



PINOY BIOTEK DIGEST

Updates on biotechnology in the Philippines

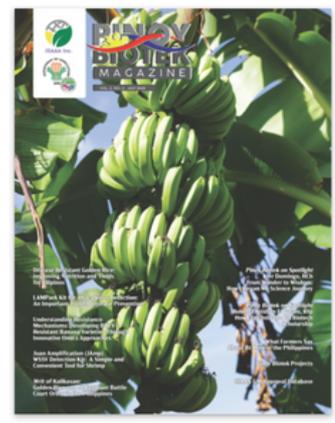


NEW RELEASES FROM ISAAA

PINOY BIOTEK MAGAZINE

>>> bit.ly/PinoyBiotekMagazine4

Pinoy Biotek Magazine aims to raise awareness, understanding, and acceptance of Pinoy products derived from conventional and modern biotechnology. The fourth issue features disease resistant Golden Rice, LAMPaR Kit, Juan Amplification (JAmP) WSSV Detection Kit, and other Pinoy Biotek innovations.



PINOY BIOTEK POLICY BRIEF

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Advancing Philippine Agriculture: Strategic Framework for the Commercialization of Biotech Innovations, presents the status of biotechnology in the Philippines and offers recommendations on boosting approval and acceptance of biotechnologies in the Philippines.

LAMPARA KIT FOR ABACA VIRUS DETECTION: AN IMPORTANT TOOL FOR DISEASE PREVENTION

BY Dr. LENY C. GALVEZ, CRIS FRANCIS BARBOSA, AND RHOSENER BHEA L. KOH

Abaca, an endemic crop to the Philippines closely related to banana, is primarily harvested for its prized fiber, considered the longest and strongest natural fiber in the world. The abaca industry not only engages 130,000 farmers but also provides employment in the manufacturing and processing industry for fiber products.

However, abaca production is hampered by the occurrence of dreaded viral diseases, namely abaca and banana bunchy top, bract mosaic, and sugarcane mosaic viruses. These four viruses may occur singly or in mixed infections, which primarily account for the low average fiber yield and are capable of wiping out the indigenous plants in the country. These viruses are primarily transmitted through insect vectors, such as aphids, or through contaminated planting materials.

The Philippine Fiber Industry Development Authority (PhilFIDA) collaborates with local government units and abaca farmers to control virus diseases by continuously surveilling and eradicating them. Hotspots, or severely infected areas, are treated with insecticides to kill aphid vectors, and infected plants are either removed or treated with glyphosate. PhilFIDA promotes the use of high-yielding, disease-free planting materials and operates tissue culture and diagnostic labs to produce disease-free plantlets. These labs use serology-based detection (enzyme-linked immunosorbent assay or ELISA) and nucleic acid-based detection (polymerase chain reaction or PCR) methods.

Many rural areas, however, do not have extensive resources to conduct ELISA or PCR for routine detection of viral diseases. Therefore, a simple, rapid, and reliable detection method is needed to identify virus-free planting materials and monitor disease incidence in the field. Thus, another technique, called loop-mediated isothermal amplification (LAMP), which possesses these characteristics, was also developed for the detection of the four abaca viruses.

FEATURES

Implementing LAMP kits for abaca virus detection is an important tool for early detection allowing timely intervention to prevent the spread of the disease. The LAMPaA Kit empowers farmers by providing them with the tools to monitor their abaca plants effectively. With proper training, farmers can utilize LAMP kits to manage viral infections more efficiently, enhancing the overall yield and quality of abaca fibers and supporting the economic stability of abaca farmers. For maximum impact, LAMP technology should be integrated into comprehensive disease management programs.

DEVELOPMENT

PhilFIDA and the University of the Philippines Diliman National Institute of Molecular Biology and Biotechnology (UPDNIMBB) developed LAMP-based virus detection as part of the “Enhancing Virus Detection Technology for Effective Disease Management in Abaca” project, funded by the Philippine Biotechnology for Agriculture and Fisheries of the Department of Agriculture (DA Biotech Program). To ensure field applicability of the developed LAMP assay, a subsequent project was initiated to package and refine the LAMP technology into a portable kit suitable for onsite use.

Evaluation of the field performance of the kit includes assessing its diagnostic accuracy, replicability, and ease of use by farmers and other beneficiaries without requiring a high level of technical knowledge. Through this project, PhilFIDA developed the LAMP para sa Abaca, or LAMPaA Kit, for the detection of abaca viruses. The kit includes all the necessary supplies to conduct a diagnostic assay directly in the field. The kit is portable allowing for on-site testing. The procedure is simple and does not require sophisticated equipment. The process is rapid, with results available within 30 minutes, and the results analysis is simply based on color change.



JUAN AMPLIFICATION (JAMP) WSSV DETECTION KIT: A SIMPLE AND CONVENIENT TOOL FOR SHRIMP

BY LUCILLE GRACE V. PUNZALAN

Filipinos love eating seafood, such as shrimp, crab, and various types of fish. About 96% of the shrimp produced in the Philippines is consumed locally, with only 4% exported to other countries. However, the domestic shrimp production is threatened by diseases which must be detected immediately. One deadly pathogen for shrimp is the White Spot Syndrome Virus (WSSV), which has no commercially available control method. The virus can cause white spot syndrome, which is highly contagious and lethal to shrimp. To address this issue, a research team from the University of Santo Tomas, led by Dr. Mary Beth Maningas, produced the Juan Amplification (JAMP) WSSV Detection Kit. This technology is based on the molecular diagnostic assay known as loop-mediated isothermal amplification (LAMP). The kit includes instructions for extracting DNA and a master mix for the LAMP assay with primers specifically designed for WSSV detection.



Photo Source: DOST PCAARRD

FEATURES

JAMP WSSV Detection Kit is a simple and convenient tool for onsite detection of WSSV in shrimp. It can be used for shrimps at different life stages and any type of tissue can be used.

The kit uses four to six specially developed primers, which makes it ten times more sensitive compared to the polymerase chain reaction (PCR), which uses only two primers. The multiple primers of JAMP also speed up the reaction time, reducing the detection time and providing results within an hour. The results can be easily determined by visual examination. A fluorescent sample indicates a positive result.

The cost-effective technology is paired with a heat block apparatus, which is cheaper than a thermal cycler and does not require other sophisticated instrumentation. As a result, testing is low-cost compared to other conventional methods.

RELATED RESEARCH

The JAMP WSSV Detection Kit can be adapted to detect other diseases when the platform is modified or customized. Dr. Maningas developed the JAMP AHPND Diagnostic Kit to detect acute hepatopancreatic necrosis disease (AHPND) or early mortality syndrome 6 (EMS) in shrimp. AHPND is a bacterial disease that causes high mortality rates in farmed populations of giant tiger prawn and whiteleg shrimp. The process and features of using JAMP-AHPND Diagnostic Kit are similar to those of JAMP WSSV Detection Kit. For more information about these technologies, you may contact Dr. Mary Beth B. Maningas at (02) 732-7486.

IMPACT

Since the JAMP WSSV Detection Kit efficiently detects WSSV in shrimp, it enables immediate control and preventive measures to curb the spread of the disease. This will help avoid shrimp mortality and reduce economic losses for farmers and pond owners in the Philippines.

The technology can also be used by other countries. The kit may enhance farm management practices in the Philippines and lessen dependence on costly and imported diagnostic kits. Using locally-built equipment will also decrease the cost of pathogen detection. Pilot tests of the kit have been conducted in General Santos, Iloilo, Bohol, Cebu, and Davao. Eighteen kits were distributed to shrimp operators and beneficiaries nationwide.