

Biological Control of

Purple Loosestrife (*Lythrum salicaria*) in Manitoba with *Nanophyes marmoratus*



Purple Loosestrife (*Lythrum salicaria*) is an invasive perennial weed that was introduced into North America in the early 1800s. Purple loosestrife destroys natural habitats, displacing native vegetation by forming dense monotypic stands. Wildlife that depends upon native vegetation for food, shelter and breeding areas are forced to leave invaded habitats. There is no Canadian insect, bird, fish or mammal that solely depends on loosestrife for survival. In fact, purple loosestrife threatens the survival of our wildlife and is responsible for significant habitat loss across Manitoba.

Purple loosestrife may be the most difficult noxious weed to control in Manitoba. Purple loosestrife is an aggressive invasive weed with one mature plant capable of producing as many as 2.7 million seeds per year! There are no chemical or mechanical methods available to serve as a long-term *sustainable* management strategy for the control of purple loosestrife.

Biological Control of Purple Loosestrife

When purple loosestrife was introduced into North America, it escaped its natural enemies that control its spread in its European range. Biological control reunites a target weed such as purple loosestrife with its host-specific natural enemies. Biological control with specialized plant-eating insects may provide a long-term sustainable control strategy for purple loosestrife. *Nanophyes marmoratus* is a European insect that has been identified as a potential biological control agent for purple loosestrife

All forms of purple loosestrife, including garden cultivars were placed on the Manitoba Noxious Weed Act in 1996...

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Exit holes in seed capules indicate presence of *N. marmoratus*.

***Nanophyes marmoratus* - A host-specific weevil**

Host-specificity screening was carried out by the International Institute of Biological Control between 1990 and 1992. Screening tests were carried out on taxonomically similar plants, associated wetland plants, and important agricultural plants. *N. marmoratus* was found to be highly host-specific to purple loosestrife. A permit for the importation of *N. marmoratus* into North America was then granted in 1994.

Nanophyes marmoratus is a herbivorous weevil (Coleoptera: Curculionidae) about the size of the end of a pencil. After overwintering, emerging adults start to feed on the young loosestrife shoots. Once flowers develop, adults feed and copulate on inflorescences and females lay a single egg into the tip of young flower buds before the petals are fully developed. Attacked flower buds remain closed and do not flower. Larvae further consume the stamens, petals and ovary. Larvae form a pupation chamber from their frass at the bottom of the bud in which they pupate. Attacked purple loosestrife flower buds are aborted due to both adult and larval feeding.

Complete development from egg to adult takes about four weeks. New generation adults appear in late summer and feed on purple loosestrife prior to overwintering. *Nanophyes marmoratus* have one generation per year. Purple loosestrife is the only known host for *N. marmoratus*.



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Collection and Importation

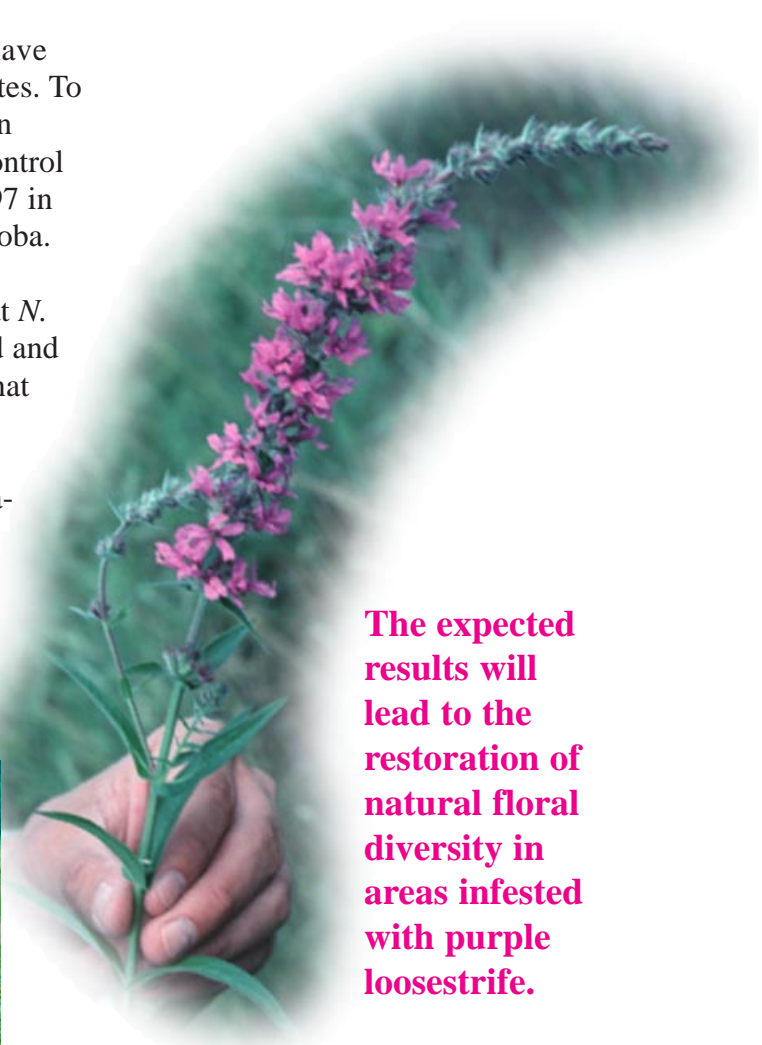
In 1996, the Manitoba Purple Loosestrife Project was a partner in a collaborative effort with Cornell University and the Minnesota Department of Natural Resources. The team collected *N. marmoratus* from its native European range. Collected *N. marmoratus* were taken to the University of Kiel in northern Germany for nematode screening. After screening, insects were then imported into North America and held in quarantine at Cornell University until the spring of 1997. Voucher specimens can be found in the Canadian National Collection of Insects in Ottawa.



Adult *Nanophyes marmoratus*

Releases of this biological control agent have occurred in Manitoba and in several US states. To date, Manitoba remains the only Canadian province to have released this biological control agent. *N. marmoratus* were released in 1997 in the Netley-Libau Marsh in southern Manitoba.

Field monitoring in 1998 has indicated that *N. marmoratus* has successfully overwintered and established in Manitoba. It is estimated that it will take seven to 10 years for the insects to build up population levels high enough to impact purple loosestrife populations. The performance of *N. marmoratus* will be monitored over the next several years.



The expected results will lead to the restoration of natural floral diversity in areas infested with purple loosestrife.



Researchers release *N. marmoratus* into a field cage.



Biological Control at Work

In addition to *Nanophyes marmoratus*, the Manitoba Purple Loosestrife Project has also released three other host-specific herbivores to combat purple loosestrife. These are *Galerucella californiensis* and *G. pusilla*, both leaf-eating beetles, and a root-mining weevil *Hylobius transversovittatus*.

Of these biocontrol agents, *G. californiensis* has begun to provide measurable levels of purple loosestrife control at a number of sites across Manitoba. In 1993, 250 adult *G. californiensis* were released at a research site in the Delta Marsh. Exponential population growth resulted in all loosestrife stems being destroyed by early July 1996 through 1998.

“Nanophyes Project” Funding Partners

- Ducks Unlimited Canada
 - Manitoba Purple Loosestrife Project
 - Murphy Foundation
- North American Waterfowl Management Plan
- Manitoba Natural Resources
 - Environment Canada Action 21 Fund
 - City of Winnipeg
- Sustainable Development Innovations Fund

Biological Control in the Libau Marsh

A second example comes from a site in the Libau-Netley Marsh. In 1994, 1000 *G. californiensis* were released and by 1998 no flowering purple loosestrife plants were found.



Libau release site - July 1994



No Flowering Loosestrife - July 1998

For more information contact the Manitoba Purple Loosestrife Project, Cory Lindgren, Project Manager, Box 1160, Stonewall, Manitoba, R0C 2Z0, Canada. Phone: 204-467-3000 Fax: 204-467-9028



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