Alliance
(https://www.aquaculturealliance.org)

Global Aquaculture Advocate ™

Health & Welfare

Field diagnostic kits for aquaculture

Monday, 1 August 2005

By Victoria Alday-Sanz, Ph.D.

Quick results for viral disease detection without a laboratory

Some diagnostic kits require the collection of a haemolymph sample from live animals.

Until recently, the screening and diagnosis of shrimp viral pathogens required the backup of a suitably equipped laboratory and well-trained staff. Due to the laborious procedures used and the often long distance between the labs and farming areas, results from the analysis could take up to a week to be delivered.

Many disease outbreaks were therefore not properly diagnosed in a timely manner. In effect, results were often a "postmortem" diagnosis that did not allow any intervention.

More diagnostic tools available

Nowadays an increasing number of diagnostic and screening tools specifically developed for field use are available in the commercial market. These kits can be used without the backup of a laboratory, and results are available in a few minutes to a few hours. The two types of kits are based on different detection methods: antibodies and polymerase chain reaction (PCR).

Antibody-based kits

Antibody-based kits are low-sensitivity systems appropriate for the diagnosis of clinical diseases. They have been developed to detect the main viral pathogens in unhealthy and moribund animals. Table 1 profiles several types of antibody-based kits.

Alday-Sanz, Screening tools for diagnosing shrimp diseases, Table 1

Products	Immunosquash	Dot Blot, Immunoblot	Test Strips	Field Polymerase Chain Reaction
Company	DiagXotics	DiagXotics	Biotech, Inve, Shrimple	Farming IntelliGene
Equipment required	Microscope	Oven	None	None
Duration of procedure	Two hours	Three to five hours	Five minutes	
Technique	Immunohistochemistry	DNA extraction, dot blot, immunoblot	Lateral flow, one step, sandwich immunoassay	Isothermal nucleic acid amplification
Tissue sample collection	Gill lamella	Gill, pleopod, haemolymph	Gill, pleopod, haemolymph	
Comments	Certain degree of training needed	Risk of false positives, long procedure	No training required	High level of training needed
Sensitivity	Low	Low	Low	High
Intended use	Disease outbreak diagnosis	Disease outbreak diagnosis	Disease outbreak diagnosis	Screening

Table 1. Screening tools for diagnosing shrimp diseases.

Fig. 1: The red bars on these test strips identify antibody test results. The lower strip shows a positive result.

Whenever there is an increase of moribund or dead animals in ponds, these kits can provide an accurate diagnosis of the problem. In these cases, higher sensitivity is not adequate, as the mere presence of the pathogen does not mean the onset of disease. The sensitivity of the kits, estimated at approximately 10,000 viral particles in field samples, is lower than that of one-step PCR.

Fig. 1 shows an example of an antibody-based commercial strip test. One band in the window means the test is negative but performing correctly. Two bands in the window means a positive result. The intensity of the second band can vary with the concentration of the pathogen in the sample. No band in the window means the test failed and needs to be repeated again using a new strip.

Field PCR kits

Field PCR testing has recently been developed for shrimp viral pathogens. It allows performing the whole process at room temperature (no need for a thermocycler), and the steps involved were designed so no additional equipment is needed. With sensitivity equivalent to nested PCR, the most sensitive technique currently available, field PCR kits are recommended for the screening of postlarvae prior to stocking.

Management decisions

Diagnostic results are only part of the information that must be considered in making health management decisions. Other factors, including environmental conditions and economic risks, also must be evaluated.

An increasing number of dying animals on the side of a pond that tests positive for White Spot Syndrome Virus or Yellow Head Virus is likely to forecast a serious mortality outbreak within a short period of time. Emergency harvest is a possible strategy to reduce the losses, while the use of antibiotics – which do not effect viral path-ogens – is not recommended.

(Editor's Note: This article was originally published in the August 2005 print edition of the Global Aquaculture Advocate.)

Author

VICTORIA ALDAY-SANZ, PH.D.

INVE Technology NV
Oeverstraat 7
B-9200 Baasrode, Belgium

v.alday-sanz@inve.be (mailto:v.alday-sanz@inve.be)