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 Paddlewheels for catfish pond aeration

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 Department of Fisheries and Allied Aquaculture, Auburn University,
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9. ABSTRACT

A combination of warm weather and cloudy days in late summer can result in low oxygen levels in fed catfish ponds. Several types of mechanical aerators are being used to maintain an adequate dissolved oxygen level in the ponds. These include air blowers, submerged pumps, and propellers. New among those being developed and tested at the Agricultural Experiment Station is a paddlewheel powered by a $\frac{1}{4}$ hp. electric motor. In tests at the Auburn Fisheries Research Unit, a comparison between the paddlewheel and a pump circulation biofilter unit found that the paddlewheel maintained the oxygen level above 5 ppm., while the biofilter treatment allowed it to dip below 1 ppm. For an average power cost of \$0.04 per kilowatt hour, the cost of paddlewheel aeration would be \$0.04 per lb. of gain while the propeller-type aerator would cost \$0.09 per lb. Additional tests are being conducted to evaluate the paddlewheel's effectiveness on commercial production-sized ponds.

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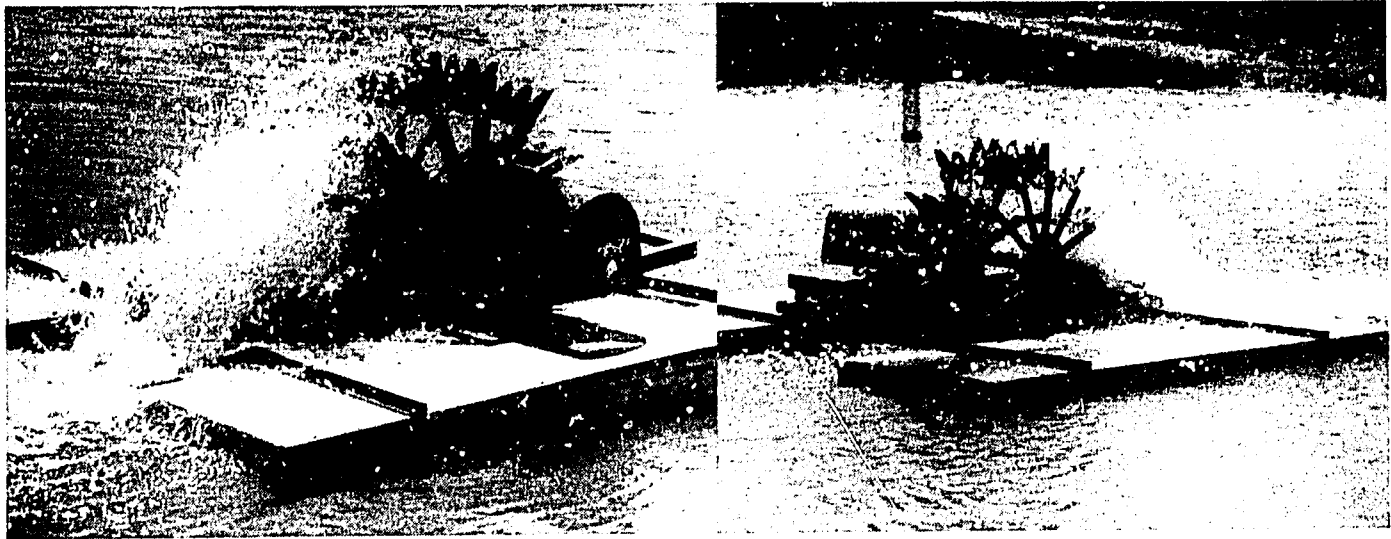


FIG. 2. Motor and paddlewheel sides of catfish pond aerator used to aerate experimental catfish ponds at Auburn.

COMBINATION OF WARM WEATHER and cloudy days in late summer can result in low oxygen levels for fed catfish ponds. The critical period is likely to be just after sunrise (as shown in Figure 1) when overnight demands have depleted the oxygen storage in the water and re-supply by photosynthesis has not been activated. When oxygen levels drop below 3 parts per million (p.p.m.) catfish will usually not feed with enthusiasm. Oxygen levels below 1 p.p.m. are likely to lead to fish kills.

Test Aerator

Several types of mechanical aerators are being used to maintain an adequate dissolved oxygen level in catfish ponds. These include air blowers, submerged pumps and propellers. New among those being developed and tested at the Agricultural Experiment Station is a paddle-

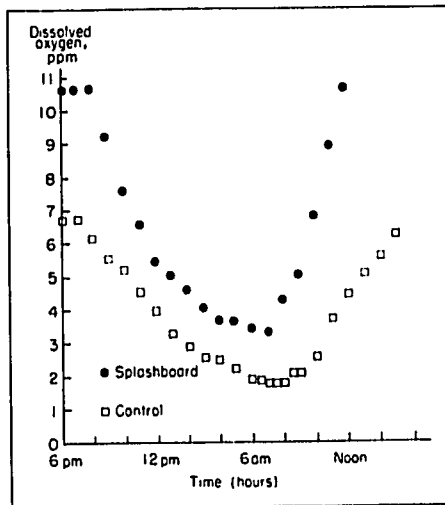


FIG. 1. Typical dissolved oxygen pattern.

Paddlewheels For Catfish Pond Aeration

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wheel powered by a ¼ hp. electric motor (Figure 2). The paddlewheel has its ancestry in riverboat propulsion and present day use in the treatment of domestic sewage and livestock wastes. Reduced in size, it is now showing promise as an energy saver when used to maintain oxygen levels for catfish ponds.

Auburn Tests

In tests at the Auburn Fisheries Research Unit a comparison between the paddlewheel and a pump circulation biofilter unit gave the oxygen profiles shown in Figure 3. The paddlewheel maintained the oxygen level above 5

CATFISH PRODUCTION ON 0.1-ACRE PONDS UNDER PROPELLER AND PADDLEWHEEL AERATION, MAY-OCTOBER, 1974

Treatment	Pond No.	Power use	Gain
		Kilowatt-hr.	Lb.
Paddlewheel	15	472	468
Aerator.....	16	513	503
Propeller	13	947	453
Aerator	17	1145	487
	18	1148	476

p.p.m. while the biofilter treatment allowed it to dip below 1 p.p.m.

In another experiment the paddlewheel is being compared with a ½ hp. propeller type of fountain aerator. The table gives the 1974 results from four 1/10-acre ponds each stocked with 800 channel catfish. The aeration equipment operated 12 hours each night and approximately 20% of the daylight hours from July through September.

Results

For an average power cost of \$0.04 per kilowatt hour, the cost of paddlewheel aeration would be \$0.04 per lb. of gain while the propeller-type aerator would cost \$0.09 per lb. Additional tests are being conducted to evaluate the paddlewheel's effectiveness on commercial production sized ponds.

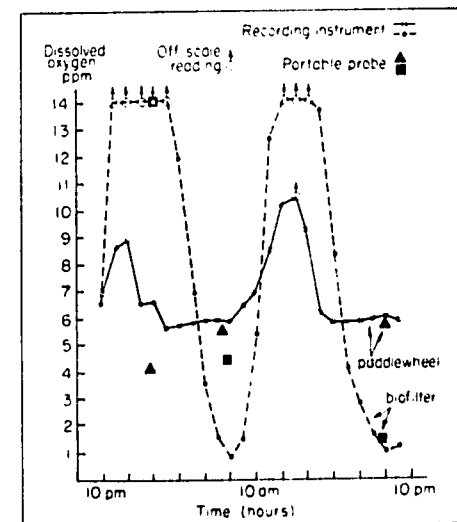


FIG. 3. Paddlewheel and biofilter dissolved oxygen profiles.