

Appendix A.

AGRICULTURE

Thousand-year-old weed solution revealed

by Noah Poritz, Bozeman

Ranchers, state and federal land managers, and other weed fighters throughout Montana are looking for the solution for many of our toughest weed problems began thousands of years ago.

The key to this perennial problem lies in the fact that introduced weeds like reed canarygrass, smooth brome and lady's tresses are native to Europe and Asia. As these plants evolved in their homelands, they developed a specialized group of herbivorous insects.

Some of these bugs ate only the seeds, others ate the developing flowers and some focused on the roots. Through the centuries, these insects and grasses became so specialized in their diet that without their weeds, they could not survive.

Today, after thousands of years of insect development, experts have learned the majority of the world's plant-eating insects are host-specific. These insects feed only on a single plant or a narrow group of closely related species. It is because of this destructive feeding that these plants are an insignificant part of their native environment.

The history of humankind is one of movement and settlement. As people expanded their travels on land and across expansive oceans, they carried with them seeds from their distant homelands.

As settlers arrived in North America, some of these seeds were dumped on shores from ship ballast. Others were hidden among the desirable seeds of crop plants. When these undetected invaders became established in North America, they flourished. They were free of the natural enemies that kept them under control.

Slowly, decade after decade, these immigrant plant species spread from coast to coast. They invaded our river valleys and crept up mountainsides. Their invasion was a biological wildfire spreading from state to state. These plants are no longer the obscure wildflowers of some distant land. They are the weeds that choke millions of acres of our prime rangelands, pastures and wildlife habitat.

In the war against weeds, the U.S. Department of Agriculture explores regions of the world where the weeds of plants. The most promising insect candidates for biological control are collected and identified. Some are collected alive and shipped to special quarantine facilities where extensive testing is completed on the bug's diet and reproduction.

Host-specific testing is a slow process. Dozens of plants related to the

Insects help control noxious weed infestation by eating the noxious weeds and seeds.

Insect releases, the weed declines after a few years. While biocontrol is slower than other weed control methods, scientists point to the benefit that it is permanent. No additional expenses are required.

As the weed infestation craters, the numbers of insects decline as well. This is because they can survive only by eating their target weed.

Some of the weed-infested range in Montana have been inaccessible for environmentally sensitive the other control methods for no practical of domestic.

Ranchers, county weed control personnel and federal land managers throughout the state are using bio-control more each year. For many of our worst weed infestations, biological control is considered to be the best available weed management tool.

The weed decline has been dramatic. Millions of acres of weed-infested range

GUEST COLUMN

Canada thistle: Our worst weed?

by Noah Poritz
Bozeman

Montana ranchers, environmentalists and land managers all agree: Canada thistle is one of the state's worst weeds. This prickly perennial weed infests many millions of acres of public and private grazing lands in Montana and the surrounding western states.

It dramatically reduces agricultural productivity by diminishing grazing capacity and increasing weed control costs. Increased soil erosion, reduced plant and animal diversity, and increased fire risk are direct results of Canada thistle invasion. Equally catastrophic infestations occur in environmentally sensitive wildlife habitat and riparian zones.

Exotic weeds like Canada thistle represent the single greatest threat to sustainable ranching and terrestrial ecosystems.

Biological weed control, utilizing introduced beneficial insects, is considered to be the most promising control tactic against many of Montana's exotic rangeland and pasture weeds. Dramatically successful weed control has been achieved using introduced insects in the United States.

Unlike chemical or mechanical weed control methods, biological control is a sustainable weed management method. Once an insect is established on its target weed, few additional expenses are required. As the insect population builds, greater and greater stress is exerted on the weed.

Also, the insect naturally disperses to new weed infestations without additional cost to the rancher. Biological weed control is proven, permanent and cost-effective.

Because of this success, biological weed control is increasingly being used in many areas of the west. Ranchers and chemical weed control professionals are often integrating beneficial insects into their existing weed management programs.



The Canada thistle gall fly helps control Canada thistle outbreaks in a biological manner.

Photo by Noah Poritz

Using insects for weed control is quite simple: colonies of the beneficial insects are placed into specific weed infested locations and allowed to build up and stress the target weed.

Currently, there are four insects available for Canada thistle biological control in Montana. All attack the thistle at different times of the year and/or on different parts of the plant. These insects include a stem and root crown mining weevil, a stem gall fly, a flowerhead weevil and a defoliating beetle.

The stem and root crown mining weevil, *Ceutorhynchus litura*, damages the plant by mining the primary stem and root crown of the thistle. This damage affects the weed's vegetative propagation. Being very cold-hardy, this weevil thrives in most areas where Canada thistle is a problem.

Thistle attack by the stem gall fly, *Urophora cardui*, stimulates the plant to form a hard, woody growth or gall. Gall formation is an energy drain for the thistle plant. Nutrients are directed into gall formation instead of flowering and root storage. Multiple galls are possible on a plant and galled stems rarely flower normally. This bio-control agent thrives in the moister thistle infested areas.

Another weevil, *Larinus planus*, attacks the thistle's flowerheads thereby damaging the seed producing capacity of the weed. Canadian research has documented up to 95 percent seed reductions by this hardy weevil.

Defoliation by the tortoise beetle, *Cassida rubiginosa*, reduces the weed's ability to gather energy from the sun. Unfortunately, defoliation alone is not very stressful to Canada thistle. This beetle has a large reproductive ability and is the most widespread thistle feeder in the Eastern United States.

A noteworthy fifth insect is the painted lady butterfly. This large butterfly is a nomadic migrant along the front of the Rockies and Great Plains every five to 10 years. During migration, spectacular outbreaks of the butterfly will severely defoliate Canada thistle. Unfortunately, the thistle grows back as the painted lady numbers decline.

While none of these insects by themselves will get rid of Canada thistle, their combined attack has been shown to have an increased impact on the weed. Results from another Canadian study illustrated that the combined impact of the stem weevil and the gall fly was greater than either insect alone.

New scientific surveys in China have identified additional thistle feeding insects as future bio-control prospects.

Because we are not yet to the point of a "success story" in the bio-control of Canada thistle, ranchers should utilize each of the bugs that are available today. These insects are available through some county weed control and extension offices and from commercial suppliers of beneficial insects.

Also, don't forget to encourage plant competition against your weeds. This is an essential component of any bio-control effort; plant competition adds further stress to the weed.

More information on biological control of Canada thistle can be found by searching the Web using the key