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The Shrimp Book: Principal shrimp infectious diseases, diagnosis and management

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Good pond management, stable weather conditions and good water quality can control or prevent many diseases



Disease outbreaks are the result of the presence of pathogens in combination with suboptimal environmental and nutritional management.

Farmed shrimp are faced with conditions quite different from their natural marine environments. Disease outbreaks occur not only due to the presence of known pathogens within the culture system, but also due to suboptimal environmental, nutritional, management, genetic or physiological factors.

Multiple pathogens are often present in shrimp pond environments. Multiple secondary infections can therefore occur, sometimes masking the primary cause of disease. With the complexity of shrimp pathogen ecology, it is essential to consider the host, the pathogen and the environment in order to prevent or treat disease conditions.

Global impacts

Historically, some diseases have been endemic to specific shrimp-producing regions and their native shrimp. However, with increased international movement of live animals, different shrimp species – together with their corresponding pathogens – have been translocated among farming regions.

Nowadays, most infectious shrimp diseases can be found in both the Eastern and Western Hemispheres. The Middle East, West Africa and Australia – regions that are relatively new to farming shrimp – have successfully established regulations governing the importation of live and dead shrimp into their respective countries or regions.

Hatchery diseases

Acute diseases responsible for high mortality rates are considered a priority, and efforts are directed toward their prevention or treatment. In contrast, chronic diseases that affect growth and performance tend to be a cause of much less concern to producers, despite their high costs.

The main disease problems at the hatchery level are related to bacterial and fungal infections (Table 1). These can be prevented with proper sanitary measures and water quality management.

Principal shrimp infectious diseases, diagnosis and management

	Hatchery East	Hatchery West	Growout East	Growout West
Virus	IHHNV	IHHNV	TSV	TSV
Virus	HPV	HPV	WSSV	WSSV
Virus		B.P.	YHV	YHV
Virus	MBV		IMNV	IMNV
Virus			IHHNV	IHHNV
Virus			HPV	HPV
Virus				B.P.
Virus			MBV	PvNV
Bacteria	Fouling disease	Fouling disease	Fouling disease	Fouling disease
Bacteria	Vibriosis	Vibriosis	Vibriosis	Vibriosis
Bacteria			Mycobacteria	Mycobacteria
Bacteria				NHP
Bacteria			Mycoplasma	

Bacteria			Streptococcosis	Streptococcosis
Fungi	Larval mycosis	Larval mycosis	Fusariosis (adult mycosis)	Fusariosis (adult mycosis)
Parasites	Fouling disease	Fouling disease	Fouling disease	Fouling disease
Parasites	Gregarines	Gregarines	Gregarines	Gregarines
Parasites			Microsporidian	Microsporidian
Parasites			Haplosporidian	Haplosporidian
Parasites			Metazoan	Metazoan

IHHN: Infectious hypodermal and hematopoietic necrosis

HPV: Hepatopancreatic parvovirus

MBV: Monodon baculovirus

B.P.: Baculovirus penaei

T.S.: Taura syndrome

WSS: White spot syndrome

YHV: Yellowhead virus

IMN: Infectious myonecrosis

PvNV: *P. vannamei* nodavirus

NHP: Necrotizing hepatopancreatitis

Table 1. Disease and virus expression in main shrimp production stages and regions. Sources: Lightner, 1996; Hasson et al., 2009; Senapin et al., 2007.

Enteric viruses can cause high mortalities of shrimp larvae in hatcheries, but again, proper cleaning and disinfection can exclude these viruses. Systemic viruses are not known to cause mortality in shrimp at early stages of life, although they can infect larvae. Both enteric and systemic viruses can be excluded using detection techniques to screen broodstock and thus prevent vertical or horizontal transmission of these pathogens to the larvae.

Production issues

The most serious production losses at the farm level are caused by systemic viruses (Table 1). Viral diseases typically cause high mortalities and generally strike 30 to 40 days after stocking.

Maintaining strict biosecurity and completely excluding pathogens from conventional shrimp ponds are difficult due to the ponds' size and open exposure. Good pond management, stable weather conditions and good water quality are necessary to control or prevent the onset of many diseases.

Sudden drops in ambient temperature or reductions in salinity due to heavy rains stress shrimp and have been implicated as significant risk factors contributing to disease outbreaks.

Perspectives

Chronic diseases should not be ignored. Enteric viruses, in particular, are associated with poor growth and performance.

To avoid both mass mortalities and impaired performance, it is essential that shrimp are screened during the larval stages to ensure low prevalence of viral pathogens. Bacterial, fungal and parasitic diseases are mostly avoidable with proper management of growout ponds.

The Shrimp Book, published in 2010 by Nottingham University Press (ISBN 978-1-904761-59-4), brings together experts from around the world to fill the critical need for a central reference source on the state of shrimp production practices. With chapters by 67 authors representing the spectrum of shrimp biology and aquaculture – many of whom have contributed to this magazine – the book is addressed to a diverse readership at every step of the shrimp-farming value chain. The editor is well-known shrimp pathologist Victoria Alday-Sanz, DVM, M.S., Ph.D.

Overall, the comprehensive book represents an extraordinary effort by many of the most prominent researchers involved in penaeid shrimp studies. With the permission of the publisher, the *Global Aquaculture Advocate* is presenting a series of summary articles that highlight chapters from *The Shrimp Book*. These summaries are meant to provide a glimpse into the vast knowledge available in the book, and by no means can replace actual reading of this excellent publication.

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