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DEVELOPMENT OF BENEFICIAL BIOLOGICAL AGENTS FOR INVASIVE SPECIES CONTROL

Problem

Noxious and invasive weeds colonize disturbed areas and outcompete and displace native and other desirable vegetation. This can result in the loss of pollinators, wildlife food, nesting resources, and decrease biodiversity. In cases where invasive plants establish monocultures (i.e. the presence and/or growth of only one plant species), or where remedial management of noxious or invasive plants must be employed, winter cover can be lost, soils destabilized, and the filtering quality of wetlands and riparian areas may be diminished and siltation increased.

In addition to the environmental problems invasive and noxious plants cause, they have a financial impact as well. The SHA spends over \$300,000 annually in purchasing herbicides to control exotic weeds. That figure is much larger when factoring in administrative, equipment, fuel, and labor costs. Current practices of pesticide use and mowing are not only costly but also often high impact, causing even further disturbance and perpetuating the cycle of colonization by invasive plants.

Objective

The objective of this study was to develop methods for the use of biological control (i.e. using a natural predator, in this case a weevil or small beetle) that would provide SHA with a sustainable, cost effective, and beneficial method for dealing with noxious and invasive weeds on SHA rights-of-way (ROW).

Description

The research team at the Maryland Department of Agriculture (MDA) propagated and released two beneficial biological agents, *Galerucella* leaf beetles and *Rhinoncomimus latipes*, for the control of two invasive plant species (purple loosestrife and mile-a-minute weed) at strategic locations. The team then monitored their effects on weed populations over the course of two growing seasons. Other biological agents were also monitored for their potential to aid in the management of Canada thistle, *Cirsium arvense*.

Results

The research team at MDA adapted and refined rearing protocols developed by the New Jersey Department of Agriculture during the course of this project. The result is a year-round weevil-rearing process where colony numbers can be increased quickly. MDA also developed a method for holding weevils in cold storage (similar to hibernation) for several days prior to release to ensure that sufficient numbers are collected.

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During the study period, high levels of activity of the Canada thistle bud weevil, *Larinus planus*, were found in Canada thistle populations in Maryland. However, the impact could not be determined. Due to the widespread distribution and abundance of this herbivore, it is likely that the impact on seed development is significant, although not enough to eliminate populations of Canada thistle. It may however, reduce colonization of new sites due to the reduction in spread of viable seed.

The numbers of the leaf beetle, *Cassida rubiginosa*, while high in certain areas, remained relatively low overall. The research team speculated that the impact of the leaf beetle on Canada thistle is low, as many plants still are able to flower and set seed after early season leaf beetle herbivory. However, coupled with other biocontrol agents, additional stressors, including the leaf beetle, may have a long term impact on Canada thistle populations.

Based on site visits, the disease causing apical chlorosis in Canada thistle continued to spread in Maryland. The disease is of interest because it appears to delay and/or reduce flowering and viable seed production. The research team hypothesized that mechanical means of transmission and spread of the disease, including feeding by certain insects and human activities (e.g. mowing), may help spread the disease.

The overall conclusion of this project is that biological control can provide a sustainable method for dealing with noxious and invasive weeds. It can also save herbicide, labor, equipment, and fuel costs associated with traditional weed management methods.

Report Information

For more information on this study please contact:

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Link to Full Report

http://www.roads.maryland.gov/OPR_Research/MD-13-SP009B4T_Development-of-Biological-Agents-for-Invasive-Species-Control_Report.pdf