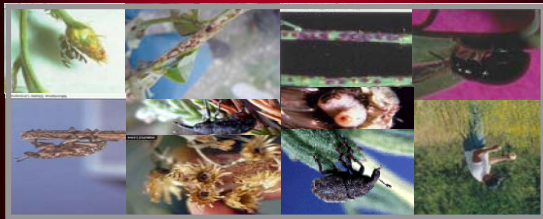


QUESTIONS & ANSWERS



LEARN THE ANSWERS

1. **How** do I get started?
2. **How** do these insects harm the weeds?
3. **How** many do I need?
4. **Should I** spread them over the whole area?
5. **If I** release these insects, will they go to my neighbors?
6. **How long** will it take to see results?
7. **What happens** when the weeds are gone?
8. **Are there** any success stories?
9. **How important** is competing vegetation?
10. **Are herbicides compatible** with biocontrol?
11. **Do I** need any permits?

CHOOSING BIOLOGICAL CONTROL

THE THOUSAND YEAR OLD SOLUTION

It may come as a surprise to you that the solution to your weed problems began thousands of years ago. As plants slowly evolved in Europe and Asia, each species developed a specialized group of herbivorous insects. Some insects ate only the seeds. Others formed abnormal growths on the stems. And others devoured the insides of the root system of the plant. Through the centuries, these insects became so specialized in their diet that without their host plant, they could not survive. Today, after thousands of years of evolution, overwhelming majorities of the world's plant feeding insects are host-specific. They feed only on a single plant species or a narrow group of closely related species. It is because of this destructive feeding that these plants are an insignificant component of their native natural environment. They are uncommon, in part because of the stress exerted upon them by these host-specific herbivorous insects.

BIOLOGICAL WILDFIRE

The history of humankind is one of movement and settlement. As people expanded their travels on land and across oceans, they carried with them seeds from their distant homelands. As settlers arrived in North America, some of these seeds were dumped on shore from ship ballast. Other seeds were hidden among the desirable seeds of crop plants. When these undetected and overlooked invaders became established in North America, they flourished. They were free of their evolved natural enemies; free of the insects that kept them under control. Slowly, decade after decade, these immigrant plant species spread from coast to coast. They invaded the 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 plague millions of acres of our rangelands and pastures.

BIOLOGICAL CONTROL TODAY

Once a weed is identified as a candidate for biological control, the U.S. Department of Agriculture, together with foreign agricultural organizations, explores regions of the world where the weed originated. There insects are observed and the most promising candidates for biological control are collected and identified.

Reference courtesy of Biological Control of Weeds, INC, and Lincoln County Noxious Weed Control Board Staff.

Help protect Lincoln County's environment from noxious weeds!

www.co.lincoln.wa.us/weedboard/weedboard.html

P.O. Box 241/405 Ross St.
Davenport, WA, 99122
(509) 725-3646

Noxious Weed Control



For More Information:

The mission of the weed board is to educate landowners to be responsible stewards of the land and resources, to make Lincoln County a better place to live by protecting and preserving all lands and natural resources of the County from the degrading impact of invasive noxious weeds; and to provide quality, timely, and responsive service to the residents of Lincoln County.

Our Mission Statement:

Lincoln County Noxious Weed Control Board

Some are collected alive and shipped to special facilities (insect quarantine laboratories) where extensive testing is completed on the diet and reproduction of the insect under study.

Host-specificity testing is slow. Dozens of plants related to the target weed are tested. Unrelated plants, which have physical and chemical similarities, may be on the test list. Of course, crop plants, economically important to North America agriculture, are tested on the insect as well. Once the host-specificity testing is completed, a wide range of individuals examines the data. Botanists, entomologists, zoologists, agriculturists, members of the public, and the governments of Canada and Mexico all examine the host data. From the information, a determination is made whether an insect is safe for field release into the United States.

Once an insect is deemed safe for introduction, the USDA and State cooperators begin making releases of small numbers of these biological control agents. Cooperation with County Noxious Weed Control Boards on these initial releases allows for adequate monitoring of the agents to ensure that they respond in the field the same as in the laboratories.

WHY BIOLOGICAL CONTROL?

Herbicide application has been the most widely adopted management tool against rangeland and pasture weeds. Unfortunately, the marginal economic rewards and inaccessibility of many of the infested rangelands has limited the value of chemical application. Simultaneously, the elimination of desirable broad leaved species and the potential contamination of the water table by herbicidal application have been major side effects.

To be successful, an introduced biological control agent need not kill its weedy host outright. If the insect can stress the plant and reduce its competitive advantage, more desirable vegetation can displace the weed. Biological control using insects is slower than other weed control methods. Five to fifteen years is a realistic timetable for some degree of weed suppression to occur, but biological control is a safe, permanent, and inexpensive weed management tactic.

The following is a list of the services pertaining to biocontrol that we offer landowners:

- ⇒ Consultation on noxious weed control plan
- ⇒ Selection of available biocontrol agents
- ⇒ On-site weed walk of infested property
- ⇒ Help in ordering the biocontrol agents
- We will place the order via email
- Provide current price sheets from vendors
- ⇒ We will receive delivery of the biocontrol agents
- ⇒ We will help in the initial release of insects
- We will release them at a predetermined location
- Release the insects together with the landowner
- ⇒ Offer educational brochures to landowners for clarification and reference.

BIOCONTROL SERVICES WE PROVIDE

You now can get control of those infestations that lye up steep grades and down in canyon bottoms. Don't risk injury to yourself or desirable plants trying to get to those pesky infestations. Use the insects to control these areas and say goodbye to those hard to reach infestations and maintain the plant diversity you desire.

The Lincoln County Noxious Weed Control Board offers assistance FREE of charge to Lincoln County landowners interested in utilizing biocontrol agents as an integrated approach to their noxious weed control plan.

LIMITATIONS

Not all noxious weeds have a biological control agent available for redistribution. Scientists are constantly on the look out for new biological control agents. This limited availability coupled with the slow rate at which control occurs and biotype matching make biological control a challenge.

HOW BIOLOGICAL CONTROL WORKS FOR YOU

1. Low-cost weed control

Biological control is considered by many to be the most cost-effective weed management method available. A recent economic analysis revealed a benefit/cost ratio as high as 100 to 1.

2. Effective weed control

All the insects that are available have a proven scientific record in attacking and feeding upon their target weeds. In addition to scientific studies, there are the numerous landowners of Lincoln County who tell us of their satisfactions with their insects. They might be your neighbors.

3. Permanent weed control

Once established and feeding in your weed infestations, your insects will continue to attack your weeds, month after month, year after year. No other weed management method provides you with such long-lasting control.

4. Environmentally friendly weed control

Only the target weed is attacked—non-target trees, shrubs, grasses and crops are unaffected; safe for use along shelterbelts and waterways; so safe a child can use this weed control method!

5. Integrated weed control

Using biological control agents is easy—just release each container into specific areas where you want them to go to work. You can continue to use herbicides if you desire. Just limit your chemical treatments around your insect release sites in the first few years. As your insects expand their range and have an increasing effect, your herbicide use can decline or be integrated for an even greater degree of weed control.

QUESTIONS & ANSWERS

1. HOW DO I GET STARTED?

Your first goal in starting any biological control program is to identify the areas in which you intend to release your insects. You may already have specific areas in mind you want to put out your first releases. Perhaps they are areas which are environmentally sensitive and preclude the use of herbicides. They may be areas which are inaccessible for spraying or some other control method. Or, you may just be fed up with herbicide treatment or other control method and want to begin biological control as an integration of control techniques.

Whatever the reason, the best way to accomplish the above set of goals is to contact the Lincoln County Noxious Weed Control Board staff. The Weed Board staff will talk over your situation, visit the your site, establish an agreed upon Noxious Weed Control Plan and assist you in the purchase, delivery and release of your purchased biological control agents.

2. HOW DO THESE INSECTS HARM THEIR TARGET WEEDS?

1. Each species available for use is able to harm

their weedy hosts. Some do so by feeding as larvae inside the flower heads thereby destroying seed production. This type of feeding usually does not influence plant density. Rather, it reduces the amount of new, viable seeds growing into the seed bank in the soil.

2. The of other species fed inside the stem of the plant. This can disrupt the vascular tissues that move moisture and nutrients within the plant.

3. Other species feed on the exterior and interior of

the primary and secondary roots and the fine root hairs. Root feeding can be very destructive to a weed. Small plants may be killed outright and the larger plant's growth may be severely stunted. Again, the vascular tissues of the plant are damaged.

aged.

6. HOW LONG WILL IT TAKE TO SEE RESULTS?

Even the most successful of cases, years are required before an insect can catch up with a noxious weed species. In some cases, multiple insects species were needed before successful control was achieved. Each weed has certain vulnerable stages which you try to exploit using biological control. Regardless of how many different species you release, biological control takes time. It is not a quick fix, but a permanent, self-perpetuating weed control tactic.

7. WHAT HAPPENS TO THE INSECTS WHEN THE NOXIOUS WEEDS ARE ERADICATED?

In most cases, your noxious weeds will never be eradicated by biological control agents or any other **single** noxious weed control method. In the most successful examples of biological control there are always a small number of plants that do not succumb to the attack of the beneficial insects. To reach full eradication, you will need to use another effective noxious weed control method. **NO ONE METHOD WILL ERADICATE AN INFESTATION.** This is why Weed Board staff recommend an integrated weed control approach.

8. ARE THERE ANY SUCCESS STORIES?

YES! The biggest success story in the Lincoln County area is the dramatic reduction of Diffuse and Spotted Knapweed by the knapweed seed eating weevil (*Larinus minutus*). The weevil's first release in Washington State was in 1991. Since 1998, a strong push toward getting Lincoln County landowners to purchase the weevil has proven to be incredibly beneficial. Releases in Lincoln County have shown that saturating (ex. 900/10 infested acres) infestations with the weevil show 99% reduction in knapweed within 4 years after release.

Another equally impressive success has been the control of Dalmatian Toadflax by the foliage feeding/stem boring weevil (*Mecinus janthinus*). This approved weevil first crossed the Canada/U.S border around 1999, since 2003 Lincoln County landowners have purchased more than 100 thousand adults. Each female lays between 80 and 120 eggs per season into the stems. The larvae mine the inner stems which destroy the plants.

4. Call forming insects have a unique evolutionary

relationship with their weedy hosts. The adult gall former will lay their eggs into specific parts of the plant. The feeding larvae will stimulate the plant to form a structure (the gall) to surround the developing larvae. In addition to the direct damage caused by the feeding larvae, the plant must redirect some of its energy into gall formation. Studies have found that the gall formation acts as an energy drain on the entire plant, not just the attacked areas.

5. Defoliation is an obvious form of attack by some insects. While not particularly stressful to many weeds, it does contribute to reducing leaf area, water loss, yellowing and leaf death.

These and other forms of plant damage are important in harming your noxious weeds and fit hand-in-hand with good land management. Biological control should be an integral part of your Noxious Weed Control Plan. With successful biocontrol, the noxious weed's competitive ability is diminished, other control methods are reduced, desirable plant species are invigorated and the value of your land improves.

8. HOW MANY INSECTS DO I NEED?

Great question! This is another question that the Weed Board staff can help you answer. We know that since you are the one who will make the ultimate decision of what number will be purchased. We will simply talk you through the process and reach an agreed upon strategy.

One approach is to inundate your infestation (s) with as many releases as is affordable during the first couple years of introduction. After that, you should make additional releases in isolated areas in future years. This method is most dramatic. It reduces the time, in years, for an insect to build up and disperse to the limits of your infestation. **Weed Board recommended.**

It is estimated that with 50% of each release being females and laying 100 eggs; Lincoln County Dalmatian toadflax infestations have in excess of **250 million adults** decreasing their numbers countywide.

9. HOW IMPORTANT IS COMPETING VEGETATION?

Biological control insects alone are not the answer. That goes for all noxious control methods. Without healthy stands of desirable vegetation to take the place of undesirable weeds, biocontrol cannot be successful. As the insects reduce the weed population, useful plants take their places and gain a competitive advantage. Together, biocontrol agents and competing vegetation will reduce weed infestations. Encouraging desirable plants, by re-seeding or reducing grazing pressure, will greatly help the insects do their job.

10. ARE HERBICIDES COMPATIBLE WITH BIOCONTROL?

Yes and No. Each noxious weed and beneficial insect has specific, case by case, situations where one can integrate herbicides and biological control agents. For most cases, while herbicides **DO NOT** kill the insects, the damage done to the host plants prevents the insects from completing their development. In other words, if all the noxious weeds die, then the insects won't have anything to live on.

To integrate insects with herbicides, we recommend releasing the insects on an area where you can guarantee no herbicide treatment will be used closer than 20 feet after the initial release. Subsequent years will need initial monitoring prior to herbicide treatment to establish the distance of spread by the insects from the initial release location.

affordable and the degree of infestation in your area. **Weed Board recommended.**

The least costly approach is to introduce one or two releases into your infestation (s) and do nothing more. This method will get a colony started. It may take many more years for the insects to distribute itself throughout your entire infestation (if ever). **Not Weed Board recommended.**

4. SHOULD I SPREAD EACH RELEASE OVER A LARGE AREA?

NO! Concentrate each release. Your goal is to get beneficial insect colonies established in the areas you have set aside for biological control. With an herbicide treatment, you take a finite amount of material and dilute and spread the material over a large area.

In introducing biological control agents, one takes a finite amount of material (insects) and concentrate them in specific areas. In the initial releases, one wants to concentrate the insects so the insects can continue to find each other to mate and reproduce. Also, this allows one to more easily check for the insect in future years and for later redistribution to new areas.

5. IF I RELEASE THESE INSECTS, WILL THEY GO TO MY NEIGHBORS?

YES, THEY WILL. Because you have the same weed problem, your neighbor (s) **will eventually** receive the benefits of your efforts at biological control. Weed Board staff encourages "community biological releases" which encourages adjacent landowners to take a look at the big picture, get together, and make coordinated releases. Everyone then shares in the cost and benefits of biological control. Your weed problems did not spring up overnight and they will not go away quickly either. Get everyone involved in biological control.

The Canada Thistle infestation below was treated with herbicides. Weed Board staff saw this and checked to see if (1) there were any seed heads infested with seed



gating weevils and (2) if the larvae were damaged by the rapid desiccation of the plants from the herbicide treatment.

Sure enough some of the seed heads were infested. When staff opened up one of the infested seed heads they found a fully formed seed head weevil. Lucky for him his development was in the final stages when the treatment occurred



11. DO I NEED ANY PERMITS TO BUY INSECTS?

Maybe. Under authority of the Plant Protection and Honeybee Acts, permits are required for the importation, international transit, domestic movement and environmental release of plant pests (**plant feeding insects, mites, snails, slugs, etc.**, and plant pathogenic bacteria, viruses, fungi, etc.), **biological control organisms of plant pests and weeds, bees, parasitic plants and Federally listed noxious weeds.**

FPQ Permit 526

This is the general permit for the movement, possession, and environmental release of plant pests, plant pathogens, **biological control organisms, bees, parasitic plants and noxious weeds.**

Contact your vendor or the Weed Board to determine if you need any permits before purchasing biocontrol agents.