

# Biological Control of Noxious Weeds

## Noxious Weeds and Why They Are a Problem

- A "noxious weed" is any plant designated by a federal, state or county government to be injurious to public health, agriculture, recreation, wildlife or any public or private property.
- Noxious weeds are not native to the United States. They are able to dominate landscapes because they arrived here without the natural controls, insects, pathogens and competing vegetation that keep them in check in their natural environment.
- They can out compete native plant communities creating a weed monoculture that can:
  - Increase soil erosion
  - Increase stream sedimentation
  - Alter water and nutrient cycling
  - Increase fire hazard
  - Reduce local biodiversity
  - Reduce grazing capacity
  - Reduce wildlife habitat



Leafy spurge

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Leafy spurge infestation in Montana

# What Is Biological Control?

- Biological control is the intentional use of a living organism to reduce the population of an undesirable pest. The types of biological agents used to control noxious weeds include:
  - Insects - Beetles, moths, flies
  - Diseases - rusts and fungus
  - Vertebrates - goats, sheep, cows
- Biological control agents are selected for their ability to affect different parts of the weed; the flowers, leaves, stems and roots.
- The most effective biological control programs use a mix of agents, attacking many parts of the weed, to reduce the competitive advantage they have over native species.
- Biological control is not a “Silver Bullet.” Biological controls, by themselves, will not completely eradicate a weed population. They must be combined with other integrated weed management techniques to be successful.
- Properly tested and approved biological control agents will feed only on their targeted weed. They will not move to, or feed on, any other plant.



Flea beetle larvae in a leafy spurge root



Goats grazing leafy spurge



Rust spores on rush skeletonweed

# Feeding Strategies of Biological Control Agents?

Each specialized biological control agent has co-evolved with its plant host and are selected for their ability to attack different parts of the plant.



Adult female gall-producing insects sting the plant and insert an egg into the plant tissues; larvae secrete chemicals into the plant tissues. Both affect plant growth and development creating an enlargement (gall) of the plant at that point. Nutrient-rich cells within the gall are consumed by the organism for growth and survival. Galls influence the plant by acting as a nutrient sink; causing the plant to direct nutrients to the tissues rather than seed development and growth.

Thistle stem gall fly larvae in a galled Canada thistle stem.



Some defoliators partially or completely consume leaves, flowers, bracts and sometimes the stems. Defoliators obtain nutrients while reducing the plants ability to produce sugars for the root systems. Reduction of these sugars may suppress the plants ability to grow and survive.

Black-margined loosestrife beetles consume purple loosestrife leaves.



Damage from insects that attack seeds or seed-producing tissues may be direct such as when the insect consumes some or all of the seeds, or may be indirect, when seed-producing tissue is damaged and nutrients are diverted from producing healthy seeds. This reduces the number of healthy seeds produced.

Thistle head weevil larvae infest a musk thistle seed head.



Stem-dwelling organisms are protected from predators and parasites while they mine within the stems. In some cases, secondary damage from pathogens or destructive arthropods caused after the stem-dweller leaves its host may be greater than the direct damage it causes.

Canada thistle stem weevil larvae in a Canada thistle stem.



Organisms that feed upon the root hairs and young roots reduce the plant's ability to take up moisture and nutrients and to replace depleted root reserves. Wounds caused by these insects may allow entry by soil microorganisms and secondary diseases that can further weaken the plant.

Knapweed root boring weevil larva attack a diffuse knapweed root.