow knapweed in 2003, on black knapweed in 2012, and on short-fringed knapweed in 2013. In two instances, the weevils had been observed on these other knapweed species several years earlier, prior to the species identification. It is suspected that *L. obtusus* has self-dispersed onto brown knapweed as well as it has done in the U.S.A. In 2015, there was a report of *L. obtusus* occurring on big head knapweed (*C. macrocephala*) on Hwy 93 between Grassmere and the B.C. border town Roosevelt.

BRITISH COLUMBIA RECORD

Origin:

The *L. obtusus* releases in B.C. originate from Romania.

History:

L. obtusus was first introduced to open field releases in 1992 and 1993 in the southern interior. While the sites in the Kootenays established, others did not. Subsequent releases made have established and the weevils have dispersed. Assisted redistribution is still ongoing and may occur in mixed populations with *L. minutus*. In 2002, *L. obtusus* was designated secondary status.

Field results:

Releases made near Merritt in 1993 and 1994 on diffuse knapweed did not establish. It was later determined *L. obtusus* would not establish on diffuse knapweed in hot locations such as those near Merritt. In 1999, 14,800 adults were field collected from the Nelson area and redistributed. Of the 33 new sites, 29 established within a single year. *L. obtusus* and/or *L. minutus* are observed to be widespread in the southern interior knapweed habitats.



Fig. 3. *L. obtusus* dispersal site on short-fringe knapweed near Grindrod (Interior Douglas-fir zone)



Fig. 4. *L. obtusus* dispersal site on mixed stand of short-fringe, meadow, black and brown knapweed in the Shuswap area – Salmon Arm (Interior Douglas-fir zone)



Fig. 5. Established *L. obtusus* release site near Yale in the Fraser Canyon (Coastal western hemlock zone)

Collection for redistribution:

Adults can be seen from June to late July. Sweeping for adults during peak emergence on hot days is rapid and effective. Use heavy sweepnet bags and aspirate clean collections as the adults climb towards the top opening. On hot bright days adults take flight quickly. When females are actively ovipositing, they will cling tenaciously to the plant. Care must be taken not to harm them when sweeping. It is best to collect *L. obtusus* before this time (mid-July) so one can be assured the females transported to new sites will still have eggs to establish a new population.

NOTES

- *L. obtusus* can exist with *Urophora affinis* because the fly attacks the plants earlier and is shielded with a protective gall. *L. obtusus* does, however, attempt to avoid using the same buds.
- It is the last of the seed feeding agents to oviposit and competing agents can limit its success.
- *L. minutus* and *L. obtusus* are difficult to differentiate from each other in the field. The two species may co-exist at many sites in B.C.
- Recent genetic work on the *L. obtusus* and *L. minutus* is showing they may be variants of a single species.

REFERENCES

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