

Fertilization strategies for plastic-lined fish culture ponds

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Goals and Objectives:

- To determine the plankton and benthic communities of plastic-lined hatchery ponds, and
 - To modify nutrient levels to improve the zooplankton and benthic communities essential to growth and development of larval fish.
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Progress:

A completion report was submitted in December 2003.

Conclusions and Recommendations:

Organic fertilizers are important in the culture of walleye in plastic-lined ponds. The years that organic fertilizers were used, there was more prey available, both zooplankton and benthic invertebrates, to the young fish. However, we noted in each year of the study that nitrogen was limiting, and that more inorganic nitrogen was added to adjust to the targeted ratios. Alfalfa pellets were the organic fertilizer used throughout the study; however, alfalfa pellets tend to add only a minimal amount of nitrogen to the ponds. Soybean meal, another organic fertilizer, is known to have higher amounts of nitrogen compared to alfalfa pellets (7% for soybean meal vs. 2% for alfalfa hay [Snow 1957]). Clouse (1991) stated that soybean meal is 44% protein, and alfalfa meal is 18% protein. Therefore, it may be advantageous to use soybean meal in place of alfalfa pellets as the organic fertilizer in the future.

Walleye fingerlings may consume formulated feed, if the natural prey base is unavailable. In such a case it would be important to feed. However, if one is managing for zooplankton and benthic invertebrates with the application of organic fertilizers and can sustain a natural prey base, formulated feed is not needed for the culture of walleye in plastic-lined fish culture ponds. Furthermore, there are still questions as to the timeline of when food should be added. We noted some fish consumed formulated feed: the zooplankton population was depleted at this time, and the benthic numbers were beginning to decline. However, there was some remnant of the natural food base. It is unclear if we would have had better success getting the walleye on formulated feed if we had waited longer to harvest them, thus giving the natural food base more time to decline. However, this was not a feasible option since we did not want to allow cannibalism in our culture ponds.

In conclusion, for the culture of fingerling walleye in plastic-lined ponds, we recommend managing for a natural prey base of zooplankton and benthic invertebrates with the use of organic fertilizers, and monitoring water quality parameters, such as ammonia, nitrogen, total phosphorus, dissolved oxygen, temperature and pH; water quality needs to be assessed at all stages of the culture period. The application of supplemental commercial fish diets might be useful when the natural food base in the ponds becomes depressed.