

Kaewta Limhang 2010: Suitability Studies of Low Salinity Waters for Rearing of Pacific White Shrimp (*Litopenaeus vannamei*): Monoculture and Polyculture with Nile Tilapia (*Oreochromis niloticus*). Doctor of Philosophy (Fisheries Science), Major Field: Fisheries Science, Department of Fishery Biology. Thesis Advisor: Associate Professor Chalor Limsuwan, Ph.D. 209 pages.

Several studies were carried out in both laboratory setting and on farms to determine the suitable methods of rearing Pacific white shrimp (*Litopenaeus vannamei*) under low salinity waters. Effects of increasing water salinity on survival, growth, production, cost and profit from treatment ponds in which brine water was added to increase salinity were compared with the control ponds without adding brine water. In laboratory experiment, 62-day feeding trial was conducted by using postlarval (PL) 8 and 10 rearing in low salinity water of 1 and 3 part per thousand (ppt) with three different stocking (60, 90 and 120 PL/m²), three replicate tanks per treatment in a 500-L fiberglass tank. Shrimp raised in 3 ppt groups had survival and growth rate significantly higher than those of 1 ppt groups ($P < 0.05$) for stocking at the same density and PL ages. The major ions at 3 ppt were significantly higher than those in 1 ppt groups ($P < 0.05$) about twofold. In intensive shrimp farm, PL₁₂ were stocked at the density of 38 PL/m² into six earthen ponds (3,200 m²) equipped with adequate aerators. Brine water was added into three treatment ponds throughout the 120 days of culture period to maintain salinity between 1-3 ppt while in three control ponds brine water was added before stocking of PL₁₂ only. Results showed that treatment groups had survival rate 85.4% significantly higher than that of control groups 77.1% ($P < 0.05$) which related to higher major ions in pond water throughout 120-day culture period. Similar results were obtained from shrimp farms that using low salinity water 1.4-2.0 ppt from Tha chin river as the control compared to the treatment group that adding brine water to give the salinity of 2.4-3.0 ppt in the grow-out ponds (2,400 m²) with the stocking density of 25 PL/m² but installed one aerator for supplying two ponds. After 120 days shrimp were harvested, the treatment group had higher survival, growth, production and profit than control group. Polyculture of *L. vannamei* with Nile tilapia (*Oreochromis niloticus* Linn.) in low salinity water was also studied. Water was pumped from irrigation canal into three control ponds with an average area of 5,600 m², and the salinity ranged from 0.5-1.2 ppt. For the three treatment ponds, brine water was added to obtain salinity between 2-4 ppt. PL₁₂ were stocked into each pond at the density of 9 PL/m² and one week later Nile tilapia were stocked into the same pond at the density of 1 fish/m². After 80 and 120 days of culture, *L. vannamei* were partially harvested and PL₁₂ were stocked into the ponds at the density of 3 PL/m² and raised until final harvested at day 196. The results showed that the shrimp production, average weight, survival rate and major ions in treatment ponds were significantly higher than the control ponds ($P < 0.05$) but fish production from both groups was not significantly different. Treatment ponds had higher profits than the control ponds even though the production cost was higher. Moreover, species composition and abundance of plankton and benthos, from control and treatment groups during the culture period were also studied. In conclusion, this study indicated that monoculture of *L. vannamei* and polyculture of *L. vannamei* with *Oreochromis niloticus* under low salinity conditions shrimp farmers should maintain salinity levels throughout the culture period in order to achieve good survival and growth of *L. vannamei*. If the ionic profiles of the water were similar to sea water at the same salinity, PL₈-PL₁₀ should be stocked at the density not more than 60 PL/m² for rearing in 1 ppt salinity water, and between 60-90 PL/m² at salinity 3 ppt.

Student's signature

Thesis Advisor's signature