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RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

Title: Stocking Densities of Nile Tilapia in Shrimp Ponds under Different Feeding Strategies

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Abstract: This study, consisting of two experiments, was carried out at the Asian Institute of Technology (AIT), Thailand, to investigate the growth performance of shrimp (*Penaeus monodon*) and Nile tilapia (*Oreochromis niloticus*), water quality and nutrient budget in different stocking combinations of tilapia-shrimp polyculture. Both experiments were conducted in nine 200-m² earthen ponds with three treatments in triplicate each, namely: a) shrimp alone at 30/m² (monoculture); b) shrimp at 30/m² and Nile tilapia at 0.25/m² (low-density polyculture); c) shrimp at 30/m² and Nile tilapia at 0.50/m² (high-density polyculture). In experiment 1, the feed ration was determined daily by feeding-tray method in every pond during the 65-day culture period, while the fixed feed ration for all ponds was determined by a feeding table and estimated mean survival rate in experiment 2 during 75-day culture period.

In experiment 1 with varied feed rations, the growth, yield and survival of shrimps were not significantly different among all treatments ($P > 0.05$). Although the Feed Conversion Ratios (FCR) of shrimps, which ranged from 1.62-2.24, were not significantly different among all treatments ($P > 0.05$), shrimp monoculture had significantly lower feed input than tilapia-shrimp polyculture ($P < 0.05$). However, in experiment 2 with fixed feed rations, the low-density tilapia polyculture resulted in significantly higher shrimp yield than the monoculture and high-density tilapia polyculture ($P < 0.05$). FCR in the low-density tilapia polyculture treatment (1.44) was significantly better than those in both monoculture and high-density tilapia polyculture, (1.73

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and 1.69, respectively) ($P < 0.05$).

In both experiments, Nile tilapia showed fast growth (3.98-4.70 g/fish/day). There was no significant difference in growth and survival of Nile tilapia between the low- and high-density tilapia polyculture ($P > 0.05$), while fish yields were significantly higher in the high-density tilapia polyculture than those in the low-density tilapia polyculture ($P < 0.05$).

Simple economic analysis showed that the net returns were not significantly different among all treatments ($P > 0.05$) in experiment 1, with the highest value in the shrimp monoculture, intermediate in the high-density tilapia polyculture and lowest in the low-density tilapia polyculture. In experiment 2, however, the highest net returns were achieved in the low-density tilapia polyculture, which was significantly higher than those in both monoculture and high-density tilapia polyculture ($P < 0.05$).

The present study indicated that the addition of Nile tilapia into shrimp ponds can improve water quality and feed utilization efficiency, resulting in better economic returns and less environmental pollution. The present study showed that the tilapia-shrimp polyculture with appropriate feeding strategy is technically feasible, economically attractive and environmentally friendly.

This abstract is excerpted from the original paper, which was a proceeding of the Sixth International Symposium on Tilapia in Aquaculture.