Lime Slurry—An Innovative Management Tool for Aquatic Plants

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My research team has found that lime slurry is an economic and effective tool for reducing the density of aquatic plants, including the exotic curlyleaf pondweed (*Potamogeton crispus)*, without harming native aquatic plant species. The idea of using lime to control macrophytes originated in Alberta, Canada, where researchers determined that lime effectively controlled macrophyte biomass without affecting invertebrate communities, as long as water pH was maintained at less than 10 (Chambers and others 2001, Prepas and others 2001).

The benefits of lime treatment in the Canadian research project led us to develop a pilot study at Big Lake, a 249-acre (104-ha) lake near Osceola in western Wisconsin. During a macrophyte survey of the lake in June 1996, we found curlyleaf pondweed was the dominant species in the lake (Rattei 1997). We treated replicate 1-acre (0.4-ha) plots with calcium hydroxide as a slurry at a dose of 150 g/m^2 during 1998 and at a dose of 300 g/m^2 during 1999. Our results indicated a statistically significant reduction of macroophyte stem density and biomass during the years of treatment and during one year following treatment (Figure 1), and that the higher dose increased the effectiveness of the treatment. We did not observe curlyleaf pondweed in the treatment plots following treatment, even though the plant continued to occur throughout the lake (Rattei 2001).

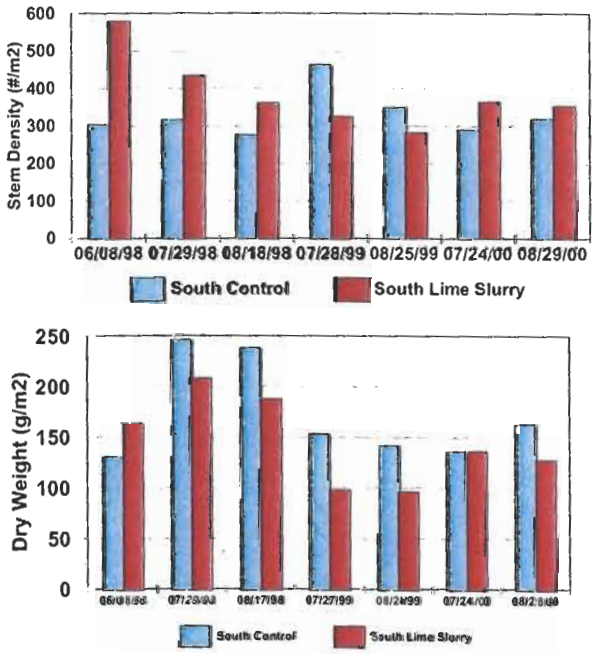

Figure 1. Macrophyte stem density (above) and dry weight measurements (below) from control and lime slurry treatment plots from 1998 through 2000. Pretreatment data were collected on June 8, 1998 and treatment occurred during mid-June of 1998 and 1999. Lime treatment reduced plant stem density and dry weight during treatment years. Stem density and dry weight increased in 2000, but levels remained below pre-treatment levels.

Our assessment of the lime slurry plots indicated that the treatment encouraged the growth of native aquatic species considered valuable habitat for fish. These species included wild celery (*Valisneria americana)*, large-leaf pondweed (*P. amplifolius)*, Canada waterweed (*Elodea canadensis)*, Richardson's pondweed *(P. richardsonii)*, sago pondweed (*P. pectinatus)*, water stargrass (*Zosterella dubia)*, flat-stem pondweed (*P. zosteriformis)*, duckweed (*Lemna minor)*, and morthern watermilfoil (*Myrophyllum exalbascens)* (Rattei 2001).

After completing our pilot project, we treated Clifford Lake and Faille Lake, located near Osakis in central Minnesota, with an alum (to control internal phosphorus loading from sediments) and lime slurry (300 g/m^2) in order to control vegetation and reduce internal phosphorus loading. Prior to treatment, a very dense growth of curlyleaf pondweed occurred in the lakes each year during early summer. Following treatment in April 2002, staff of the Sauk River Watershed District did not observe curlyleaf pondweed in areas where we had applied the alum and lime. However, due to the presence of a large number of curlyleaf pondweed turions (winter buds) in the lakes' sediment, weed density in the lakes during 2003 was about 80 percent of pretreatment density (L. Nelson pers. comm.).

The U.S. Army Corps of Engineers is currently conducting a lime slurry research project at the Eau Galle Aquatic Ecology Laboratory near Spring Valley, Wisconsin to determine lime's mode of action. Four hypotheses have been suggested—1) it alters sediment chemistry, 2) it causes changes in ammonia by changing water pH, 3) it causes changes in carbon by changing pH, and 4) chemical precipitation on leaves interferes with photosynthesis.

The cost of using lime slurry is about $650 per acre (cost varies with size of treatment area), which is less expensive than many mechanical treatments (harvesting, hydroraking, rotovating) and herbicides (for example, tryplichor). Although lime slurry is a promising aquatic plant management tool, the decision to use it depends on many factors, including the type of plant community that is being restored and the management goals for a particular lake.

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