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New procedure controls TSV in white shrimp

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TSV attacks at low salinity are more critical due to scarcity of minerals for molting

Although this white shrimp recovered from a TSV attack, scars remain in affected areas of the cuticle after molting.

Since Taura syndrome virus (TSV) was first recognized as a shrimp disease in 1992, it has caused serious economic losses to shrimp farmers throughout the world. Efforts in Thailand and the United States have been successful in controlling this disease through selective breeding programs to improve resistance. However, few protocols for controlling TSV infection in ponds have been reported.

Although Taura syndrome can appear in all culture phases of shrimp, the highest mortality usually occurs during the first month of the growout phase. Infected juveniles show pinkish to reddish color followed by black cuticular lesions, empty guts and expanded chromatophores. Histopathological exams of infected shrimp have shown multifocal to extensive areas of necrosis in the sub-cuticular epithelium, connective tissue and adjacent striated muscle.

Affected cells often display nuclear pyknosis and karyorrhexis (Fig. 1). Due to this damage in the cuticular and sub-cuticular tissues, shrimp lose the ability to molt or may die in the process. Only after these tissues have recovered and are capable of using the minerals needed for molting can shrimp overcome the disease.

TSV treatment

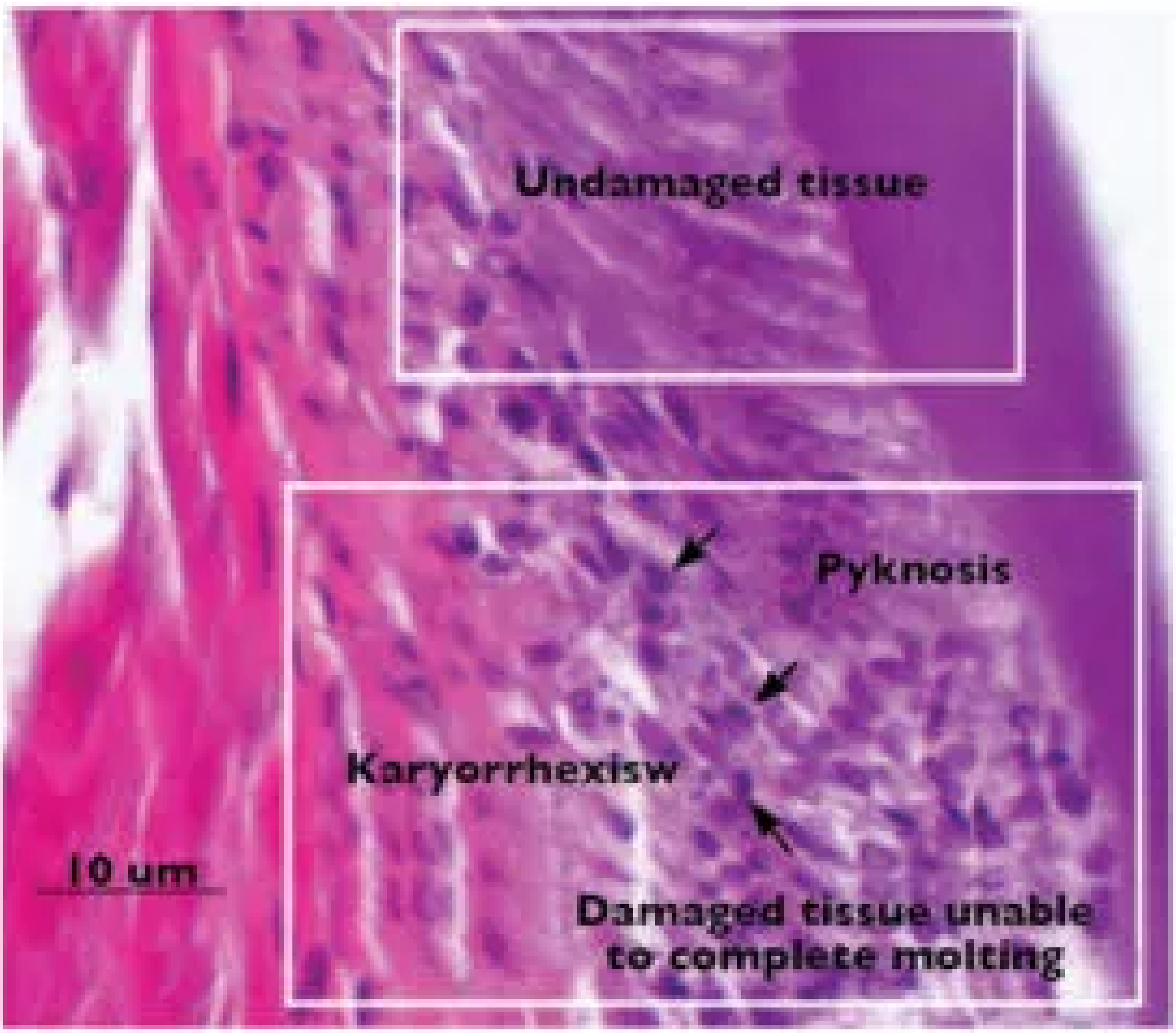

Fig. 1: This histopathological section shows both normal subcuticular epidermal tissue (top) and the lesions caused by TSV in the subcuticular tissue of *L. vannamei.*

The authors have established a procedure to reduce the impacts of Taura syndrome virus (TSV) in the culture of Pacific white shrimp (*Litopenaeus vannamei).* This procedure focuses on avoiding the molting process of shrimp by limiting culture conditions.

Once mortality is detected and TSV has been identified through histopathology, real-time polymerase chain reaction or in situ hybridization, actions must be taken to keep shrimp from molting. These include zero water exchange, reduction of feed, increasing pH to 8.0 or above and strong aeration to keep optimum water quality.

Feeding infected shrimp normally can cause molting and mortality thereafter. Therefore, in many cases, feeding should be reduced or stopped. The use of feed trays can help evaluate consumption and mortality, since moribund shrimp often gather in the feed trays before mortality occurs.

To keep pH at or above 8.0, liming treatments with calcium carbonate or calcium hydroxide should be applied. Every day, pH readings should be taken at dawn, when the lowest pH level occurs and decisions on applying lime can be made. Application of other chemicals like fertilizers or antibiotics should be avoided.

It is expected that a TSV attack at low salinity will be more critical due to the scarcity of minerals for molting. This has been noticed in field visits by the authors to low-salinity farms affected by TSV in Thailand and China.

Moribund and dead shrimp should be collected from the pond every day. This will avoid further deterioration of the water quality and disease propagation through cannibalism. The most efficient way to collect dead shrimp is through the discharge gate or siphoning.

Once the critical period of four to five days has passed and mortality stops, feed dose and water exchange should be resumed gradually. Remains of TSV-affected areas can be readily seen in the shells of animals that have molted after a TSV attack. Usually, full recovery of shrimp can take two consecutive molts.

Treatment trial

The authors' procedure was tested in intensive culture on Naozhou Island in China's Guangdong Province during the summer cycle of 2009. A marked difference in productivity was noted between the control and TSV treatment ponds (Table 1).

Ching, Average results of ponds with treatment against Taura syndrome infection, Table 1

	Area (ha)	Stocking Density (shrimp/m²)	Yield (kg/ha)	Weight (g)	Survival (%	Feed-Conversion Ratio	Time (days)
Control*	0.64	146.8	4,770	13.0	25.4	2.54	87
Treatment*	0.75	147.0	11,540	15.7	50.3	1.26	78

* Comparative data averages results of 3 ponds/treatment with similar stocking density, larvae and area (N = 3)

Table 1. Average results of ponds with treatment against Taura syndrome infection (Treatment) and ponds without treatment (Control) in intensive shrimp culture in China.

The trial area was affected by heavy typhoon rain at the end of the culture cycle. In spite of using up to 200 kg/ha of lime to increase pH, this could not be achieved, and mortality occurred prior to harvest. Due to the rain, survival in the treated ponds dropped from 80 to 50 percent.

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