

Auburn University and USDA/Natural
Resources Conservation Service

Alabama Aquaculture
Best Management Practice (BMP)

Pond Fertilization

BMP No. 8



Definition

In the early spring, catfish ponds may have clear water. Fertilizers are applied to increase nitrogen and phosphorous concentrations for the purpose of promoting phytoplankton growth. Phytoplankton is the base of the food web that provides natural food organisms for fish. The turbidity created by phytoplankton restricts light penetration in ponds to prevent or limit the growth of large aquatic plants (aquatic weeds).

Explanation

In the early spring, feed inputs to catfish ponds usually are low, and there is not enough nitrogen and phosphorus in pond waters to promote growth of microscopic plants known as phytoplankton. Ponds may have clear water and rooted aquatic weed infestations may develop on pond bottoms and in the water column in response to light penetration. Aquatic weeds obtain nutrients from pond bottom soils through their roots. These weeds can interfere with feeding and fish harvest. Also, ponds infested with aquatic weeds are not as productive as ponds with good phytoplankton production. An abundance of natural food organisms is especially important in fry and fingerling ponds to supplement manufactured feed. Large catfish also gain some benefit from natural food organisms. Fertilization is a proven technique for improving conditions for catfish production in ponds with clear water.

As water temperature increases, feed input increases due to increased fish activity. Phytoplankton becomes more abundant as a

result of increased food input and warmer temperature. An abundance of phytoplankton is called a phytoplankton bloom. Fertilization is generally unnecessary to maintain phytoplankton blooms in most ponds during the warmer months because there are plenty of nutrients from feeds. Fertilization is counterproductive in ponds where feeding rates are high enough to maintain adequate phytoplankton blooms. Fertilization encourages excessive phytoplankton and a greater oxygen demand. Unnecessary fertilization is detrimental to water quality in ponds and may lead to higher concentrations of nitrogen and phosphorus in effluents.

Fertilizers often are not effective in promoting phytoplankton growth in pond waters with total alkalinity concentration below 20 ppm. Applications of agricultural limestone to increase alkalinity can improve the response to fertilization. Higher alkalinity also is beneficial to fish production. Few commercial catfish ponds in Alabama have acidic, low alkalinity waters, and applications of agricultural limestone seldom are necessary.

Manures and organic fertilizers such as plant meals have historically been used to fertilize ponds. These materials are decomposed by bacteria resulting in an oxygen demand and low dissolved oxygen concentration. Manures also may contain antibiotics or other drugs that could contaminate effluents or fish flesh. Moreover, manures can contain a high abundance of bacteria. Use of animal manures in catfish ponds, and especially in food fish grow-out ponds, is not a recommended practice.

Fertilizing catfish ponds

Practices

- Only apply fertilizers when necessary to promote phytoplankton blooms.
- Do not use animal manures for fertilizers.
- Avoid excessive fertilization by using moderate doses and relying on the Secchi disk visibility to determine if fertilization is needed.
- Manage pond water levels to prevent or minimize effluent release to the extent possible.
- Do not fertilize ponds 1 or 2 days before expected periods of significant precipitation if overflow is expected.
- Apply agricultural limestone to ponds with total alkalinity below 20 ppm.
- Store fertilizers under a roof in a dry place to prevent rain from washing over it into surface waters.

Implementation notes

The most common fertilizers for catfish ponds are triplesuperphosphate, ammonium nitrate, diammonium phosphate, and liquid fertilizer. A suitable N:P₂O₅ ratio for ponds fertilizers in Alabama is about 1:3. Inputs should be around 2.7 lb N/acre and 8 lb P₂O₅/acre per application. Suitable fertilization programs can be based on periodic applications of the following amounts and types of fertilizers:

- 1) Triplesuperphosphate, 18 lb/acre and ammonium nitrate, 8 lb/acre
- 2) Diammonium phosphate, 18 lb/acre
- 3) 10 – 34 – 0 liquid fertilizer, 24 lb/acre

Fertilizers only should be applied when there is not enough phytoplankton. The Secchi disk is a good tool for assessing phytoplankton blooms. If Secchi disk visibility is greater than 18 inches in the spring, fertilizers should be applied.

Granular fertilizers should not be broadcast over pond surfaces. They should be mixed in a container of pond water (10 or 20 parts water to 1 part of fertilizer) and splashed over pond surfaces. An alternative is to apply granular fertilizers on an underwater platform such as illustrated in Figure 1. As nutrients dissolve from fertilizer on the platform they are mixed throughout the pond by water currents. Liquid fertilizers may be sprayed over pond surfaces or released into the propeller wash of an outboard motor as a boat is driven over the pond surface.

Alternatively, liquid fertilizers may be mixed with pond water and splashed over pond surfaces behind paddlewheel aerators.

Fertilizers may be applied at weekly intervals if plankton is scarce and water is clear. The Secchi disk (Figure 2) is used to estimate visibility into the water. The depth that this disk disappears from view is called the Secchi disk visibility. Water with a Secchi disk visibility of less than 24 inches usually is considered too clear and fertilizer can be applied to promote phytoplankton. Once a Secchi disk visibility of 18 inches or less is achieved and feeding rates are above 20 or 30 lb/acre per day, pond fertilization should be discontinued to avoid introducing unnecessary nutrients.



Figure 2. Secchi Disk.

Fertilization of muddy ponds often helps clear the water of excessive turbidity. Application of agricultural limestone also can help clear muddy water in ponds with low alkalinity. Agricultural limestone application rates can be obtained by sending a sample of pond bottom soil to the Auburn University Soil Testing Laboratory for analysis. Agricultural limestone application rates usually are 2,000 to 4,000 lb/acre, and the limestone should be spread uniformly over pond surfaces using a boat.

References

- Boyd, C. E. 1981. Fertilization of warm water fish ponds. *Journal of Soil and Water Conservation* 36:112-142.
- Boyd, C. E. 1982. Liming fish ponds. *Journal of Soil and Water Conservation* 37:86-88

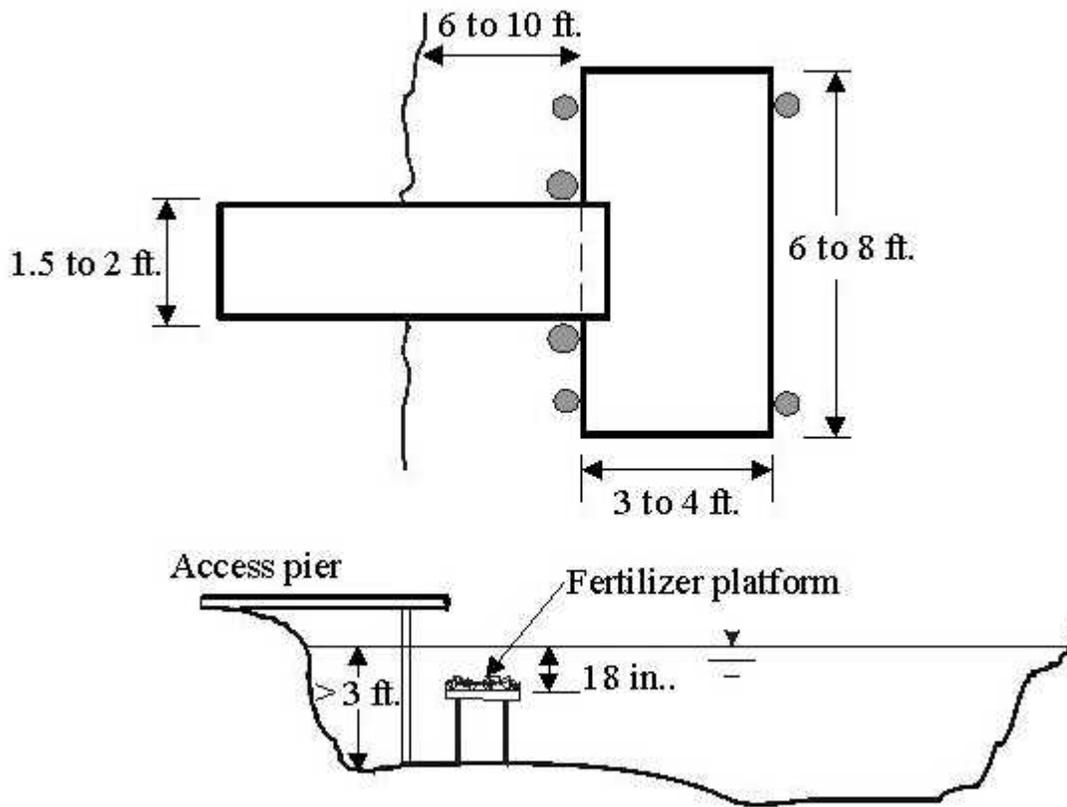


Figure 1. Underwater platform.



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