Spotted Knapweed

Biocontrols for Knapweed

Larinus minutus, Knapweed Flower Weevil

Attacks Spotted and Diffuse Knapweed

Created by Lincoln County Noxious Weed Control Board

Diffuse Knapweed

Pest Status of Knapweed

Spotted knapweed is a purple-flowered, herbaceous, perennial weed, living three to five years on average.

Diffuse knapweed is typically a white-flowered, herbaceous, bushy biennial that grows from a rosette and reproduces and spreads solely from seed.

The weeds infest semiarid range lands in the western United States plus roadsides, fields and waste areas. Infested areas are quickly dominated by the plant, reducing its grazing value and suppressing native plant communities. The plant, originally from Central Asia, has been in North America for over 120 years.

Economic damage. Knapweed is a serious problem on rangeland and causes significant forage losses.

Ecological damage. Spotted knapweed reduces livestock and wildlife forage, increases surface water runoff and soil sedimentation and lowers plant diversity. Spotted knapweed produces an allelopathic compound that reduces germination of some grasses.

Why Biological Controls?

Biological controls are effective for inaccessible areas where spraying is too costly.

Don't use biological controls for small patches, especially if it can be easily sprayed by a herbicide.

Biological controls need three-to-five years for weed management. The impact of released insects will not be noticeable until they reach high-population densities.

Diffuse and spotted knapweed can be managed similarly. They are readily controlled with herbicides. However, the weeds will reinvade unless cultural techniques are used.

Weedmaster, 2,4-D, Tordon, Cimarron Max, Transline, Curtail, Redeem and Banvel all control knapweed while preserving grass. Round-up kills knapweed, but kills grass.

Use an integrated approach of spraying accessible areas, releasing insects for other areas, and cultivating and overseeding areas of infestation.

Biological controls are recommended for hillsides, forested areas and very large patches.

Adult Larinus minutus

Releasing Larinus minutus

Larinus minutus, up close

Larinus minutus has been one of the most successful biocontrols throughout Lincoln County, Wash.

History of Larinus minutus

Larinus minutus (a seedhead weevil), a native of Greece, was first released in the United States in 1991, and later in Lincoln County, Wash., in 1999, as part of a biological control program to control spotted and diffuse knapweed.

Larinus minutus is one of the most successful biocontrols in Lincoln County.

Larinus minutus attacks the flower seed heads of both spotted and diffuse knapweed with a slight preference for diffuse knapweed.

In 1999-2000, 2,100 Larinus minutus released near Keller Ferry in Lincoln County reduced a 50-acre infestation to five acres by 2002, and just 50 weeds by 2003. Another 250 Larinus minutus released in 2003 near Hume Road and S.R. 25 eliminated a 20-acre patch on the bluff overlooking Fort Spokane, leaving just 45 scattered weeds remaining.

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Larinus minutus, Knapweed Flower Weevil, a Biocontrol for Knapweed

Life Cycle and Biology of Larinus minutus

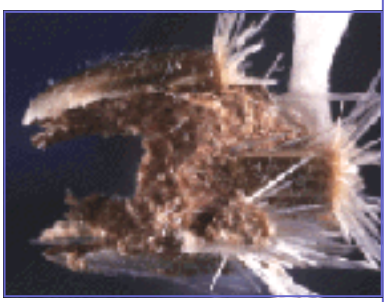
- Larinus minutus is a brown-grey weevil with a very large, bulbous snout. The weevil measures 4-5 mm in length.
- Larinus minutus are strong fliers and disperse throughout the entire knapweed patch in several years.
- They have one generation per year.
- The weevil over-winters as an adult in the soil near the base of the plant.
- Adult Larinus minutus weevils emerge in late spring from the ground litter where they have been hibernating. Adults feed on the leaves and flowers prior to laying eggs.
- The female weevil must feed on the knapweed flowers for ovary development.
- Egg laying begins after the knapweed has started to bloom.
- Eggs are deposited between the pappus hairs in the flower head. Up to five eggs are laid throughout the florets.
- Females produce between 28 and 130 eggs. The elongated, yellow eggs are 1.5 mm long and hatch in three days.
- Once the eggs hatch, the larvae begin feeding on the flowers and then migrate to the seeds and feed on the seeds too. Larvae feed within the flower head on the pappus hairs of the developing seeds.
- There are three stages of larval growth, but larval development is completed within four weeks.
- The larvae construct a cocoon from seeds and pappus hairs in the receptacle of the seed head. Pupae are white but turn brown shortly before adult emergence.
- When development of the larvae is complete, the larva pupates and emerges from the seed head as a new adult.
- When the adults first emerge from the knapweed seed head, they are light grey with some yellow fuzz on their bodies.
- Development from egg to adult takes about four weeks.
- Adults are active in the field from May through mid-September. In the laboratory, adults lived up to 14 weeks.
- The newly emerged adults feed on the plant foliage, and they eventually go into the soil and ground litter to hibernate for the winter.
- The weevil prefers hot, dry areas. It does not do well at higher elevations and in areas with prolonged rainfall.

Adult Larinus minutus

Seed heads eaten out

Adult Larinus minutus on seed head

Seed head eaten out



Massive damage to seed head

Impact of Larinus minutus

- Adult Larinus minutus feed on the knapweed leaves and foliage.
- Knapweed defoliation by adults can be severe in sites with high weevil populations, resulting in the stunting and death of affected plants.
- Larinus minutus larvae feed on the seeds in the flower heads.
- Larvae destroy up to one hundred percent of the seed in an infested knapweed seed head.
- This weevil along with other seed feeders will reduce the seed that spotted and diffuse knapweed are dependent on for reproduction, dispersal and survival.
- At least 200 Larinus minutus per acre are recommended for release.

Photos courtesy of Eric Coombs, Oregon Department of Agriculture; Norman E. Reese, USDA, ARS; USDA ARS Archives; Bob Nowierski, Montanta State University; Robert D. Richard, USDA APHIS; University of Idaho Archives; Gary Piper, Washington State University; and Bob Bourchier, Agriculture Canada.

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