

Is more better?

A field evaluation of the efficacy of varying doses of 2,4-D BEE on variable milfoil in New Hampshire Lakes

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Introduction:

Variable milfoil (*Myriophyllum heterophyllum* Michx) is the most widespread invasive aquatic plant in freshwater lakes and ponds in New Hampshire. Recent herbicide evaluations completed by the US Army Engineer Research Development Center (ERDC) determined that 2,4-D BEE (granular formulation) was the most effective herbicide for control of New Hampshire strains of variable milfoil (Netherland and Glomski 2007). Results of field applications can vary from the laboratory results due to dissipating herbicide concentrations over time from water exchange, diffusion, plant uptake and adsorption and herbicide breakdown (Green and Westerdahl 1990). Considerable state, municipal and private funds are spent each year on herbicide treatment programs to control variable milfoil in New Hampshire lakes and higher application rates carry a higher price.

Objective:

This study was performed to evaluate the difference in field treatment efficacy of 100 lbs/acre (112 kg/ha) or 200 lbs/acre (224 kg/ha) of 2,4-D BEE granular on variable milfoil and thereby provide support for using one application rate over the other.

Methods:

- Six experimental sites on three different lakes ranging in size from 5 to 14 acres were treated at a rate of either 100 lbs/acre (1 site per lake) or 200 lbs/acre (1 site per lake).
- Two control sites with a size of approximately 5 acres on two different New Hampshire lakes were designated as no-treatment sites.
- Point intercept surveys based on a standardized 85-foot grid were performed pre-treatment and approximately twelve weeks post-treatment.
- During the pre-treatment survey the following information was recorded at each data point location: water depth, sediment type, soft sediment thickness, aquatic plant species present, and dominant plant species. The mean variable milfoil root crown mass measured in ounces was also measured at five 0.5 meter quadrats per experimental site.
- During the post-treatment survey the aquatic plant species present and the dominant aquatic plant species were measured at each data point location. The mean root crown mass measured in ounces within five 0.5 meter quadrats per site was also measured.
- Measurements were compared utilizing two-sample, two-tailed, unpaired t-tests ($\alpha = 0.05$) and mean values.

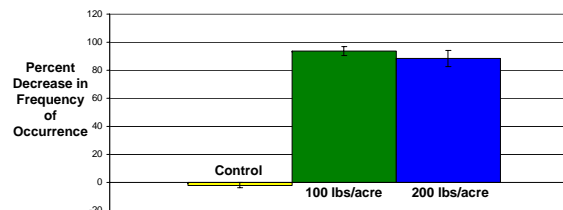
Sample Treatment Path and Survey Grid – Lake Massasecum



Results:

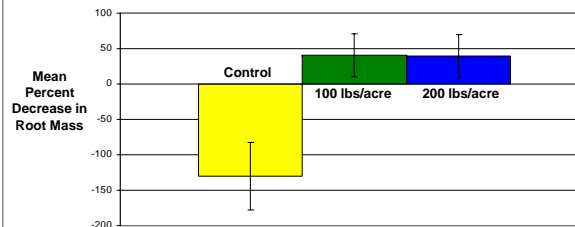
- The percent decrease in frequency of occurrence of variable milfoil was significantly different for the control group versus both the 100 lbs/acre treatment group ($p=0.0002$) and the 200lbs/acre treatment group ($p=0.0013$).
- No significant difference in the percent decrease in the frequency of occurrence of variable milfoil was observed for the 100 lbs/acre treatment group versus the 200 lbs/acre treatment group ($p=0.4672$).

Application Rate Did Not Affect Variable Milfoil Occurrence



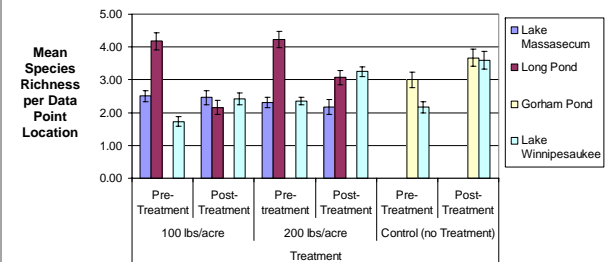
- No significant difference was observed between the mean root mass in the 100 lbs/acre treatment group when compared to the control group ($p=0.094$) or the 200 lbs/acre treatment group ($p=0.981$).
- The average root mass for the 200 lbs/acre treatment group was significantly different from the control group ($p=0.048$).

Application Rate Did Not Affect Mean Root Mass



- Comparisons of mean species richness increased in some sites post-treatment and decreased in others for both treatment groups and show no obvious trends.

Species Richness Measurements Revealed No Obvious Trends



Conclusions:

The study provides some empirical field based support for the use of 100 lbs/acre as the standard treatment dose for variable milfoil control in New Hampshire Lakes as no statistically significant increase in control was observed to match the higher cost associated with a 200 lbs/acre treatment.

Literature Cited:

- Green, W. R. and H. E. Westerdahl. 1990. Response of Eurasian watermilfoil to 2,4-D concentrations and exposure times. *J. Aquat. Plant Manage.* 28: 27-32.
- Netherland, M. D. and L. M. Glomski. 2007. Evaluation of aquatic herbicides for selective control of variable milfoil (*Myriophyllum heterophyllum* Michx). Final Report to the New Hampshire Dept. of Environ. Services. 96 pp.

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