**STOCKING TILAPIA IN SHRIMP CULTURE RESERVOIR:**

**FIELD TRIAL IN ACEH, INDONESIA**

**Sidrotun Naim1, Cut Desyana2**

*1University of Arizona, Tucson, USA*

*2WWF – Indonesia*

**ABSTRACT**

Shrimp culture was started in Indonesia in 1980’s and tilapia culture became popular in the last ten years. Both species are considered as the main fisheries commodities by the government. Previous research findings suggested that shrimp-tilapia polyculture may help to minimize the risks of Vibriosis and WSSV infection.The use of water from a tilapia culture pond reduced the prevalence of bacterial infections in shrimp ponds from luminous Vibriosis. Field experiment of shrimp-tilapia polyculture has been conducted in Aceh by stocking tilapia in the reservoir. After two months, the shrimps were infected with WSSV . The tilapia was able to survive and grown up to harvest time.

**INTRODUCTION**

Polyculture has been a long tradition in Asian countries, including Indonesia. While milkfish culture was started in the 17th century, shrimp aquaculture was not initiated until the beginning of 1980’s. Since then, shrimp-milkfish polyculture has been practiced in extensive, semi-intensive and intensive culture systems. In most shrimp-milkfish polyculture systems, shrimp is cultured as the primary; while milkfish is cultured as the secondary species to reuse the shrimp feed wastes and to improve the water quality.

Having one of the longest coastlines in the tropical countries, the people in Indonesia are more familiar to marine fish. Only in the last five years, tilapia, one of the freshwater fish has become popular. In fact, tilapia was already present in Indonesia since 1930’s. In Indonesia, tilapia is known as ‘ikan nila’ (for *Oreochromis niloticus*) and ‘ikan mujair’ (for *O. mossambicus*). Not a native to Indonesia, but the local name ‘mujair’ for mossambicus came from the persons who found the fish in 1939 in the Serang River, Blitar, East Java. Most probably, the Dutch during the colonial era shipped the live fish from South Africa to Indonesia. This history also explains how *Mossambicus* is also known as the Java Tilapia, as it was already found in Java in 1930’s. As tilapia became popular, the shrimp-polyculture had already started on a small scale in some places.

The use of water from a tilapia culture pond reduced the prevalence of bacterial infections in shrimp ponds from luminous *Vibriosis* (Huervana, et.al., 2004; Tendencia, et.al.,2006). *Vibrio harveyi* is a bacterial pathogens common in shrimp culture nd is a gram negative, while waters which have been used for fish culture tend to be dominated by gram positive bacteria (Yi and Fitzsimmons, 2004).

In Indonesia, traditional extensive shrimp farms usually have a reservoir, where the water from the coast is settled before entering the pond, particularly if the farms are far away from the nearest coast. Most of the time, farmers do not stock shrimps or fish in the reservoir. The field experiment aims to investigate the stocking of tilapia in the reservoir.

**MATERIAL AND METHODS**

*Pond preparation*

Infrastructure work commenced on the embankment and the sludge was removed. Standard measurements for pH, DO, and salinity were conducted periodically. The pond was fertilized, limed, and irrigated. Saponin was added before stocking with shrimps.

*Culture*
In a one hectare pond, 20,000 black tiger shrimp post larvae (12 day) were released into the pond. The post larvae came from hatcheries at Trieng Gadeng, Pidie Jaya. Feeding commenced 35 days after shrimp stocking. The amount of feed given was 0.5 kilogram every morning, afternoon, and evening. Red Tilapia from Ujung Batee Brackish Aquaculture Research Center were stocked in the reservoir simultaneously with the shrimps. The experiment for shrimps was conducted for two months (April-June 2010) and for tilapia went on for six months (April-December 2010).

**RESULTS AND DISCUSSION**

The survival and growth rates of both shrimps and tilapia were quite good in the first two months. As it common in a traditional extensive system, the farmer did not feed the shrimps for the first month and relied on the natural feed. After a heavy rain, which was not common in May/June, the water quality was low.

Table 1 Water quality measurements during two month culture

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No** | **Age (day)** | **Salinity (ppt)** | **Water pH** | **Water colour** | **Note** |
| 1 | 14 | 33 | 8.1 | yellow |  |
| 2 | 18 | 33 | 8.2 | yellow |  |
| 3 | 23 | 22 | 8.2 | yellow | Heavy rain |
| 4 | 32 | 28 | 8.8 | yellow |  |
| 5 | 40 | 39 | 8,4 | Red-brown | High evaporation, 10 cm water change |
| 6 | 46 | 39 | 8,2 | yellow | High evaporation |
| 7 | 50 | 24 | 8,0 | yellow |  |

At 56 days into the culture, fifty shrimps were found dead with some lesions: broken pleopod, some black spots on the body, and red muscle. Vitamin C (one tablet each feeding) and coconut oil were added into the feed to treat the diseases. Fifty kilogram of lime was also added into the pond. Samples of dead shrimps were sent to Ujung Batee Brackish Aquaculture research Center for analysis. PCR confirmed that the shrimps experienced WSSV. After three days, another 200 dead shrimps were found, and the farmer decided to conduct a sudden harvest. Other than the dead shrimps, it was noticed that the water color changed from yellow to brownish-red at 40 days, and again changed to yellow two weeks before the sudden harvest.

All the tilapia survived in the reservoir up to the time of harvest (after six months). The finding suggests that the tilapia was able to survive in reservoir and maintained good growth rate. Even though other findings in lab scale or field observation suggest that the tilapia has the ability to minimize the risks of Vibriosis and WSSV, the exact mechanism and under what condition are remain unclear. Another question is whether the tilapia has direct inhibition against both pathogens or indirect inhibition by stimulating microbes or microalgae to grow. Further research needs to be conducted to investigate the mechanism.

**Acknowledgement**

The field experiment in Indonesia was funded by the L’Oréal Indonesia For Women in Science Program. SN would like to thank the US Department of State, the Schlumberger Foundation Faculty for the Future Program, and the University of Arizona for supporting the PhD study and research component in the US.

**References**

Huervana. F.R., J.J.Y De la Cruz, C.M.A.Caipang. 2006. Inhibition of luminous *Vibrio harveyi* by green water obtained from tank culture of tilapia *Oreochromis mossambicus.* Acta ichthyologica et piscatorial 36 (1): 17-23

Tendencia, E.A. M.R. de la Pena. C.H. Choresca. 2006. Effect of shrimp biomass and feeding on the anti-*Vibrio harveyi* activity of Tilapia sp. in a simulated shrimp tilapia polyculture system. *Aquaculture* 253 (1-4): 154-162.

Y, Yi., Fitzsimmons, K., 2004. Tilapia-shrimp polyculture in Thailand. pp. 777-790. In: Bolivar, R., Mair, G. and Fitzsimmons, K. (eds). New Dimensions in Farmed Tilapia. Proceedings of ISTA 6. Bureau of Fisheries and Aquatic Resources. Manila, Philippines.

2010. Peradaban ikan mujair air tawar. http://www.manifest-2010.co.cc/2010/12/peradaban-ikan-mujair-air-tawar.html