

Polyculture of *Macrobrachium rosenbergii* and *Notemigonus crysoleucas*

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Abstract

A polyculture study was conducted in southwest Louisiana comparing production of Malaysian prawns, *Macrobrachium rosenbergii*, in monoculture and polyculture with Golden shiners, *Notemigonus crysoleucas*.

This test revealed stocking of shiners at 24.7/m² with prawns at 4.4/m² resulted in increased total pond production over monoculture of prawns at 4.4/m² with equal prawn yields in both systems and little increase in labor. Feeding rates were based on prawn biomass. Food conversion ratios ranged from 0.5 to 1.0 in polyculture and 0.9 to 1.1 in monoculture when total production was considered. Prawn production averaged 640 kg/ha in polyculture and 629 kg/ha in monoculture. Mean size of prawns was 19 g in polyculture and 20 g in monoculture. The polyculture of shiners with prawns added an average of 307 kg/ha of the bait fish to pond production.

Shiners did not compete seriously with prawns when stocked at these rates. This practice could result in added revenues to producers culturing these species together.

The freshwater prawn, *Macrobrachium rosenbergii*, has attracted an enormous interest as an aquaculture species during the past two decades. This species is reared in several tropical and semi-tropical countries throughout the world. Many farms are devoted to monoculture; however, others are practicing the ancient Chinese approach where a variety of fish are reared in polyculture. Stocking strategies are determined by the feeding habits of the fish, taking into account natural feeds available in the various ecological niches within the pond. In Israel, carp (*Cyprinus carpio*) and tilapias (*Oreochromis* sp.) are stocked with prawns as "primary" species, and grass carp (*Ctenopharyngodon idella*) and silver carp (*Hypophthalmichthys molitrix*) as "sanitary" species (Cohen et al. 1983). Unfortunately, these fish have a limited commercial value in the United States.

In Louisiana, prawn polyculture research has centered around species of commercial importance. In 1979 prawn were introduced into ponds with channel catfish fry (*Ictalurus punctatus*) (Huner et al. 1980). When they were cultured with channel catfish fingerlings and brood fish (Miltner et al. 1983),

no significant interactions were noted, and increased total production was encouraging. In an evaluation of prawns, catfish and crawfish polyculture, Huner et al. (1983) reported rapid catfish growth in all ponds and best survival of prawns in ponds with highest survival of catfish. In a related study, the addition of Chinese grass carp to this stocking combination did not affect growth or survival of prawns (Miltner et al. 1983).

A recent polyculture study of prawns in Louisiana was conducted with the golden shiner, *Notemigonus crysoleucas*, which contributes a little over 80% to the bait-fish industry in the southeastern United States (Dupree and Huner 1984). It is omnivorous, feeding on small plant and animal matter and is readily adapted to artificial food. Production levels range from 338–900 kg/ha (Giudice et al. 1981).

Louisiana has over 1,000 ha of shiner bait-fish production ponds. If prawns can be polycultured with shiners, bait-fish farmers could realize added revenues from their ponds. Therefore, the major objective of this project was to determine if prawns and golden shiners are compatible in polyculture.

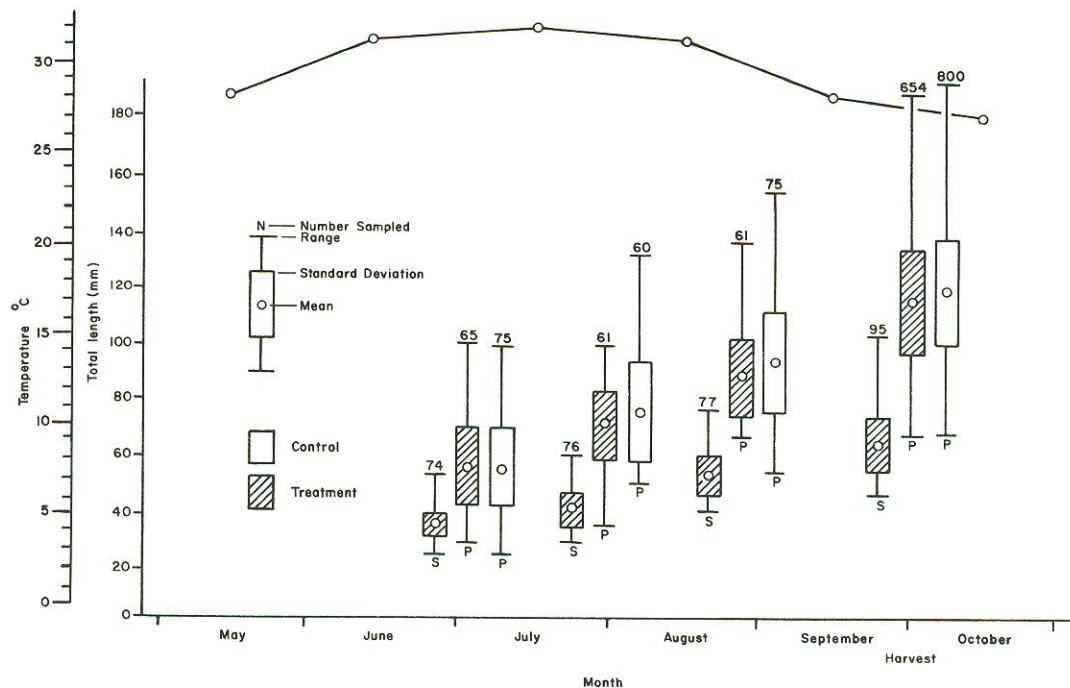


FIGURE 1. Mean, standard deviation and extremes of *Macrobrachium rosenbergii* (P) and *Notemigonus crysoleucas* (S) in polyculture (indicated by hashed lines) and *M. rosenbergii* in monoculture for months sampled and at harvest. Solid line represents water temperatures, Rockefeller Wildlife Refuge, 1984.

Materials and Methods

The 1984 polyculture studies with prawns and golden shiners were conducted in twelve 0.04 ha earthen ponds on the Rockefeller Wildlife Refuge. Average depth of the Southwest Louisiana ponds ranged from 0.8 to 1.0 m, and they were filled with brackish canal water.

Post larvae were transported from Commercial Shrimp Culture International, of Brownsville, Texas, on 10 May 1984. Prawns were held overnight in nursery tanks supplied with *Artemia*. The 8–12 mm total length prawns were hand counted and stocked at 4.4/m². Ponds were randomly assigned as treatment or control to lessen any variable due to pond depth.

Oxygen and temperature were monitored daily in the ponds. At daybreak if dissolved oxygen was less than 2 mg/L, aeration was initiated immediately. Afternoon dissolved oxygen readings were used as indicators of potential problems.

Golden shiner fry, 2,317/kg, were transported from the Wisner Louisiana Minnow Hatchery to Rockefeller and stocked at random into each of five prawn ponds 7 June 1984 at 24.7/m². Purina Catfish Chow (SR) with 30% crude protein was fed to prawns on weekdays between 1600 and 1700 h. Initially, prawns were given 35% body weight. As prawn size increased, feeding was decreased to 3% body weight. The feeding rates were adjusted by periodic seining of portions of each pond to determine biomass of prawn. Therefore, the treatment consisting of prawns and shiners received feed based only on the weight of the prawns and did not include the shiners. A 30% mortality rate of prawns over a 140 day period was used in the estimation of biomass.

On 1 October 1984, after 144 culture days, the ponds were harvested. This consisted of the transfer of shiners and prawns to holding tanks and complete dewatering of each of the 0.04 ha ponds. A subsample of 10% was

