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Water Quality Improvement with Physical and Chemical Management Practices

Jinwon Seo

Department of Fisheries and Allied Aquacultures, Auburn University, Alabama 36849 USA

Three different pond bottom treatments were evaluated in 12 earthen ponds. Bottoms of four ponds on the Auburn University Fisheries Research Unit, Auburn, Alabama, were dried for 1 month and tilled with a roto-tiller (dry-till treatment). Four other ponds were dried and tilled, and after filling with water, enough gypsum (calcium sulfate) was applied to give a total hardness of about 200 mg/L. Gypsum was reapplied as needed to maintain the hardness (dry-till with gypsum treatment). Four ponds were not subjected to bottom drying, tilling or gypsum treatment (controls). Channel catfish (*Ictalurus punctatus*) fingerings were stocked at 15,000/ha. Selected water quality variables were measured at 1- to 2-week intervals during the growing season. Concentrations of most variables increased over time because feeding rate was increased progressively as fish grew. Compared to the controls, both treatments had lower concentration of total phosphorus and soluble reactive phosphorus, and higher concentrations of dissolved oxygen ($P < 0.05$). In addition, ponds of the dry-till with gypsum treatment had in addition lower concentrations ($P < 0.05$) of chlorophyll *a*, chemical oxygen demand, gross primary productivity, and total alkalinity than control ponds. The reduction in chlorophyll *a* concentration suggested less phytoplankton in gypsum-treated ponds, and this effect was probably related to lower phosphorus availability because of calcium phosphate formation. Secchi disk visibility, total suspended solids concentrations, and turbidity did not differ significantly among the treatments ($P > 0.05$). Total fish production and survival rate did not differ significantly ($P > 0.05$) among the treatments. These findings suggest that water quality improvement can be achieved by drying and tilling pond bottoms between crops, and benefits possibly may be increased by treating low hardness waters with gypsum.