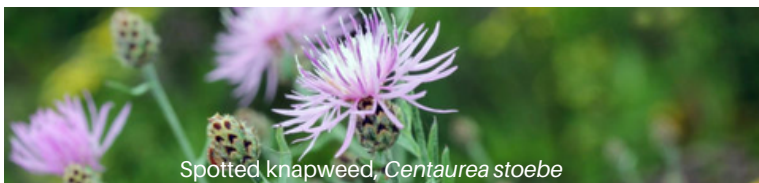




## WHAT IS BIOCONTROL

Biocontrol is the suppression of pest populations using living organisms. The release program started as a collaboration between Agriculture & Agri-Food Canada and several Agricultural Fieldmen in 2001. The AISC took over in 2016 and continues to use host-specific insects for invasive plant control in Alberta.



Spotted knapweed, *Centaurea stoebe*

## SPOTTED KNAPWEED

Spotted knapweed (*Centaurea stoebe*) is classified as a prohibited noxious weed in Alberta. This perennial plant flowers in late June to early July with mostly purple blooms. Each plant can produce up to 140,000 seeds. Spotted knapweed produces a chemical that prevents the germination of neighbouring plants.



Diffuse knapweed, *Centaurea diffusa*

## DIFFUSE KNAPWEED

Diffuse knapweed (*Centaurea diffusa*) is classified as a prohibited noxious weed in Alberta. This plant grows mostly as an annual or biennial, and flowers from early summer to fall in its second year with mostly white blooms. Each plant can produce up to 18,000 seeds.

## KNAPWEED WEEVILS

The AISC uses *Larinus minutus* (seed head) and *Cyphocleonus achates* (root) weevils as biocontrol agents for spotted and diffuse knapweed populations. Seed head weevils feed on flowers limiting the plant's seed output. Weevils are small (5-10mm) and can lay 60 eggs in the flowerheads. Eggs will hatch and eat the seeds as they develop to adults that overwinter in the soil and leaf litter. Root weevils feed on leaves and roots limiting the plant's ability to grow. Weevils are larger (0.5-1.75cm) and can lay 45 eggs in the root crown. Eggs will hatch and begin feeding, creating a gall-like enlargement in the root as they develop to adults that overwinter within the taproot. Since the seed head and root weevils attack different parts of the plant, they do not compete with one another and can be used simultaneously to maximize control.



Seedhead (*Larinus minutus*, left) and root weevils (*Cyphocleonus achates*, right)



## HOW TO PREPARE

Here's how you can prepare for your biocontrol release:

- **Get your orders in!**
  - Orders are 'first come, first serve'; please contact AISC as soon as possible.
- **Locate ideal site for release.**
  - Knapweed patch size (guideline of 5 plants per metre squared).
  - Full sun, avoid tree canopy.
  - Coarse and well-drained soils with litter cover.
  - Separate from herbicide treatments (at least 10m) and mowing.
  - Avoid floodplains or find high water mark as saturated soils can be detrimental to weevils that haven't yet emerged.

## MOVING WEEVILS

Once you have an established population of knapweed weevils on your property, you can move them to nearby infestations of spotted or diffuse knapweed. Seed head weevils can fly and spread to nearby infestations by themselves. However, root weevils cannot fly and require assistance with dispersal. Please note, not all biocontrol releases will result in established populations.



Seed head weevil, *Larinus minutus*

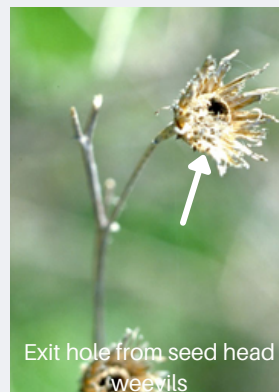


Root weevil, *Cyphocleonus achates*

Here are some tips to help you start collecting and releasing your knapweed weevils:

### When can you move the weevils?

When populations of weevils are large (usually 3-5 years after a release), moving and collecting weevils is most efficient. An established site will exhibit stunted knapweed plants, exit holes in flowerheads or roots and/or visible weevils.



Exit hole from seed head weevils



Root weevil emerging from root gall

**Note:** if root weevils are not visible, check knapweed plants for larvae. Pull up a plant, if a gall is found, snap it open. If you see larvae inside the gall, the root weevils have yet to emerge.

### How do you move the weevils?

- **Gather equipment.**
  - GPS, sweep net, collection



### CONTINUED..

tray, click counter and containers.

- **Monitor the site for weevil activity.**

- Stunted knapweed plants and exit holes in flowerheads and roots.
- Visible weevils on knapweed tops.

- **Once weevils have emerged, collect!**

- Weather must be hot and sunny for collection.
- For seed head weevils:
  - Sweep net by swinging net back and forth over the top of the plants.
  - Dump net contents into tray and sort weevils from other insects. Seed head weevils will 'play dead' when disturbed.
- For root weevils:
  - Gently handpick weevils off plant tops.
- Transfer weevils to a container (with a knapweed piece inside!) and store in a cooler with ice packs.
- **Release the weevils!**
  - Weather is no issue for releasing, release in rain or shine!
  - Choose areas with no tree canopy and away from floodplains (see site requirements under 'How to prepare').
  - Release on 1m area on knapweed flower tops.

That's all folks! The weevils will get to work on your knapweed infestation and you should see changes within a few years!



A biocontrol release site in Minnesota.

Need help or have any questions?

Feel free to contact the AISC! We offer additional biocontrol agents for several invasive plants found in Alberta, please visit our website at [abinvasives.ca](http://abinvasives.ca) to learn more!

Contact us:

587-999-0954  
[info@abinvasives.ca](mailto:info@abinvasives.ca)