

Report as of FY2006 for 2006DE74B: "Predators of Galerucella Beetles, Biocontrol Agents of Purple Loosestrife"

Publications

- Water Resources Research Institute Reports:
 - Graham, J., and J. Hough-Goldstein, 2007, Predators of the Galerucella Beetle: Biocontrol Agent of Purple Loosestrife, Delaware Water Resources Center, University of Delaware, Newark, Delaware, 37 pages.
- Other Publications:
 - Boyd, A., ed., 2006, Delaware Water Resources Center WATER NEWS Vol. 6 Issue 2 Nine DWRC Internship Winners for 2006 2007, <http://ag.udel.edu/dwrc/newsletters/Summer2006.pdf>, p. 6-7.

Report Follows

Undergraduate Internship Project #5 of 9 for FY06

A *DWRC / University of Delaware (UD) College of Agriculture and Natural Resources* co-sponsored internship advised by Dr. Judith Hough-Goldstein of the *UD* Department of Entomology and Wildlife Ecology dealt with purple loosestrife, an invasive plant clogging Delaware freshwater ponds. Intern *Jason Graham* studied the effectiveness of beetles released to control targeted loosestrife stands at Ashland Nature Center and Flat Pond near the C & D canal. He investigated to what extent potential predators such as praying mantids, ladybird beetles, arachnids, and assassin bugs are feeding on the biocontrol beetles as a possible explanation for their failure to establish a colony in the Ashland location. His project was titled “*Predators of Galerucella Beetles, Biocontrol Agents of Purple Loosestrife.*”



Abstract

During the summer of 2004, two species of *Galerucella* beetle were released in two distinct ecosystems to control stands of the invasive plant, purple loosestrife. The two species *G. pusilla* and *G. californiensis* are indistinguishable by the unaided eye and were reared and shipped together from the Phillip Alampi Beneficial Insect Laboratory, New Jersey Department of Agriculture. The ecosystems were different in that Flat Pond, bordering the C&D canal, is a near monoculture of purple loosestrife while the stand of loosestrife at Burrow’s Run, Ashland Nature Center is mixed in with a diverse selection of plants.

The *Galerucella* beetles were successful in establishing at Flat Pond within the first year. While successful at establishing in undetectable numbers at Burrow’s Run, during the first two years they were thought to have failed. A small population of *Galerucella* was discovered in the third year after release at Burrow’s Run.

My hypothesis is that the *Galerucella* beetles establishment at Burrow’s Run was subject to interference by arthropod predators. This hypothesis was explored by: conducting arthropod sample sweeps at both sites on a weekly basis throughout the summer, conducting predation experiments in the laboratory and monitoring both sites in 2006.

The results of the arthropod sample sweeps gave an overview of the predator biodiversity within the two habitats. The predators found in higher numbers at Burrow’s Run include Heteroptera, Coleoptera and Mantodea. In predation experiments the lady beetle (Coleoptera, Coccinellidae, *Harmonia axyridis* Pallas) was found to prey upon *Galerucella* eggs. In another predation experiment the wheel bug (Hemiptera; Reduviidae; *Arilus cristatus* L.) nymph was found to prey upon *Galerucella* in adult, egg and larval stages. The results of the monitoring sessions of 2006 show that *Galerucella* adults, eggs and larvae were found at Burrow’s Run. There were fewer larvae and eggs in comparison to Flat Pond, but higher numbers of adults.

These results support the hypothesis that biotic interference from predators may have interrupted the establishment of *Galerucella* at Burrow's Run in comparison to Flat Pond. This report provides a better understanding of the use of *Galerucella* as biocontrol agents and the predators which they have overcome in two habitats of Delaware.