BIOLOGICAL CONTROL OF PURPLE LOOSESTRIFE

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ABSTRACT

Motivation: Decrease the population of purple loosestrife (*Lythrum salicaria*) in an area using golden loosestrife beetles (*Galerucella pusilla*) as a biological control agent.

Questions and Objectives:

- What methods are needed for growing purple loosestrife indoors?
- What types of problems may arise?
- Is growing purple loosestrife during the winter better than in the spring?
- Is early release for beetles possible or more effective?

Methods:

- Dig up and pot purple loosestrife plants
- Water plants and record data (temperature, growth, events)
- Introduce the beetles to the greenhouse plants
- Introduce the beetle infested greenhouse plants into the original site

Findings:

- Plants are susceptible to powdery mildew
- When collecting the purple loosestrife, washing the soil from the roots will rid of other insects that may infect the plant
- Purple loosestrife can grow in the winter in a greenhouse environment

INTRODUCTION

Purple loosestrife (*Lythrum salicaria*) was first introduced and established in estuaries in northeastern U.S. by the early 1800s. It caused very few problems. It became more aggressive by 1930s and expanded its distribution within the U.S. Since then, purple loosestrife has caused a severe threat to open water habitats and wetlands (freshwater meadows, marshes, banks of rivers/streams/ponds, reservoirs, and ditches).

It is important that we reduce the population of purple loosestrife where it is not native, because it replaces the native plants with a dense monoculture, which reduces biodiversity, endangers rare species, and provides little value for wildlife. Native birds, amphibians, and butterflies that rely on native wetlands for food and shelter find very little resources in loosestrife because it is dense, provides little food, poor cover, and few nesting materials.

One of the ways to decrease loosestrife populations is using golden loosestrife beetles (*Galerucella pusilla*). These host-specific beetles use only purple loosestrife as a resource, which stresses the plants process of photosynthesis to create flowers.

This technique has been used and proven to be effective (Fig. 1). The Wallingford Conservation Commission wanted to apply this technique on the Tilcon property, which has been taken over by purple loosestrife. When starting this project, we also wanted to test early introduction of the beetles and grow purple loosestrife over the winter to be able to sustain more beetles.

Objectives:

- Evaluate growth patterns of purple loosestrife in the greenhouse after mid-fall introduction
- Assess the effects of early introductions of beetles on purple loosestrife

Fig 1. A study done in Roger Williams Park Zoo Wetlands by Lisa Tewksbury and Richard Casagrande from University of Rhode Island and Plant Sciences Dept. using *Galerucella* beetles. Comparison between 1997, 2003 and 2004 shows the effectiveness of using beetles to clear and open up wetlands again.

MATERIAL AND METHODS

Study Area:

- Purple Loosestrife (*Lythrum salicaria*) plants were collected from the Tilcon property in Wallingford, CT (Fig. 2)
- Loosestrife plants were transplanted to a greenhouse at Lyman Hall High School (Fig. 3)
- Golden loosestrife beetles (*Galerucella pusilla*) will be acquired from Biological Control of Weeds (http://www.bio-control.com/products.php)

Study Procedure:

- 15 loosestrife plants were collected in late September 2014
- They were potted in the greenhouse in early October 2014
- The following data were recorded for all plants in the greenhouse:
  - Temperature
  - New growth, progress of growth (Fig. 4a)
  - Insect infestation (Fig. 4b)
  - Presence of powdery mildew (Fig. 5a,b)
- Introduce beetles to greenhouse plants
- Reintroduce the beetle infested plants back to the original property

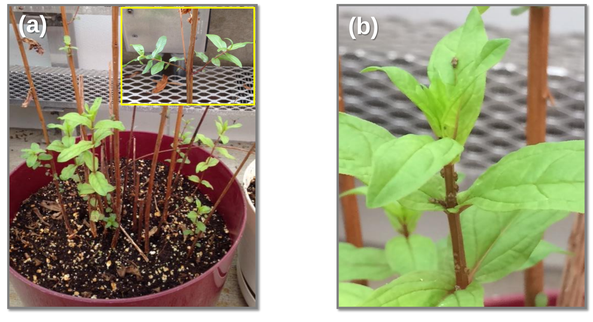

Fig 4. (a) By late October some plants were growing very well. Most plants had new growth from the nodes on the old stems. (b) By early and mid-November, insects started to appear and infest one plant then spread to others in less quantities.

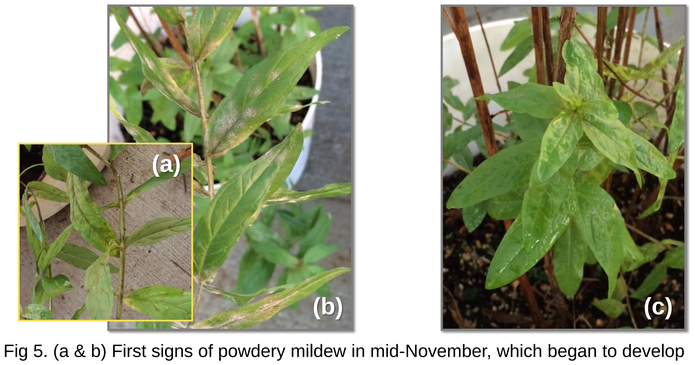

Fig 5. (a & b) First signs of powdery mildew in mid-November, which began to develop and some leaves were entirely covered and wilted. (c) A baking soda solution was made as a prevention and was sprayed on the effected and non-effected plants.

RESULTS

Observations:

- Both of the largest pots did not grow as successfully
- The insect infestation stopped after the mildew started (Fig. 4b & 5a,b & 6)
- Even though the plants looked dormant, it was still early enough for them to re-grow from the existing stems (Fig. 4a)

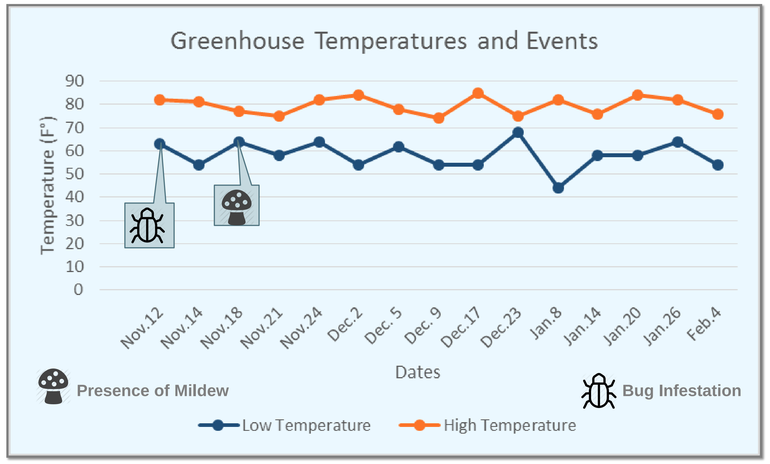

Fig 6. Powdery mildew was able to grow well because the temperatures were ideal (68° to 86°F). After the long break between Dec. 28 and Jan. 8, there is a large decrease in temperature and it was the lowest temperature recorded.

CONCLUSIONS

This project highlighted many important things when rearing plants in a greenhouse. One important step that needed to be taken was cleaning the roots to rid of any insects inside the soil. While the insect infestation was not severe, in the future it will be more important because there might be a more dangerous insect or *Galerucella* beetle eggs will be inside the soil. Greenhouse plants are also more susceptible to powdery mildew as it does not require water to germinate and it prefers warm days and cool nights (68° to 86°F), which are temperatures usually found in greenhouses (Fig. 6). Now I know different ways to prevent powdery mildew growth so that growing plants inside the greenhouse will be more ideal. I did make a baking soda solution to prevent the spread of powdery mildew (Fig. 5c), however given the reduced accessibility to the greenhouse, the spray was not effective. Because of problems with mildew and bug infestation, early introductions of beetles were delayed. However, there is more to learn when we introduce the beetles.

FUTURE DIRECTIONS

This project is still underway. If the purple loosestrife can grow well inside the greenhouse like before, the beetles will be purchased and will be used to infest the greenhouse loosestrife for a few weeks before transferring the plants and the beetles to the Tilcon property. They will be spread out around the edges of the dense loosestrife population in small colonies.

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