# Performance of the Milfoil Weevil on Hybrid Watermilfoil Genotypes

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## Introduction

The Eurasian Watermilfoil (*Myriophyllum spicatum*) is an invasive aquatic plant that has become a huge problem in lakes and ponds throughout the U.S; including Minnesota. The plant outcompetes native species, disrupts habitats, and is a nuisance to boaters. Preventative measures to control the plant involve primary chemical and mechanical means; which often require repeated use and high cost.

The Milfoil Weevil (*Euhrychiopsis lecontei*) is a native semi aquatic herbivore coleopteran which services as a specialist herbivore for the Watermilfoil plant. The weevils true impact on plant degradation is the result of burrowing behavior through the stem preformed by weevils in their larval stage.

The Eurasian species of the watermilfoil Minnesota also has a native species; the Northern Watermilfoil (*Myriophyllum exalbescens*). Naturally occurring cross breeding between the two species has resulted in the creation of multiple various hybrid variants.

The weevil has shown a selective preference for the Eurasian Watermilfoil species which correlates with higher rates of weevil survivability and plant susceptibility. The focus of this experiment is to determine weevil survival and development rate differs between the different genotypes of hybrid in comparison to both Northern and Eurasian watermilfoil.

## Methods and Materials

The process used to determine involves measure qualitative and quantitative metrics to measure degradation to the plant.

Adult weevil pairs were introduced to watermilfoil plants from three hybrid variants (Grays, Smith, and Otter) and two controls (Eurasian and Northern) are taken from stock tanks. After isolation; successful oviposition of the adult weevils are removed, and the plant is transferred to the growth chamber via an isolation tube. Upon introduction to the chamber, the weevil life cycle development is allowed to take place as progress on both plant stem damage by centimeter (cm) from the larva and weevil life stages are monitored and recorded.

**Figure 1.** Watermilfoil plant prepared for growth chamber.

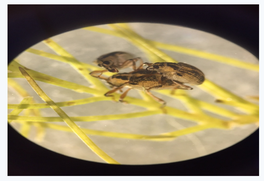

**Figure 2.** Milfoil Weevil exhibiting mating behavior.

## Results

Reared weevil weights for both the Smith and Otter hybrid variants were above the average weight of 1.37; with Grays falling slightly below. Average weight for both the Eurasian and Northern species both fell below the average weight.

Survival rates for weevils to adulthood varied greatly within hybrid variants; but were considerably high for the Eurasian species. The Northern variant production of adult weevils fell close to the median for successful adult emergence.

Plant damage for the hybrid and Eurasian variant were considerably high at 65.2% and 93% respectively. Damage to northern species stem from larva herbivory averaged at 46.4%.

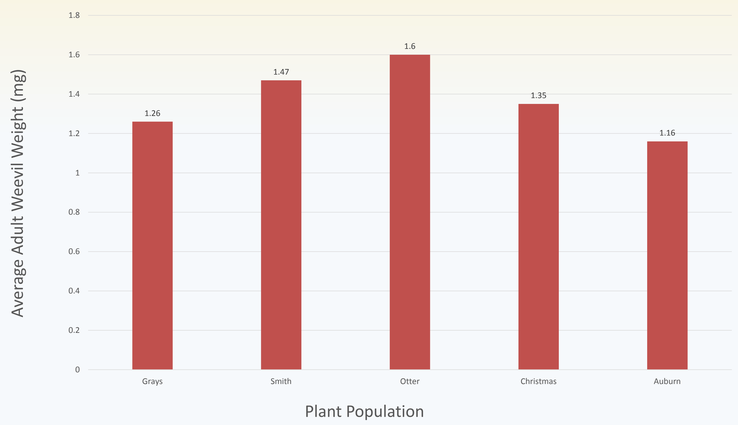


**Chart 1.** Average Reared Adult Weevil Weight for varying Introduced Plant Populations (n= 52)

**Table 1.** Recorded Data from Watermilfoil Isolation and Egg Introduction

| | Plant species | Stem Damage (cm) | Completed Adult Life Stages |
|---|---|---|---|
| Gray's Bay (G) | Hybrid | 154cm | 14 |
| Smith's Bay (S) | Hybrid | 205cm | 5 |
| Otter Lake (O) | Hybrid | 161cm | 2 |
| W. Auburn Lake (A) | Eurasian | 159cm | 22 |
| Christmas Lake (C) | Northern | 96cm | 9 |
| Totals | | 775cm | 52 |

## Discussion

Higher weevil weights for hybrid species serve as indicators for an increase for the rate of survivability. The successful maturation for eggs oviposited on hybrid and Eurasian variants also supports this.

High survival rates of weevils from larval stage to adults for eggs oviposited upon hybrids indicate an increase likelihood of fostering sexually mature adults. Also, the Eurasian variants have shown to be strong indicators for potential successful self sustaining populations.

Heavily sustained plant damage from larval behavior for both the hybrid variants and Eurasian species in comparison to the Northern species correlate with a decrease in plant survivability upon weevil offspring introduction. Therefore, supporting a higher degree of fitness for the milfoil weevil upon the Eurasian and hybrid variants in comparison to the northern species.

Though all of the recorded plants were kept under the same environmental conditions other factors such as high algal levels, number of introduced eggs, and plant height may have also influenced the results.

## Conclusions

Based on the collected data during this experiment a relatively strong case can be made for the viability of the Milfoil Weevil (*Euhrychiopsis lecontei*) as a form of biocontrol for the Eurasian Watermilfoil (*Myriophyllum spicatum*) species and hybrid variants.

The susceptibility of the plant to herbivory by the weevil larva in conjunction to high survival rates of maturation would be indicative of the weevil's ability to maintain a self-sustaining population. A self sustaining population is required to ensure the continued mitigation of the Eurasian watermilfoil species infestation.

Similar studies conducted by Newman and Mako[1] offer promising results which add to the Milfoils weevil's credibility as a biocontrol. The Milfoil Weevil has shown a selective preference for the Eurasian species over Northern watermilfoil for the oviposition of eggs.

Higher rates of stem damage from larval activity have also been observed by an experiment being preformed by Mazzei[2]. This supporting similar findings in this study which indicate a higher susceptibility to damage from the milfoil weevil to Eurasian Watermilfoil.

More testing must be conducted regarding the viability of the Milfoil weevil as a biocontrol agent for the invasive Eurasian Watermilfoil and subsequent hybrid variants. However; favorable results from multiple studies, including this one have indicated a strong possibility for the weevil efficacy on reducing the population and spread of the invasive plant species.

## Acknowledgements

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