ISAAA Inc.

DEPARTMENT OF AGRICULTURE 1898

PINOY BIOTEK MAGAZINE

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Welcome Message

It is with pride that the International Service for the Acquisition of Agri-biotech Applications (ISAAA) Inc., in collaboration with the Philippine Agriculture and Fisheries Biotechnology Program Office (DA Biotech), brings you the third issue of *Pinoy Biotek Magazine*.

In this issue, we feature pioneer Filipino biotechnologists who have been conducting scientific research to respond to the needs of food producers and researchers. One of the first biofertilizers was BioN™ which was developed in the 1980s, to enrich the nitrogen content of the soil. A DNA barcoding kit was developed for easy identification of scallop species, determining their diversity and geographic distribution, and is hoped to aid the Philippine scallop industry in the international market.

The early discovery of the molecular biology tool, the loop-mediated isothermal amplification (LAMP) has revolutionized the rapid and efficient detection of viral and fungal pathogens in crops and animals. It was used in efficiently detecting rice tungro virus and was the basis for developing the dry LAMP QuickCArE for easy detection of lethal caprine arthritis encephalitis (CAE) virus in the blood of Caprine species goats and sheep. LAMP was also used in detecting various species of the foodborne bacterial pathogen *Vibrio* in fishes. This method will efficiently hinder large-scale infection in aquatic animals which could lead to human food poisoning.

In this issue, a scholar Ericka Joy Ancayan, narrates her journey on how she became an agri-biotechnologist, a regulator, and her hopes for Philippine biotechnology.

Also featured is Ms. Angelina 'Lyn' Resurreccion, a multi-awarded science journalist, for her staunch support in disseminating correct information on agri-biotechnology in the Philippines.

We trust that this issue will bring the much-needed appreciation of our Pinoy biotechnologists that will inspire the young scientists and regulators to continue their careers in biotechnology.

We thank the scientists, writers, and the ISAAA team for pulling off this excellent issue. Congratulations team!!!

Dr. Rhodora Romero-Aldemita
Executive Director, ISAAA, Inc.
Director, Global Knowledge Center on Biotechnology

Director's Message

Recent advancements in various industries have brought the term "biotechnology" to the spotlight as a popular buzzword associated with cutting-edge scientific progress. Most often than not, when people hear the term, they often immediately think of genetic engineering, personalized medicine, and the development of new biopharmaceuticals. However, the field of biotechnology encompasses a broader scope than these areas.

In this third issue of *Pinoy Biotek Magazine*, we strive to make the term more mainstream and highlight the significance of biotechnology beyond its typical associations. We aim to demonstrate how this field plays a crucial role in driving research and development (R&D) initiatives forward to a broader audience.

The third issue of the magazine will feature DNA-based and LAMP-based technologies that can detect disease and infections in crops (rice), fisheries, and livestock (ruminants); barcoding technology; and the Bio N™ fertilizer. It will also feature articles of the DA Biotech Program scholars, and a special cover on Ms. Ma. Angelina Resurreccion's contributions in the field of science journalism.

In partnership with ISAAA, DA Biotech is steadfast in providing accurate news information and introducing technological progress to the Filipino community. I sincerely trust that *Pinoy Biotek Magazine* will prove to be a valuable resource for all to enhance their understanding and further appreciation of agri-biotechnology.

Once again, I would like to extend my deepest appreciation to everyone — writers, researchers, and editors who have put in tremendous effort to produce the third issue of this magazine.

Mabuhay ang Pinoy Biotek!

Dr. Paul C. Limson, DVM
Director, DA Biotech Program

PINOY BIOTEK MAGAZINE

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QuickCArE: Pen-side Test Kit for Caprine Arthritis Encephalitis

BY DR. GABRIEL ALEXIS TUBALINAL

Imagine you are a goat farm veterinarian. Your herd is experiencing the poor condition of their coats and hair loss with cases of mastitis, while kids are experiencing paralysis. Samples must be collected and sent to service laboratories to confirm a diagnosis. Kind of tedious, isn't it? What if there is a test kit to screen your herd for caprine arthritis encephalitis (CAE)? The QuickCArE Dry LAMP CAEv Test Kit got you!

Goat farming in the Philippines is a booming industry. The goat population has been steadily increasing since 2016. However, as with every livestock farm in the Philippines, goat farming faces several threats, and CAE is one of these.

CAE is a disease of small ruminants that causes arthritis, mastitis, pneumonia, and central nervous system damage that leads to progressive weight loss and death. CAE endemicity hinders countries from trading live goats to countries free from CAE, considering its grave economic effect. Furthermore, according to the World Organisation for Animal Health (WOAH), the economic relevance of CAE is underestimated. Since 2018, the list of notifiable diseases of goats and sheep in the Philippines includes CAE.

In 2012, a Department of Science and Technology (DOST) research grant from the Outstanding Young Scientist Award of Dr. Claro N. Mingala fueled the initial development of the prototype test kit. Following the completion of this research grant, the Department of Agriculture - Philippine Agriculture and Fisheries Biotechnology Program (DA-Biotech Program) funded the QuickCArE Dry LAMP CAEv Test Kit with Dr. Mingala and Dr. Michelle M. Balbin as co-project leaders.

Current detection methods of CAE in the Philippines

In the Philippines, the current methods to detect CAE are enzyme-linked immunosorbent assay (ELISA) or nested-polymerase chain reaction (n-PCR). Both tests require samples to be collected in the field, transported and tested in the laboratory. The current detection methods may take up to three to five days before issuance of test results. Aside from the logistical hurdles, the current detection systems are time-consuming, expensive, and require trained personnel. With these difficulties in mind, Dr. Mingala and Dr. Balbin were inspired to develop an easy-to-use and inexpensive pen-side test, leading to the development of the QuickCArE Dry LAMP CAEv Test Kit.

QuickCArE CAEv Test Kit promotional material during the Philippine Carabao Center (PCC) Technology Pitch Day. Photo Source: Intellectual Property and Technology Business Management (IPTBM), PCC

Unique features of QuickCArE Dry LAMP CAEv Test Kit

QuickCArE Dry LAMP CAEv Test Kit is an easy-to-use CAE detection or screening kit that can be done in four simple steps. First, DNA is extracted from goat blood using the built-in DNA extraction provided. Secondly, as instructed in the kit, the extracted DNA is mixed with the freeze-dried reagents. Then, the mixture is incubated in an insulated vacuum flask (ex. Thermos bottles) at 60°C for 10-60 minutes. Lastly, results are visualized – orange means negative, and green means positive.

With regard to sensitivity and specificity in detecting CAE, the developed test kit is at par with such as ELISA and n-PCR, but is easier to use, cheaper, and has a shorter test time compared to other test kits or services currently available in the market.

QuickCArE Dry LAMP CAEv Test Kit impact

QuickCArE and pen-side test kits will be significant in helping and augmenting the laboratory test services in the country in screening and detecting livestock diseases and initiating control and prevention strategies. This technology will help unload the current flow of CAEv screening in the country which takes a longer time. Government regulatory organizations like the Food and Drug Administration (FDA) and the Bureau of Animal Industry (BAI) must monitor the use of these test kits in order to fully reap their benefits.

SPARE your herd and have it tested in four easy steps. QuickCArE is a Specific, Pen-side, Accurate, Reliable, and Economical CAEv Test for goats.

Dr. Gabriel Alexis Tubalinal is the Head of the Biosafety and Environment Section, Philippine Carabao Center

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A New Dawn in Rice Farming as LAMP Shines in the Battle Against Tungro Virus

BY DR. RUBIGILDA PARAGUISON-ALILI

In rice fields across the Philippines, a hidden threat looms over rice, the country's staple crop. Tungro disease, driven by the rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV), has persistently pestered the country's farmers. These viruses lead to severe symptoms, such as stunting and yellowing of leaves, which can drastically reduce crop yields. They are primarily transmitted by insect vectors like the green leafhopper. A new technology called Loop-Mediated Isothermal Amplification (LAMP) is making strides in combating this issue. This method is revolutionizing the detection of these viruses, providing a quicker, more affordable, and simpler solution than traditional methods.

Conventional detection of diseases like those caused by RTBV and RTSV in rice involved complex tests, such as polymerase chain reaction (PCR), which require time-consuming procedures and expensive equipment. This complexity often delays researchers and farmers from quickly identifying and addressing the diseases affecting their crops.

Advantages of LAMP

LAMP is changing the game. This method identifies DNA at a constant temperature using specific markers. Unlike PCR, which requires sophisticated thermal cyclers, LAMP can be performed with simple tools like a water bath or a heat block, or even at room temperature. This method not only simplifies the process but also accelerates it, providing results that are easily visible through a color change in less than an hour. Additionally, LAMP offers advantages over the gold standard of enzyme-linked immunosorbent assay (ELISA), which, while effective, demands antibodies, can be less sensitive, and takes a longer time in comparison. With LAMP, one gets a quicker, more accessible, and cost-effective way to detect rice viruses, making it a practical alternative for field diagnostics.

Researchers at the Philippine Rice Research Institute (PhilRice) in the Science City of Muñoz, Nueva Ecija, including Rubigilda Paraguison-Alili, Emmanuel R. Tiongco, Xuan Hoai Truong, and Ma. Johna C. Duque showcased the effectiveness of LAMP. Their research shows that LAMP can detect RTBV only one day after rice seedlings are infected by the green leafhopper, which transmits the disease. This detection speed is significantly faster than traditional methods like ELISA, which require more time to confirm the virus's presence.

This quick detection is crucial as it allows farmers to act swiftly to halt the spread of the disease, potentially saving entire fields from destruction. This rapid response is particularly important in areas like Isabela, Negros, and Midsayap in Cotabato, where tungro regularly inflicts significant crop losses.

However, using LAMP is not without its challenges. The method's high sensitivity is generally a benefit, enabling the detection of even small amounts of the virus. Yet, this same sensitivity also means that LAMP can easily pick up contamination, leading to false positives. To avoid this, farmers and researchers must adhere to stringent procedures to ensure everything remains clean and free from contaminants when employing LAMP. This careful handling helps maintain the accuracy of the testing process, ensuring reliable results that can effectively guide disease management decisions.

Broader Implications for Rice Farming

Beyond just finding diseases, LAMP can also help in breeding better rice varieties that are resistant to tungro. This could be a big step forward in managing the disease over the long term, reducing the need for chemical treatments, and supporting more sustainable farming methods.t

Looking forward, the role of LAMP in agriculture continues to grow. It is not just about fighting the tungro virus per se, but about shaping the future of rice farming. This tool gives farmers a new power to quickly understand and react to threats in their crops, helping ensure that the country's rice bowls are always full.

With each advance in technology like LAMP, we get closer to a future where our farmers can work with more confidence and less fear of the unknown, ensuring a stable and secure food supply for everyone. The battle against rice tungro virus is just the beginning, and the possibilities are as vast as our fields.

Dr. Rubigilda Paraguison-Alili is Professor I and Molecular Biologist at the Molecular Biology and Biotechnology Laboratory, Central Luzon State University, Nueva Ecija.

SOURCE

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LOV: LAMP Detection of *Vibrio* in Fish

BY DR. PIERANGELI G. VITAL AND JOY ANN P. SANTOS

Vibrio species, which are Gram-negative bacteria, are found ubiquitously in different aquatic environments. Among the various *Vibrio* species, *Vibrio parahaemolyticus*, *V. vulnificus*, and *V. cholerae* are known pathogens that have been associated with diseases in fish and can cause infections that may lead to significant mortalities. Vibriosis in fish populations is a concern for aquaculture as it affects fish health and can cause economic losses. These bacteria can accumulate in fish through various mechanisms, including dietary habits or environmental conditions, potentially leading to transmission to humans through the consumption of raw or undercooked seafood.

With the rising prevalence of Vibriosis and the increasing consumption of seafood around the world, it is crucial to implement more effective prevention and control measures to ensure the safety and sustainability of aquaculture industries (Ma *et al.*, 2023). Conventional techniques, while reliable, are labor-intensive and can be time-consuming, often taking days to achieve a conclusive result (Loo *et al.*, 2022).

Features of LAMP Technology

Loop-Mediated Isothermal Amplification (LAMP) technology presents a promising alternative for the detection of *Vibrio* species in fish and aquaculture settings due to its rapidity, specificity, and simplicity. It offers several advantages for testing: (1) LAMP can produce results typically within 30 to 60 minutes; (2) The assay setup for LAMP is less complex and does not require high-end instruments, making it accessible even in resource-limited settings; (3) LAMP is less susceptible to inhibitors commonly found in complex biological samples like stool, urine, or blood, which can hinder other methods such as polymerase chain reaction (PCR); (4) It offers high specificity and sensitivity, capable of detecting very low quantities of DNA; and (5) Products of the LAMP reaction can be visually inspected for color changes with the naked eye or under UV light, eliminating the need for sophisticated detection equipment (Notomi *et al.*, 2015; Loo *et al.*, 2022). However, there are limitations in using LAMP for testing in fish, such as primer design and quantification.

In aquaculture, the integration of LAMP technology could revolutionize the management of diseases by enabling rapid and accurate detection of pathogenic *Vibrio* species, thereby allowing for timely interventions. Despite its limitations, LAMP is still a powerful tool that can complement traditional methods, especially in situations where rapid, on-site testing is beneficial.

Future of LAMP detection

The future of LAMP technology in aquaculture looks promising, with continued developments and integration of novel assays that can provide rapid and accurate diagnostics at point-of-care or on-site. One of the future directions is combining LAMP with lateral flow assays (LFAs). LFAs are user-friendly devices that provide a visual readout, similar to that of a pregnancy test and, when coupled with the sensitivity and specificity of LAMP, they can produce rapid, on-site diagnostic tools without the need for specialized equipment.

The LOV project or LAMP detection of *Vibrio* in fish was supported by the Department of Agriculture Biotech Program and housed in the Biological Research and Services Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman, with team members, Pierangeli G. Vital (Project Leader), Joy Ann P. Santos (Co-Project Leader), Brian Adrielle C. Cacayan (University Research Associate), Danmhye O. Dela Cruz (Research Assistant), and Brandon Allen M. Belmi (Research Assistant).

Knowledge training on LOV Kit.

Project Proponents: Joy Ann P. Santos (left, Co-Project Leader), is University Researcher/Career Scientist, University of the Philippines Diliman. Dr. Pierangeli G. Vital (right, Project Leader), is Head of the Biological Research and Services Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman.

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Bio N™ Fertilizer: Boosting Crop Yield Since 1985

BY LUCILLE GRACE V. PUNZALAN

Who said that fertilizers need to be expensive and full of chemicals? Bio N™ Fertilizer might just be what farmers need for their crops!

Bio N™ sachets. Photo Source: UPLB BIOTECH

Background of the project

Plants cannot directly use the nitrogen in the atmosphere. However, with the help of certain bacteria located in the roots of plants, the atmospheric nitrogen is converted into ammonium nitrogen that plants can use.

In 1985, Dr. Mercedes U. Garcia and her project team from the University of the Philippines Los Baños (UPLB) started their work on Bio N™. This fertilizer is made up of *Azospirillum*, a nitrogen-fixing bacteria that is isolated from the roots of talahib grass (*Saccharum spontaneum*). Bio N™ was tested under laboratory conditions, and it was proven to be effective in improving the nitrogen intake of crops. The biofertilizer also enhanced the growth and yield of plants in dry land and paddy areas.

Features of Bio N™

Bio N™ was successfully used for rice, corn, and vegetables. The microbial-based fertilizer replaces about 30% to 50% of the crops' total nitrogen requirement and enhances the crop's nutrient absorption. Bio N™ also improves shoot growth, root development, grain quality, and yield of the crops, while still preserving the health of the soil.

Farmers do not need to worry about drought because Bio N™ ensures that plants are always green and healthy. The biofertilizer also helps avoid infestations of rice tungro and corn earworm, hence boosting agricultural production.

Impact of Bio N™

Bio N™ is a low-cost alternative to inorganic fertilizers. It comes in 200-gram sachets at a minimum of Php150 per sachet. About five to six sachets of the biofertilizer can replace two bags of urea per hectare. Since one 50-kilo bag of urea may cost up to more than Php2,000, Bio N™ will significantly help farmers save money. Aside from that, Bio N™ is also more effective compared to traditional fertilizers, thereby increasing the yield of farmers and raising their income.

Since Bio N™ is made up of bacteria, it is also organic, safer, and better for people and the environment. An abundant supply of this biofertilizer will also help solve the shortage and high-cost issues of traditional fertilizers. These advantages will be helpful for the Philippines' agricultural industry.

Status of the project

Bio N™ has a registered trademark and is registered with the Fertilizer and Pesticide Authority. The UPLB National Institute of Molecular Biology and Biotechnology (BIOTECH) produces ready-to-use packs and concentrated forms of Bio N™. The Department of Agriculture and UPLB also built 17 mixing plants that manufacture, market, and distribute Bio N™ all over the Philippines. The operating personnel was trained by the Bio N™ team led by their project leader, Julieta A. Anarna.

Even though the Bio N™ project team already has many accomplishments, they are open to regular funding, partnerships, production, licensing, and marketing opportunities. They are also seeking to expand their production to further help farmers and the agricultural industry in the Philippines.

Lucille Grace V. Punzalan is a Project Assistant at ISAAA Inc.

SOURCES

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DNA Barcoding of Scallops in the Visayan Sea: Genetic Resources & Methods for Species Identification

BY RACHEL RAVAGO-GOTANCO AND INGGAT LAYA CASILAGAN

'Scallop' is a common name that refers to marine bivalve mollusks in the family Pectinidae. Globally distributed across tropical, temperate, and polar habitats, the greatest diversity occurs in the tropical Indo-Pacific Oceans and the Caribbean Sea. Many scallop species are valued for food. In the Philippines, scallops are an economically valuable fishery harvested for domestic and export markets. From 1995 to 2021, the value of exported scallops ranged from USD 0.23 million to USD 8.2 million. However, the "boom-and-bust" cycle of the fishery, coupled with indications of overharvesting and the possible depletion of wild stocks, raises concerns about long-term sustainability.

Correct species identification is crucial for the assessment of biological diversity and stock status, with important implications for resource management and conservation plans. Accurate species information is also an important measure to ensure responsible trade and consumer safety through accurate labeling and traceability. For scallops, however, the wide range of variation in shape, texture, and color variants of their shell poses challenges for species identification.

A harvest of scallops from Bantayan Island, Cebu. Photo Source: Inggat Casilagan

Background of the project

In 2018, the Department of Agriculture (DA), through the Philippine Agriculture and Fisheries Biotechnology Program (DA Biotech Program), awarded a research grant to a team led by Dr. Rachel Ravago-Gotanco from the Marine Science Institute, University of the Philippines Diliman, to conduct a genetic assessment of commercially-valuable scallops in the Visayas region. One of the project's main objectives was to develop DNA-based assays to facilitate species identification and species composition assessments of scallop fisheries in the highly productive Visayan Sea. DNA barcoding has been widely used and has now been established as a method for species identification, especially when morphological characters for taxonomic identification are not available or are ambiguous. Using DNA sequence data from selected regions of the genome (barcode regions), taxonomic identification of a specimen can be confirmed by comparing its DNA sequence against reference sequences from taxonomically-verified specimens.

Using a DNA barcoding approach, the project team was able to survey the species diversity of scallops collected from five sites in the Visayan Sea: northernmost site (Naro Island, Masbate), central locations (the islands of North Gigante and South Gigante, Iloilo), southern regions (Bantayan Island, Cebu and Molocaboc Island, Negros Occidental), and three locations outside the Visayan Sea (Leyte, Eastern Samar, and Tawi-Tawi). Using the mitochondrial 16s gene as a barcode region, a knowledge base of DNA sequences for scallops collected from the Visayan Sea was generated. Comparing generated sequences against published DNA sequence records, six species were identified from the Visayan Sea samples, namely *Annachlamys striatula*, *Bractechlamys vexillum*, *Decatopecten radula*, *Decatopectan plica*, *Mimachlamys sanguinea*, and *Mimachlamys* sp., while three species were identified from other locations, namely *Amusium pleuronectes*, *Decatopecten radula*, and *Gloripallium pallium*. Genetic identification for each specimen was further cross-referenced against morphology-based identification using diagnostic morphological characters and geometric morphometric analysis which delineates groupings based on overall shell shape. Using an integrative approach combining molecular and morphological data increases confidence in accurate taxonomic identification.

An assay for species identification was also developed using polymerase chain reaction combined with restriction fragment length polymorphisms profiling (PCR-RFLP). The method enables the identification of six species occurring in the Visayan Sea, as well as two other species found in other sites, providing a relatively inexpensive and rapid assay without the need for DNA sequencing.

Implications of DNA Barcoding of scallops

The project showed the utility of DNA barcoding for species identification of scallops in the Visayan Sea region, enabling initial characterization of species diversity and geographic distribution. The DNA sequences generated by the project, as well as the PCR-RFLP method for species identification, represent valuable genetic resources and techniques that can be used for expanded assessments of scallop species diversity, distribution, and stock structure. Such information represents valuable baseline knowledge for the development of species traceability mechanisms for trade, as well as resource management and conservation strategies for scallop fisheries in the Visayan Sea and even beyond.

Dr. Rachel Ravago-Gotanco is a Professor at the Marine Science Institute, University of the Philippines Diliman. Inggat Laya Casilagan is a PhD student at the Marine Science Institute, University of the Philippines Diliman.

SOURCE

Philippine Statistics Authority (2021). Scallops export data from 1995-2021

PINOY BIOTEK ON SPOTLIGHT Ericka Joy Ancayan

A Different Path to A Fulfilling Career

An aspiring accountant turned into an agri-biotechnologist. I am Ericka Joy Ancayan and allow me to share my unexpected journey.

An Unforeseen Start

My high school yearbook clearly stated my career aspiration: "To be an accountant." Despite being one of the 13,100 successful passers of the University of the Philippines College Admission Test (UPCAT) for Batch 2014-2015, I could not qualify for the accountancy degree program. However, another door opened—I qualified for the Agricultural Biotechnology degree program, which brought forth a mix of emotions, including uncertainty about this new path.

Driven by curiosity, I began searching for information about agricultural biotechnology. From crops with built-in insect resistance to glow-in-the-dark fish, the products of modern biotechnology through genetic modification captured my attention. As a result, I decided to take on the challenge and pursue this course.

A Scholar's Journey

The diverse coursework for Agricultural Biotechnology, which includes biology, chemistry, statistics, computer science, and economics, laid a strong foundation for my future endeavors.

As I advanced through my major subjects, my interest in laboratory work grew deeper. I found the detailed process of developing hybrid crops using molecular markers and plant breeding fascinating, leading me to specialize in Crop Biotechnology. One of my career goals is to develop a hybrid or genetically modified crop using modern biotechnology.

My college journey was made possible through the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) Scholarship Grant. More than just financial aid, the scholarship also provided me with opportunities for professional development through internships at esteemed institutions including the National Institute of Molecular Biology and Biotechnology (BIOTECH)-UP Los Baños (UPLB), Institute of Chemistry-UPLB, Institute of Crop Science-UPLB, and the Philippine Rice Research Institute-Los Banos.

During these internships, I gained hands-on experience in various laboratory activities, such as crude protein extraction, plant growth regulator (PGRs) extraction, tissue culture techniques, and conventional polymerase chain reaction (PCR) workflow.

I am deeply appreciative of DA-BAR for providing this scholarship program.

Beyond the Lab: A Fulfilling Career in Agri-biotechnology

Agri-biotechnology offers a range of career opportunities in crop biotechnology, animal biotechnology, food biotechnology, and crop protection. Graduates can work as researchers or scientists in government agencies and private companies, pursue agri-entrepreneurship, or engage in extension work. Importantly, agri-biotech graduates are qualified to take the Agriculture Licensure Exam. A personal highlight in my career was ranking in the top 10 in the 2021 licensure exam for agriculturists.

Reflecting on my past experiences, I have worked as a research associate in academia and as a field application scientist in a private company. In these roles, I received local and international training and attended conferences, which allowed me to connect with influential figures in the molecular biology and biotechnology field.

Currently, I am a regulator at the Bureau of Plant Industry Biotechnology Office. My primary responsibility involves monitoring the transboundary movement of genetically modified organisms (GMOs), including laboratory-based detection and identification of GMOs in imported agricultural commodities. This work aligns with the Biotechnology Office's function to ensure importers and permit holders comply with biosafety conditions. Additionally, I am also involved in assisting the competent national authorities (CNAs) in conducting risk assessments of GMOs.

These experiences demonstrate that opportunities for Agri-biotechnology graduates extend beyond the laboratory.

The potential of agri-biotechnology in the Philippines

Local research institutions are advancing in the development of genetically modified crops. These include Golden Rice and Bt *talong*. This demonstrates the institutions' ability to enhance the genetic makeup of crops using modern biotechnology. Meanwhile, the Department of Agriculture is working to increase awareness of agricultural biotechnology products through various information, education, and communication campaigns. Considering this, there is great hope that Filipinos will recognize the potential of agribiotechnology beyond just agriculture.

"A personal highlight in my career was ranking in the top 10 in the 2021 licensure exam for agriculturists."

Ericka Joy Ancayan - Science Research Technician III, Bureau of Plant Industry

(Photos courtesy of Ericka Joy Ancayan)

PINOY BIOTEK ON SPOTLIGHT

Angelina 'Lyn' B. Resurreccion

Mainstreaming Biotechnology Communication Through Science Journalism

BY KAYMART A. GIMUTAO

Angelina "Lyn" B. Resurreccion stands as a stalwart figure in the field of science journalism in the Philippines, with an impressive career spanning 27 years. Currently a Senior Editor at *Business Mirror*, her responsibilities extend to the meticulous curation of the newspaper's Science, Biodiversity, and Faith sections.

Prior to pursuing the realm of science journalism, Resurreccion spent nine years of her journalism career as a political reporter. Her journalistic repertoire reflects an affinity for diverse scientific domains such as biotechnology and agriculture, nuclear science, space exploration, and the science and technology programs implemented both by the Philippine government, international, and private agencies.

The numerous accolades throughout Resurreccion's career testify to her commitment and excellence in the field. Notably, the Filipino Faces of Biotechnology Award, an accolade she earned during the award's inaugural in 2016, sealed her contributions in bridging the information gap between scientists and the public. Her nod from the Jose G. Burgos Biotechnology Award further solidified her status among the notable science journalists in the Philippines, earning her the esteemed Hall of Famer title in 2018. Other awards received by Resurreccion include the DOST's Science for the People Award in Print Media Individual Category, the Ulat Sipag Award for National Print Category by PCAARRD, and the DOST-Science Education Institute Recognition.

Her influence extends to the digital sphere, where Resurreccion became a curator of the Science and She social media campaign in 2018, initiated by the International Service for the Acquisition of Agri-biotech Applications (ISAAA).This platform served as a testament to her ability to communicate complex scientific concepts to a broader audience, particularly the younger generations.

Beyond personal accolades, Resurreccion's editorial prowess has elevated *Business Mirror* to acclaim, securing the Bantog Award for Institution Category on September 28, 2018. The publication is also the recipient of the 2014 ASEAN Champion of Biodiversity Award, a milestone achieved under her stewardship as the editor of the newspaper's unique Biodiversity page. The distinction sets *Business Mirror* apart from the rest as the only newspaper globally with a dedicated page to biodiversity.

Lyn Resurreccion's journey through the realms of journalism and science has not only garnered her an indisputable milestone but has also cemented her status as a beacon in science communication, tirelessly bridging the gap between complex scientific endeavors and the wider public audience. Her enduring legacy continues to inspire budding science journalists and leaves an indelible mark on the ever-evolving landscape of science communication.

Kaymart A. Gimutao is a freelance science writer and previously worked at ISAAA Inc.

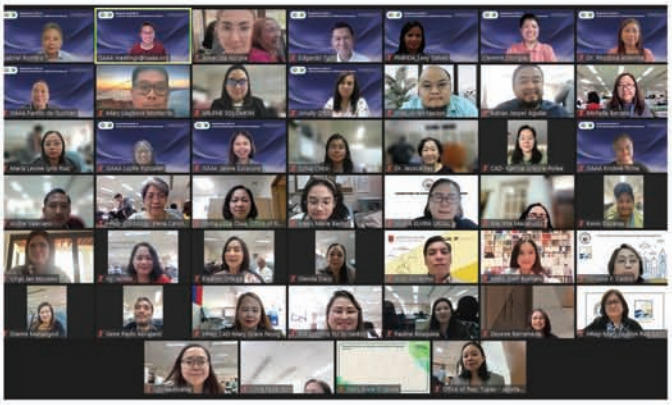
ISAAA Inc., in partnership with the Philippine Agriculture and Fisheries Biotechnology Program of the Department of Agriculture, have implemented various activities that educate different stakeholders in the Philippines about homegrown biotech products in the pipeline and available in the market.

SEMINARS

Mudfish Spawning Technology (September 1, 2023)
Philippine Carabao Center (PCC) National Headquarters and Gene Pool,
Science City of Munoz, Nueva Ecija

Improved Hatchery Protocol for Blue Swimming Crab (November 24, 2023)
Kota Beach, Bantayan Island, Cebu

PCR-based detection kit for Salmonella in Meat (March 12, 2024)
University of the Philippines Diliman Institute of Biology (UPD-IB) Auditorium, Quezon City



Regulatory Path to Commercialization of Biotech Products (May 9, 2024)
Via Zoom

TRAININGS

Students and researchers were empowered to spread information about biotechnology through hands-on training.

Becoming a Biotech Influencer: Social Media Training for Biotech Students (July 25–26, 2023)
Acacia Hotel Manila, Muntinlupa City

Scicom Frontliners: Trainers' Training on Communicating Pinoy Biotek (September 6–7, 2023)
Acacia Hotel Manila, Muntinlupa City

PINOY BIOTEK PUBLICATIONS

Biotech Crop Annual Updates provides a concise overview of research and development for biotech crops. It highlights potential benefits and offers approval updates on the current status of the featured crop.

Biotech Crops in the Philippines showcases a timeline of biotech crop developments in research, regulations, and commercialization in the country.

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PINOY BIOTEK MAGAZINE

Pinoy Biotek Magazine aims to raise the Filipinos' awareness, understanding, and acceptance of Pinoy biotech products derived from conventional and modern biotechnology. It is published in print and distributed for free to selected schools and institutions. This magazine is also available for free download in the ISAAA Inc. website.

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