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USE OF TILAPIA TO DECREASE ALGAE IN LIVESTOCK WATERING TANKS

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SUMMARY

Blue tilapia (Tilapia aurea) were stocked at 4 rates (0, 5, 10, and 27 fish/tank) in 600-gallon livestock watering tanks from July-October. Filamentous algae was significantly reduced in all tanks with fish; however, those tanks stocked at the high rate (27 fish/tank) showed the greatest algae control. Percent algae ranged from 70 to 80% coverage in tanks stocked at 5 and 10 fish/tank; whereas, algae coverage was reduced to approximately 20% coverage in those tanks stocked at 27 fish/tank.

OBJECTIVE

Tilapia were stocked into confined livestock watering systems to determine their feasibility as a seasonal algae control. This report evaluates various stocking rates of Tilapia and the effects of these rates on filamentous algae growth.

PROCEDURES

Tilapia aurea (blue tilapia) utilized in this experiment were obtained from the Texas A&M Aquaculture Center near College Station. The fish were seined and transported on July 6, 1982, to the Texas A&M University Agricultural Research and Extension Center at Overton. After tempering, the fish (ranging in size from 100 to 150 mm) were stocked into six 600-gallon capacity livestock watering tanks, each of which contained extensive filamentous algae (primarily Cladophora) coverage. Two of the tanks were stocked with 5 fish each, two with 10 fish each, and the remaining two tanks with 27 fish each.

Two parameters were developed for evaluation of the impact of blue tilapia on filamentous algae growth. Mean percent coverage (MPC) was determined by (visually estimating) ten random samples from each tank on each survey date. A cylindrical glass tube 508 mm (20 inches) long and 76 mm (3 inches) in diameter was utilized to estimate MPC of filamentous algae on the surface area of each tank's walls and floor. Individual tanks contained 6.8 square meters (75.9 square feet) of

substrate.

The second parameter developed for estimating algae was the mean algal thickness coefficient (MATC), based on a scale of one (light coverage) to ten (heavy coverage). One MATC was assigned to each tank on each survey date following MPC measurements. This parameter provided additional information since tanks could have a similar MPC, but at the same time, vary greatly in the heaviness or thickness of algal coverage. Four surveys (including a pre-stocking survey) were made approximately 35 days apart. Although a control tank was not surveyed during the course of the study, one tank containing no fish was surveyed at the conclusion for comparison purposes.

RESULTS

Members of the the genus Talapia originated in northern Africa and the Middle East. Introductions have been largely successful in many tropical and sub-tropical regions. The primary purpose of these widespread introductions has been to provide a supplemental food source for human populations. Many attempts to control vegetation utilizing Tilapia have been unsuccessful and/or impractical due, in part, to the (1) high stocking rates necessary for control in typical sportfishing of culture ponds and (2) complete die-offs of the fish which occur when water temperatures decline below 10°-12°C (50°-54°F). Therefore, Tilapia are unable to overwinter in the northern two-thirds of Texas (excluding power plant reservoirs). This may reduce the likelihood of long-term aquatic vegetation control with Tilapia.

All tanks were surveyed and drained on October 25 when water temperatures decreased to approximately 10°C (49°F). Several fish exhibited signs of stress due to low water temperatures. All blue tilapia stocked in four of the six tanks were recovered at the time of tank draining. One tank stocked at the rate of 5 fish/tank exhibited 80% survival and another tank stocked at the rate of 10 fish/tank exhibited 40% survival. All fish losses occurred near the end of the study; therefore, the effects of mortality were considered negligible. Reproduction was documented in three of the tanks by the presence of seven young-of-the-year. The impact of the small number of young-of-the-year on algal growth was also considered to be

negligible.

The mean percent coverage (MPC) of algae increased at all stocking rates from the July survey to the August survey (Figure 1). These increases continued at the two lower stocking rates (5 and 10 fish/tank) through the September survey. A sharp decline in MPC (76% to 18%) was noted during this same time period for the tanks stocked at 27 fish/tank. Slight decreases in the MPC were noted for the two lower stocking rates on the final survey date (October 25). The MPC for the high stocking rates remained virtually unchanged from the September survey to the October survey. The MPC for the control tank at the final survey was 100%. The mean algal thickness coefficient (MATC) reflected similar trends (Figure 2). Increases in the MATC of the two lower stocking rates were evident throughout the study period. However, the MATC for the heavily stocked tanks indicated a decrease throughout most of the study period. The control tank indicated a MATC of 10 (maximum thickness) at the study conclusion. Despite the success achieved in controlling filamentous algae at stocking rates of 27 fish/tank, an intermediate stocking rate (between 10 and 27 fish/tank) may prove just as successful. Even lower stocking rates may be justified if the fish are stocked as early in the spring as possible.

Despite their susceptibility to cool water temperatures, Tilapia exhibit remarkable hardiness when subjected to water quality extremes. High water temperatures, low oxygen concentrations and high ammonia levels are easily tolerated. Therefore, Tilapia may perform best when utilized for seasonal algae control where a minimum of management effort is desired. In addition, desirable control of aquatic plants would be more likely to occur in fairly confined water systems such as small culture ponds, ornamental ponds or water storage/watering tanks.

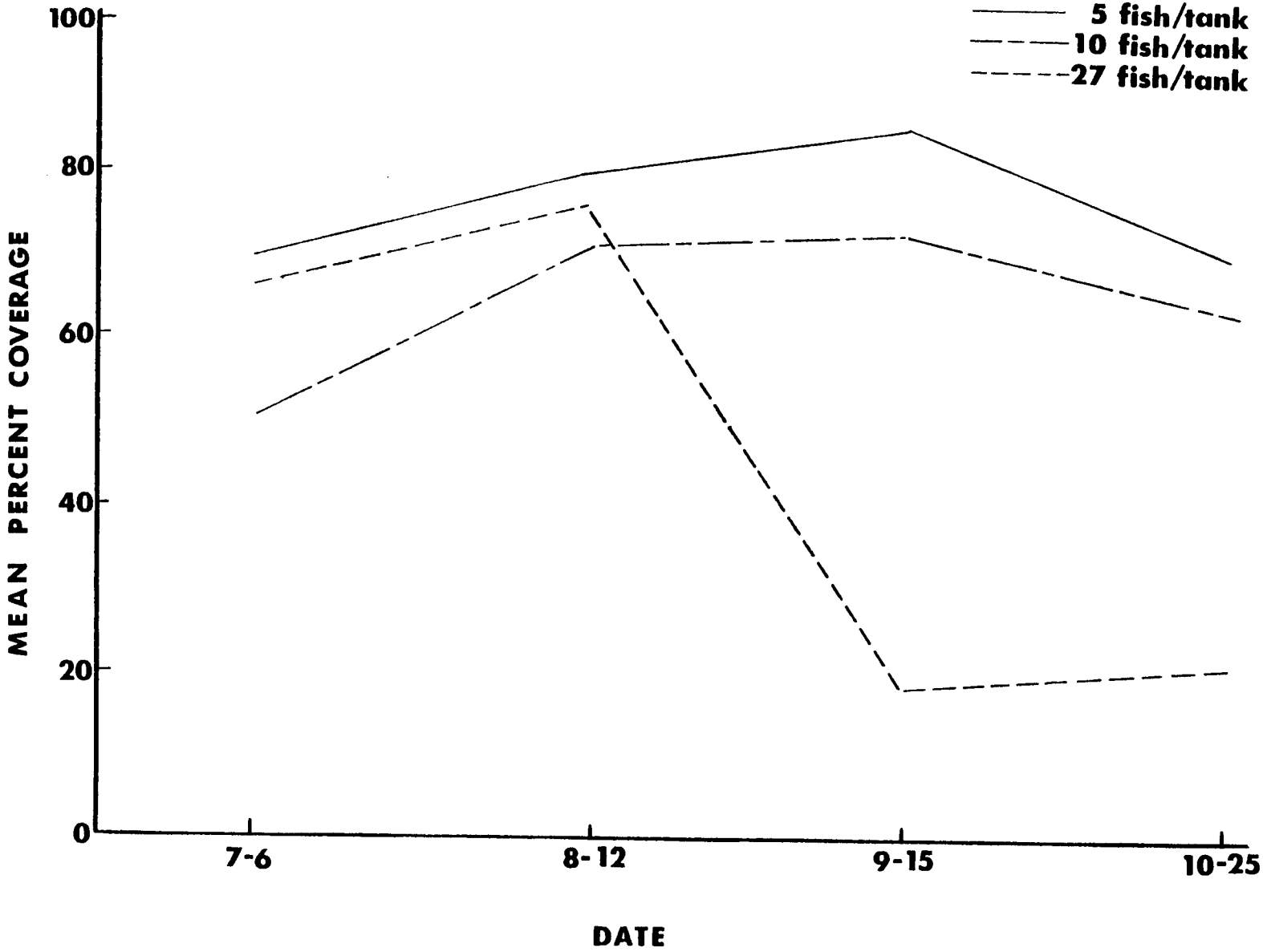

Figure 1. Mean Percent Coverage (MPC) of filamentous algae in tanks containing blue tilapia.

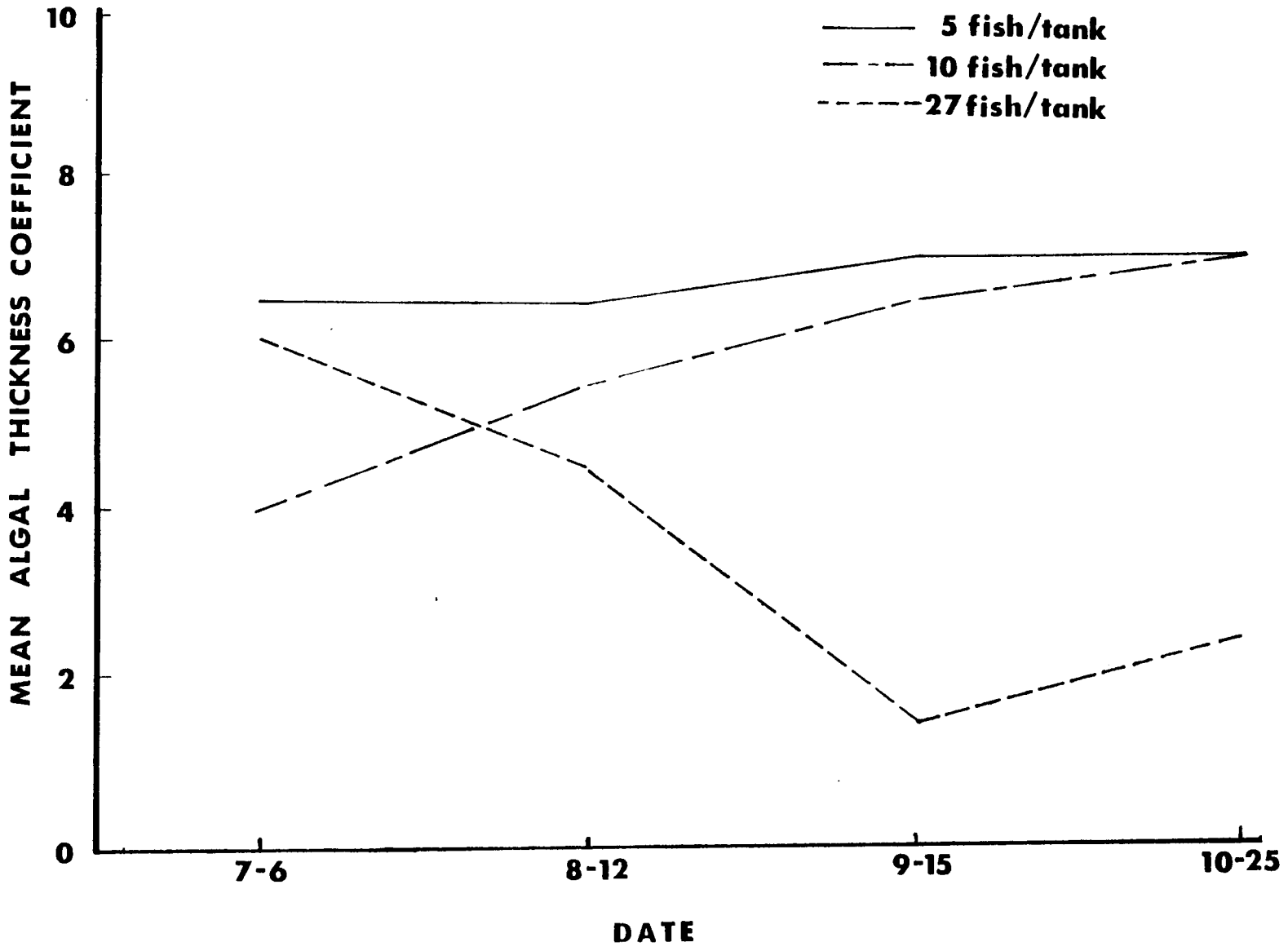

Figure 2. Mean Algal Thickness Coefficient (MATC) of filamentous algae in tanks containing blue tilapia.