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Education Series

White Spot Syndrome Virus (WSSV)

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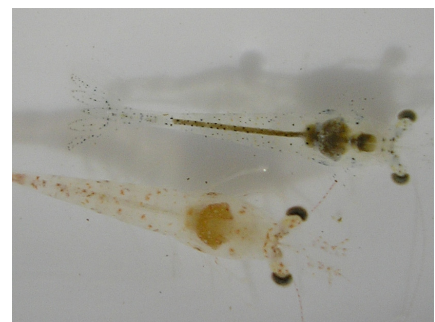


Shrimp get sick too. White Spot Syndrome Virus produces a viral infection in wild and farmed shrimp and in other crustacean; is highly contagious and causes high mortality rates in densely populated areas of fresh, brackish and marine water environments. WSSV becomes problematic when there are stress conditions in the pond, like low luminosity, reduction in feed quality on offer, large volume water exchange, abrupt physical-chemical water parameter changes, and reduction in water temperatures, for example from 30 to 26 degrees Celsius (86 to 78.8 degrees Fahrenheit) which typically occurs overnight.

Causative agent of White Spot Disease (WSD). This infectious disease is caused by a DNA virus from the genus *Whispovirus* a member of the Nimaviridae family. Virus multiplication (replication) occurs in the cell nucleus. Viral particles of WSSV are ovoid and rod shaped. Virions present regular symmetry and correspond to the biggest known shrimp virus with 80–120 nm in diameter and 250–380 nm in length. It has a flagella-like appendage at one end of the virion. There are several genotypes described from different geographical locations around the world classified as “white spot syndrome virus” under the same genus *Whispovirus*.

Whilst the virus has no impact on human health or food safety, and any affected shrimp are safe for human consumption, it does have a significantly detrimental effect for shrimp farmers. All life stages, from eggs to broodstock are susceptible, but mortalities are mainly observed in postlarvae and juveniles.

Clinical signs of WSSV are white spots on the carapace initially and later the entire body of the shrimp. They are more often visible in *Penaeus monodon* than *P. vannamei*. Also lethargy, redness of shrimp appendages and/or the entire body, soft cuticle, flaccid abdomen, empty midgut and a reduction in feed intake, as observed in the sample image (right). Dead shrimp will begin to appear along the sides of ponds. Shrimp **MultiPath** PCR will be able to confirm WSSV infections whilst also giving information on the presence and /or absence of other pathogens in the culture system, in a quantitative manner.



Early detection using Shrimp MultiPath PCR testing can give farmers up to 4 weeks early notice before clinical signs become apparent to mitigate disease spread and maximize production outputs. Early detection empowers early mitigation strategies such as increased aeration, reduced feed inputs, increased biosecurity around infected pond(s) (e.g. manage to this pond last in daily routines, have separate nets and equipment, physical barriers put in place, inform adjacent farmers of the infection), and prioritized harvest over other farm ponds.

Target life-history stages for accurate early detection include late PL stages, juveniles, subadults and adults. As WSSV is vertically transmitted, it is also possible to detect the virus in samples of eggs and larval stages (Nauplius, Zoea or Mysis).

Target organs for sensitive PCR detection are cuticular epithelium (skin) of the shrimp and subcuticular connective tissues. WSSV can also be detected in haemolymph, pleopods and gills. Samples of haemolymph, pleopods or gill filaments can be taken non-lethally if a farmer is testing valuable broodstock. In instances where sampling is lethal, the ideal epithelial tissue from the carapace region can be sampled (see the following page for a link to a detailed instructional video).

Questions?

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Sampling and preservation of tissues for PCR tests should be done in labelled vials or tubes that seal and fixative should be 70-95% laboratory grade ethanol or RNALater; freezing samples will also preserve virus DNA. Tissue size can be 2-5 mm² in size (50 mg approx.). Sample equipment must be sterilized between sample tubes.

Sampling numbers and Health Management Plans should be established with your health expert who will take into account factors such as climate, farm size and location, company structure and risk appetite, market channels for sale of product etc. There is also the option to pool samples for WSSV testing to maximize value for money with PCR testing.

Longer term solutions to WSSV include breeding for tolerance and resistance, and the use of developing "RNA interference antiviral" techniques (RNAi). Early pathogen detection and risk mitigation through the use of Shrimp **MultiPath** is also a foundational approach to solving WSSV outbreaks.

Contact Genics at info@genics.com if you would like to discuss these options for your operation or visit www.genics.com for further details.

Watch the [instructional video](#) on Shrimp **MultiPath** target organ dissection below.



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Did you know...

Shrimp rarely harbour only one pathogen and farmers often don't know which ones they are. This is a huge economic risk for farmers. **Genics has solved this problem with Shrimp MultiPath**. It stacks up as the ultimate early warning system for farmers, detecting 13 pathogens in a single automated test that is unparalleled in today's industry for its sensitivity and accuracy.