Invertebrates associated with submersed macrophytes in a prairie wetland: Effects of organophosphorus insecticide and inorganic nutrients

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With 5 figures and 6 tables

Abstract: Micro- and macroinvertebrate communities associated with submersed macrophytes in experimental enclosures in a prairie lacustrine wetland experienced primary (direct) and secondary (indirect) effects of two manipulations of the trophic cascade: (1) top down effects of an organophosphorus insecticide (chlorpyrifos) and (2) bottom up effects of nutrient addition. Both ecosystem perturbations were expected to result in increased biomass of primary producers, by elimination of grazers in the insecticide treatment and by direct stimulation of growth in the nutrient addition treatment. Rapid mortality due to direct toxicity of chlorpyrifos to Arthropoda (Cladocera, cyclopoid Copepoda, Amphipoda, Insecta) was the primary consequence of treatment, occurring in open water and in macrophyte beds at similar intensity and timing (within 1 week). Indirect effects of chlorpyrifos led to increased abundance of rotifers, calanoid copepods, Stylaria, and Chaetogaster through August. No effect on primary producers was detected.

No treatment effects of nutrient enrichment on primary producers in the mesocosms were found. Biomass of algae (phytoplankton, epiphyton) and submersed macrophytes, and % cover of enclosure bottom by macrophytes were elevated, but not markedly different from the control. The planktonic microinvertebrate community and that associated with submersed macrophytes changed in composition seasonally, but the pattern did not differ substantially from the control. Aquatic arthropod abundance generally increased in response to nutrient enrichment.

Key words: Microinvertebrates, macroinvertebrates, enclosure, bottom-up top-down, chlorpyrifos.

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