POLYCULTURE OF PRAWNS, *Macrobrachium rosenbergii,* AND CHANNEL CATFISH FINGERLINGS, *Ictalurus punctatus,* IN LOUISIANA (1)

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ABSTRACT. *Post-larval prawns,* Macrobrachium rosenbergii *and swim-up channel catfish fry,* Ictalurus punctatus, *were reared in monoculture and polyculture in 0.04 ha earthen ponds at Louisiana State University in 1979. There were no significant differences between prawn and catfish production and survival whether stocked singularly or together in fed ponds.*

INTRODUCTION

Culture of prawns, *Macrobrachium rosenbergii,* is developing into a major aquaculture industry in the tropics (6). Some of these prawns can reach sizes in excess of 100 g in 6-9 months. Although larvae must be cultured in brackish water, recently metamorphosed post-larvae and older prawns may be stocked directly into freshwater. Thus, considerable interest has been expressed in their culture in the continental United States. Prawns have been cultured in outdoor ponds in South Carolina and Florida but growth has been discouraging when the high densities stocked in the tropics have been employed, 10 or more per m^2. Most prawns did not reach desired sizes of 30 g or more in the temperature limited, 5-7 month growing seasons available at those latitudes (11,13). A complicating factor was growth inhibition created by the few, fast growing prawns that did reach large sizes in 4-5 months. This has not been as serious a problem in the tropics as large prawns are selectively harvested on a continuing basis. In subtropical and temperate climates, this practice is not feasible. As a result, yield typically approaches 1000 kg/ha produced in the tropics (5,6).

One approach to increase growth rates of prawns in temperate climates is to stock them at low densities, less than 5 per m^2 (11,13). Large prawns, 30 g or more, are valuable. Prices comparable to marine shrimps of like sizes can be obtained, $6.00-$7.00/kg. This means lower

production can be tolerated by commercial ventures as total income would be maintained. Additionally, if a valuable, non-competitive species could be stocked in the same water body without adversely influencing prawn production, total income would be enhanced.

Fish culturists in Southeast Asia stock prawns with different species of finfish in order to compensate for lowered overall prawn production resulting from low stocking rates (2). In the continental United States, low tropic level tilapias (3) and carps (4) are being cultured experimentally with prawns. Channel catfish fry, *Ictalurus punctatus,* are potentially good fish for prawn-fish polyculture in the southern United States. Channel catfish are the most important cultured food fish in the United States (8), and there is a significant demand for channel catfish fingerlings, fry grown for 4-12 months, to stock catfish production ponds.

Channel catfish fry are available into mid-June, 4-6 weeks after postlarval prawns are stocked in ponds. This could limit predation on prawns as they should be expected to maintain a substantial size advantage over the catfish.

The purposes of this study were two-fold: to investigate the growth responses of post-larval prawns in earthen ponds when stocked at a low density, 25,000/ha, and fed and to study the interactions between prawns, 25,000/ha, and channel catfish fry, 50,000/ha, when stocked together in fed ponds.

METHODS AND MATERIALS

Ten 0.04 ha earthen ponds, located at the Louisiana State University, Baton Rouge, Ben Hur Biological Research Area, were used in this study. Water was fresh with total hardness and alkalinity in the 100-200 ppm ranges throughout the study. Before stocking, the ponds were drained and rotenone was applied to low areas in April 1979 to kill any fishes present. Ponds were refilled in early May 1979. The experimental treatments were: First-post-larval prawns stocked at 25,000/ha in each of 3 fed ponds and in 1 unfed pond. Second-post-larval prawns stocked at 25,000/ha and swim up channel catfish fry stocked at 50,000/ha in each of 3 fed ponds. Finally-swim up channel catfish fry stocked at 50,000/ha in each of 3 fed ponds. Prawns were obtained from the Weyerhaeuser Corporation, Prawn Division, Homestead, Florida and stocked upon arrival on 16 May 1979. Channel catfish were shipped from Thompson-Anderson Enterprises, Yazoo City, Mississippi and stocked upon arrival on 23 June 1979. Prawns were counted at the pond site. Catfish were received pre-counted and stocked without further handling.

Ponds were treated with waste oil weekly, 0.5 liters/pond, from early May through early July to control predaceous, air breathing insects. Beginning in late June, prawns and catfish were fed 2-4% esti-

mated body weight of coarsely ground, floating Purina Catfish Chow 5 days per week. Our feeding schedule for prawns was based on that of Willis and Berrigan (13) for comparable stocking numbers. It was not possible to estimate monthly survival from monthly samples because irregularities in pond bottoms prevented consistent effort in each pond. Water was pumped into ponds to compensate for evaporation losses and on 2 occasions to flush phytoplankton blooms.

Ponds were seined at monthly intervals, June, July, August, September, to monitor prawn and catfish growth and condition. In June, ponds were seined with a 6.5 m, 3.1 mm mesh minnow seine. In July, August and September, they were seined with a 10 m, 6.3 mm mesh tarred minnow seine. At each sampling date, a seine was pulled from the mid-point of the long side of a rectangular pond to the shallow end, once along one side. One-half to two-thirds of the pond, surface to bottom, was sampled in each case.

Total length, tip of rostrum to tip of telson, to the nearest millimeter was determined for each prawn at each sampling point. All prawns were returned to the pond from which they came. Total length of prawns was used in favor of orbit-telson length because we felt that the use of a caliper would maximize handling stress. Perry et al. (10) may be consulted for a formula relating rostrum-telson length to orbit-telson length.

Prawns and catfish were harvested 13-16 October after 148-150 and 109-112 days in the ponds, respectively. All prawns and catfish were counted and weighed together to the nearest gram. The total lengths were taken for prawn subsamples.

Crawfish, primarily *Procambarus clarkii,* were already present in the ponds. They were harvested several times a month, June through October, with traps.

Water quality data were not recorded with the following exceptions: temperature was noted at the start and the end of the study and oxygen was measured during a period of inclement weather in early August.

Results

Analysis of variance revealed no significant differences ($P \geq 0.05$) between prawn and catfish production (Table 1) whether they were grown in monoculture or polyculture. Therefore, all production figures were averaged to give the following overall results: prawns - 442 kg/ha (SD = 54.7), survival - 57% (SD = 4.5) and catfish - 529 kg/ha (SD = 92.1), survival - 34% (SD = 11). There were 32.5 prawns/kg and 32.5 catfish fingerlings/kg at harvest.

Only one unfed prawn control pond was available and production