



PINOY BIOTEK MAGAZINE

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Welcome Message



Welcome to the fifth issue of *Pinoy Biotek Magazine*!

In partnership with the Philippine Agriculture and Fisheries Biotechnology Program of the Department of Agriculture (DA Biotech Program), we are once again honored to present stories and innovations that showcase the vital role of biotechnology in strengthening Philippine agriculture and improving

the lives of Filipino farmers and communities.

In this issue, we focus on the emerging technologies and research initiatives to solve the emerging agricultural challenges brought by climate change. Featured in this edition is the development of a climate-smart water buffalo production system, which explores heat stress indicators and genetic screening for thermotolerance to help livestock adapt to changing environmental conditions. We also shine the spotlight on Philippine cassava through studies on adaptability, drought screening, and genetic diversification.

The readers will also learn about the ongoing efforts to

strengthen the Philippine rubber industry through molecular characterization and germplasm conservation, as well as promising developments in producing Fusarium wilt-resistant Cavendish bananas, being one of the country's most important agricultural commodities. We also highlight the Philippines' continuing progress in agricultural biotechnology by providing an overview of recent genetically modified (GM) crop approvals in the country from January 2025 to April 2026.

Beyond research and technology, we also present inspiring stories of biotech corn farmers whose lives were transformed through innovation and perseverance, alongside the journeys of DA Biotech Program scholars pursuing excellence in their respective fields.

We extend our heartfelt gratitude to the researchers, contributors, scholars, farmers, and the ISAAA Inc. team for making this issue possible. We hope this edition continues to inspire greater appreciation and support for homegrown biotechnologies that contribute to food security, sustainability, and a more resilient Philippines.

Dr. Rhodora Romero-Aldemita

Executive Director, ISAAA, Inc.

Director's Message

Building a sustainable and climate-resilient future for Philippine agriculture remains the cornerstone of the Department of Agriculture's (DA) mission. To drive this vision forward, the DA Biotechnology Program (DA Biotech Program) continues to champion innovative research. Through strategic genetic improvements, we are actively equipping our crops and livestock with the enhanced adaptability and resilience needed to overcome the growing threats of climate change, extreme weather, and emerging and re-emerging pests and diseases.

In this fifth issue of the *Pinoy Biotek Magazine*, we proudly highlight four pivotal technologies supported by the Department, through the DA Biotech Program. We take a closer look at practical research aimed at improving heat tolerance, pest resistance, and disease resilience across key agricultural commodities—including the water buffalo, Philippine cassava,



rubber, and Cavendish banana.

But beyond the science, biotechnology is fundamentally about people. This issue shares the stories of two biotech corn farmers whose productivity and livelihoods have improved through modern agricultural technology. We also spotlight the journeys of two DA Biotech Program scholars, representing the next generation of professionals working in the sector.

As we move forward, the DA Biotech Program remains committed to the responsible use of agricultural biotechnology. We are dedicated to translating scientific work in the laboratory into tangible outcomes and lasting benefits for our farming communities.

My deepest gratitude goes to the writers, researchers, and editors who brought this issue to life. And to our dear readers—thank you for your continued support! We hope you find these stories both informative and useful.

Dr. Paul C. Limson, DVM

Director, DA Biotechnology Program



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Climate-Smart Water Buffalo: Adaptation Strategies through Biotechnology

BY DR. EXCEL RIO S. MAYLEM-ABRIAM

Water buffaloes, the national animal of the Philippines, have long been valued for their strength, resilience, and role as dependable draft animals. Through the Genetic Improvement Program (GIP) of the Philippine Carabao Center (PCC), the Philippine Dairy Buffalo was developed by crossing native swamp buffaloes with imported riverine breeds to enhance milk productivity, a goal that the agency successfully achieved.

Despite their adaptability to tropical environments, water buffaloes remain vulnerable to rising temperatures. Their dark skin absorbs more heat, making them prone to heat stress, which affects their health, reproduction, and milk production.

To address this, the Climate-Smart Water Buffalo (CSWB) Program, supported by the Department of Agriculture Biotechnology Program Office, adopts a multi-layered approach from genes to barns. It integrates environmental monitoring, physiological assessment, and molecular tools to improve buffalo productivity under climate stress.

The project began by identifying heat stress indicators in the field. Water buffaloes across selected areas in Luzon were assessed to understand their responses to heat. Traditionally, the Temperature Humidity Index (THI) has been used to evaluate heat stress. However, climate variability has made these thresholds less reliable. Field observations revealed that buffaloes already exhibit signs of stress even at levels previously considered safe. Many farmers also rely on visible animal responses, which may come too late.

Recognizing this gap, the program incorporated biotechnological tools to capture the animal's internal responses to heat. Physiological and endocrine parameters, including cortisol, triiodothyronine (T3), and thyroxine (T4), were measured and found to be associated with heat stress. At the molecular level, Heat Shock Protein 70 (HSP70) was used as a key biomarker to indicate how cells respond to heat. By combining environmental data with physiological, endocrine, and molecular indicators, the project established a more comprehensive and practical system for detecting heat stress.

Building on these findings, the program developed a probe-based single



Assessment of animals' responses to heat stress at the farm level.

nucleotide polymorphism (SNP) detection method using real-time polymerase chain reaction (qPCR) to genotype the *HSP70* gene and identify genetic variations associated with thermotolerance. The assay used blood samples and extracted DNA, with probes targeting a specific SNP that results in an amino acid substitution. Animals were classified based on their genotype: AA (non-thermotolerant), BB (thermotolerant), and AB (carrier).

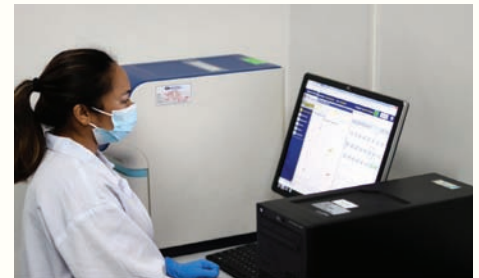
Initial results showed that the native Philippine carabao had the highest frequency of the thermotolerant BB genotype, while the non-thermotolerant AA genotype was observed only in the Bulgarian Murrah breed. Animals carrying the thermotolerant B allele demonstrated more stable and higher milk production across dry and wet seasons. This finding suggests that thermotolerance is directly linked to productivity and resilience under heat stress. Genotypes of other buffalo breeds in the country are currently being analyzed.

These findings highlight the importance of incorporating thermotolerance into selection and breeding strategies. This study also represents the first probe-based RT-PCR genotyping of thermotolerance traits in livestock in the Philippines. This opens opportunities for large-scale genetic screening of resilience-related traits.

The project aims to expand genotyping efforts to the Visayas and Mindanao regions and extend similar approaches to cattle and other livestock species. Furthermore, it intends to develop targeted nutritional and reproductive



Measurement of respiratory rate and other physiological responses of animals under current farm environmental conditions.



Allele frequency analysis for HSP70 and SLICK genes for thermotolerance identification across different water buffalo breeds.

interventions that can respond to identified heat stress conditions.

Through biotechnology-driven interventions, the CSWB Program envisions a more climate-smart and climate-resilient livestock sector that supports both animal welfare and farmer productivity.

Dr. Excel Rio S. Maylem-Abriam is a Senior Science Research Specialist at the Reproductive Biotechnology and Physiology Laboratory of the Philippine Carabao Center.

Bringing Cassava into the Biotech Spotlight

BY DR. FRANZ MARIELLE NOGOY-GARCIA

Cassava (*Manihot esculenta*) has long been seen as a “survival crop”—reliable, hardy, but often overlooked. Today, as climate change and the oil crisis threaten food production and water becomes more limited, cassava is stepping into a new role as a biotech-enabled solution for food security.

The CasDro Project (DABIOTECH-R2407: Philippine Cassava Adaptability, Drought Screening, and Genetic Diversification), led by Central Luzon State University, combines plant breeding and modern biotechnology to identify cassava varieties that can survive drought and still produce good yields. Cassava is more than just a root crop. It feeds people, supports livestock, and supplies industries with starch-rich raw materials for bioethanol production.

More importantly, cassava grows where other crops cannot. In drought-prone areas of Central Luzon, crops like rice and corn often fail. Cassava, with its deep roots and natural tolerance to dry conditions, can continue to grow. This makes it a valuable tool for climate-resilient agriculture and improved food security.

What sets CasDro apart is its use of biotechnology to fast-track crop improvement. The project collected cassava genotypes from across the Philippines, creating a diverse resource for the study. Scientists then used a combination of field testing and laboratory analysis:

- Adaptability trials – Testing cassava in real farms across Central Luzon to identify high-performing varieties
- Drought screening – Simulating water stress to identify which plants can withstand extreme conditions
- DNA analysis – Using molecular markers to examine cassava genes and identify traits linked to drought tolerance.

This approach is known as marker-assisted selection, a biotechnology tool that helps breeders select desirable traits more efficiently and accurately.

CasDro is not limited to laboratory research. Field trials were conducted in multiple provinces, with farmers actively participating in testing and evaluation. This ensures that selected cassava varieties are not only scientifically



Cassava adaptability trials in Bataan and Aurora, including transplanting of cassava seedlings in Samal, Bataan (upper photo), and yield measurement of harvested cassava in San Luis, Aurora.

promising but also practical, scalable, and suitable for local farming conditions.

Beyond identifying improved varieties, CasDro is building a foundation for future cassava biotechnology in the Philippines. This includes efforts in DNA banking, germplasm conservation, and the use of advanced tools such as RNA analysis in its second phase.

The CasDro Project demonstrates that biotechnology is not limited to high-value or widely commercialized crops. It can also transform traditional staples like cassava. By combining genetics, field science, and farmer participation, cassava is being repositioned as a key crop for climate resilience, food security, and economic growth in Central Luzon.

Ways forward for CasDro

The project team aims to complete Phase 1 data integration to identify drought-tolerant cassava genotypes and validate marker–trait associations. Building on these findings, Phase 2 will involve RNA sequencing to better



Cassava germplasm collection from different institutions, including cassava stems prepared as 7-node or 20-centimeter cuttings.

understand gene expression and the biological pathways associated with stress resilience.

These efforts are expected to strengthen local biotechnology capacity and support more precise breeding strategies. The team also recommends wider adoption of elite varieties, stronger support from local government units, and increased private sector investment in processing. These steps can enhance cassava productivity, farmer income, and support long-term industry sustainability.

Dr. Franz Marielle N. Garcia is an Associate Professor V at the Crops and Resources Research and Development Center of Central Luzon State University.

Strengthening the Philippine Rubber Industry through Molecular Characterization and Germplasm Conservation

BY DR. CHERYL L. EUSALA

The Philippine rubber industry plays an important role in the country's agricultural development. However, its productivity has been steadily declining due to pests and diseases, climate variability, and widespread use of low-yielding clones. To address these challenges, the Philippine Rubber Research Institute (PRRI), mandated by RA No. 10089, leads research, development, and extension (RD&E) efforts for the country's rubber sector. In recent years, PRRI has intensified its initiatives by leveraging biotechnology to enhance productivity and sustainability.

A key component of these efforts is the characterization, conservation, and effective use of rubber germplasm. Currently, PRRI maintains more than 80 rubber (*Hevea brasiliensis*) clones, including materials from the International Rubber Research and Development Board, ortets, and donations from state universities and colleges. Among these are several putative high-latex-yielding clones that remain underutilized and are not yet registered with the Bureau of Plant Industry.

A major constraint in maximizing these resources is the lack of comprehensive genetic information. This gap limits accurate identification and reduces their effective use in breeding programs. Without precise genetic profiling, there is a higher risk of duplication, misidentification, and inefficient selection of parent materials, which can slow down genetic improvement.



Rubber germplasm collections across rubber-producing regions in the Philippines.

To address this, PRRI uses Simple Sequence Repeats (SSRs) as a reliable tool for genetic characterization. In a recent initiative, 59 SSR markers were used to analyze 10 rubber clones, including the seven recommended clones in the Philippines. Of these, 19 markers were identified as highly informative and effective in establishing distinct genetic fingerprints. This molecular approach enables accurate clone identification and supports the development of improved rubber varieties.

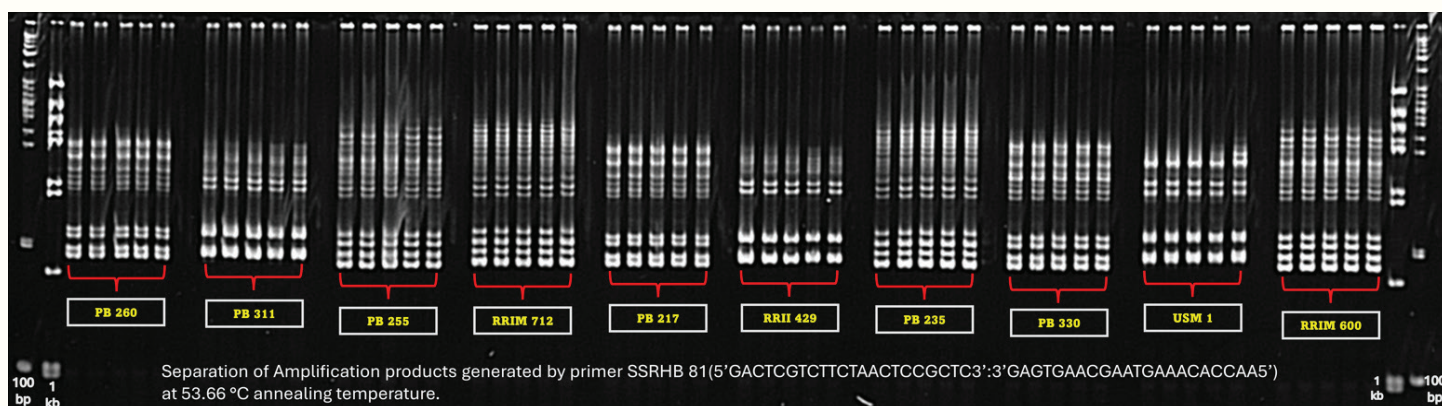
Beyond characterization, PRRI has expanded its germplasm collection across rubber-producing regions in the country. These collections have yielded valuable planting materials, including budsticks and seeds from polycross breeding. The addition of these genetic

resources broadens the national gene pool and strengthens ongoing breeding efforts.

The integration of biotechnology into rubber research helps accelerate the traditionally long process of clonal development. This is increasingly important as global demand for natural rubber continues to grow, driven by its use in industrial and medical products.

Through sustained efforts in germplasm conservation, molecular characterization, and improved utilization, PRRI is helping build a more resilient and sustainable Philippine rubber industry.

Dr. Cheryl L. Eusala is the Executive Director of the Philippine Rubber Research Institute.



Sample separation of amplification products generated by primer SSRHB 81 at 53.66°C annealing temperature.

Stronger Bananas Ahead: Developing FocTR4-Resistant Cavendish ‘Grand Naine’

BY MICHELLE LYKA V. DESCALSOTA

Fusarium wilt, caused by soil-borne fungus *Fusarium oxysporum* f. sp. *cubense* (Foc), is one of the most destructive diseases affecting global banana production, particularly in Cavendish cultivars. In 2005, Tropical Race 4 (TR4) was confirmed as the strain responsible for *Fusarium* wilt in Cavendish bananas in the Philippines. External symptoms include yellowing and wilting of leaves, as well as skirting and splitting of the pseudostem, while internal symptoms are characterized by vascular discoloration.

The ‘Grand Naine’ remains one of the most widely grown Cavendish varieties for commercial plantations due to its medium plant height, high yield, and ease of harvest. However, it is highly susceptible to FocTR4, resulting in significant losses for banana growers. To mitigate these impacts, strategies such as the use of resistant varieties like ‘Giant Cavendish’ tissue-culture variants (GCTCVs), improved management practices, and biological control are currently being applied.

Developing new banana genotypes with resistance to major diseases through conventional breeding is extremely challenging due to the sterility of most cultivated bananas. As an alternative, resistance in other banana cultivars has been developed through irradiation, chemical mutagenesis, somaclonal variation, and in vitro selection under stress conditions.

To address this, the Institute of Plant Breeding at the University of the Philippines Los Baños, in collaboration with the University of Southeastern Philippines (USEP) and with support from the Department of Agriculture Biotechnology Program, initiated research to develop *Fusarium* wilt resistance in Cavendish ‘Grand Naine’ using in vitro techniques, particularly somaclonal variation.

Molecular profiling of ‘Grand Naine’ plantlets using Diversity Arrays Technology (DART) revealed distinct genomic polymorphisms indicative of somaclonal variations arising from tissue culture. Further analysis identified several molecular markers and genomic loci associated with these induced variants, providing insights into the genetic diversity generated during in vitro micropropagation.

Additional assays confirmed that treatments used to induce somaclonal

variation, including supplementation of 6-benzylaminopurine (BAP) in the culture medium and increased subculture cycles, resulted in both homozygous and heterozygous single nucleotide polymorphisms (SNPs), regardless of concentration. These findings suggest that BAP may act as a mutagenic agent influencing genomic stability and contributing to the development of somaclonal variants.

Following molecular characterization, the derived plantlets and their clonal lines were regenerated, micropropagated, and transferred to rooting media before being established under controlled conditions. These were then transplanted into FocTR4-inoculated concrete beds for disease resistance evaluation. A total of 8,082 somaclones were successfully regenerated and potted, of which 7,310 have undergone pathogen inoculation and disease screening using a modified protocol.

Among those screened, 2,017 plantlets from the first batch were dissected and evaluated for internal vascular discoloration using a standard disease rating scale. Results showed that only 102 somaclones, or approximately 5%, exhibited no visible signs of FocTR4 infection, indicating potential resistance or tolerance to the pathogen.

Screening of the remaining batches is ongoing under greenhouse conditions, with further validation of putative resistant somaclones planned in the next phase. Selected candidates will undergo field evaluation for FocTR4 resistance and assessment of key morphological traits.

These efforts aim to accelerate the development of FocTR4-resistant Cavendish ‘Grand Naine’, offering a sustainable solution to combat the *Fusarium* wilt and support the long-term resilience of the banana industry.



Project team visit and regular monitoring of greenhouse trials for FocTR4 resistance at USEP, Davao.
Photo Source: Roanne R. Gardoce



Cavendish ‘Grand Naine’ showing symptoms of *Fusarium* wilt.

Ms. Michelle Lyka V. Descalsota is a University Researcher I at the Institute of Plant Breeding of University of the Philippines Los Baños.

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Recent GM Crop Approvals in the Philippines: Regulatory Overview

BY SHEILA CHAVEZ AND KRISTINE GRACE TOME

The Philippines has an established national biosafety framework on the conduct of activities on genetic engineering, as formulated by the National Committee on Biosafety of the Philippines. Guided by the Joint Department Circular No. 1, Series of 2021, the Departments of Agriculture, Science and Technology, Environment, Health, and Interior and Local Government ensure a science-based risk assessment for food, feed, and environmental safety during the research, testing, and commercialization of GM plants in the Philippines.

Approval Trends

As of April 2026, the Bureau of Plant Industry (BPI) Approval Registry details regulated articles approved for various uses, including direct consumption as food and feed, processing, and commercial propagation. To date, the registry lists 67 event approvals for single traits for FFP (23 corn, 17 soybean, 12 cotton, 7 canola, 3 alfalfa, 3 potato, 1 eggplant, 1 rice, and 1 sugarbeet).

Aside from single events, 50 events with stacked traits were also listed for direct use as food, feed, or processing. These include 23 corn, 12 cotton, 10 soybean, 3 canola, and 2 alfalfa events with combined traits for additional benefits to the growers and consumers.

Biosafety approval for commercial propagation is specifically authorized for 17 varieties of corn, one each for eggplant and cotton (both insect resistant), and two healthier rice varieties (vitamin A-enriched and high iron and zinc). BPI recently granted the



biosafety permit for high iron and zinc rice (HIZ039) after it has successfully passed the rigorous biosafety assessments required for commercial propagation, as outlined in the Joint Department Circular (JDC) No. 1, Series of 2021.

After the biosafety permit has been issued, the approved biotech crop can be registered with the National Seed Industry Council. Seed developers may grant exclusive contracts to seed companies for the multiplication and distribution of seeds to retailers and ultimately for sale to the farmers.

Trait Focus and Technology Direction

The Philippines continues to align with global biotechnology trends. The most common GM traits include herbicide tolerance and insect resistance, both aimed at improving

farm productivity and supporting a stable food and feed supply. Recent approvals also include traits that provide health benefits to consumers, such as Malusog Rice (vitamin-A enriched) and high iron and zinc rice varieties. These rice varieties were developed to complement existing efforts to control malnutrition, particularly deficiencies in vitamin A, iron, and zinc.

Outlook

With the recent approvals, the Philippines is in a stable yet cautious phase of agricultural biotechnology, with the ongoing court battle against some approved biotech crops. While the regulatory system remains active, particularly in managing import approvals, the expansion of local cultivation of some crops is constrained by legal and policy uncertainties. However, Filipino farmers continue to plant biotech maize, with a record 709,000 hectares in 2024 according to DA-BPI.

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Third-Generation Farmer Finds New Hope in Biotech Corn

BY KAYMART GIMUTAO



Dorenne “Dhen” Roche, 31, is a third-generation farmer and a second-generation biotech corn farmer from Sara, Iloilo. Farming has played a vital role in her family's life. The commercialization of biotech corn in the Philippines in 2002 significantly improved their livelihood. Her mother was among the earliest adopters in their community, and the technology helped finance Dorenne and her siblings' education.

Embracing Biotech Corn Farming

A graduate of Bachelor of Science in Information Technology, Dorenne initially had no plans to pursue farming as her primary source of income. Having witnessed how labor-intensive it was for her parents, she chose a different career path and worked as an online English tutor. However, her mother's positive experiences with biotech corn gradually changed her perspective.

Her mother explained how farming had become more efficient with biotech corn compared to traditional methods. As the direct seller of their produce, she also had an advantage over farmers who rely on middlemen. This combination of improved efficiency and better market access became a turning point for Dorenne to take interest in farming.

“It is not that hard to see the potential of biotech corn farming to improve our lives now that I have my own family and children to raise,” Dorenne shared. “My mother talked about biotech corn farming and how the technology changed farming for the better and provided better income for our family. My husband and I also grew

up in farming households.”

Beyond family influence, Dorenne observed how biotech corn farming transformed the lives of other farmers in their community. She researched suitable seed varieties, optimal planting schedules, and cultivation methods, and consulted seed technicians from biotech trade centers to maximize productivity.

Despite her family's experience, Dorenne approached the transition carefully, recognizing it as one of the most important decisions of her life, especially with her children's future in mind. Once she started growing biotech corn, she quickly saw its potential and never looked back.

“Biotech corn farming gave our parents an opportunity to improve our lives. Now, we have the chance to secure our children's future,” she said.

Today, Dorenne manages a 2.5-hectare biotech corn farm. She noted that biotech seeds are more resistant to pests and can deliver higher yields with lower production costs, particularly due to reduced pesticide use. She added that biotech corn farming has proven to be promising and has not disappointed her since she adopted the technology.

Addressing Misconceptions About Farming

The benefits of biotech corn could help attract younger generations to farming, especially with stronger science communication and agricultural extension support. Dorenne admitted that she once shared the common perception among young people that farming is a less desirable profession.



“My college degree, as well as my husband's, is Information Technology, a field far removed from farming. But later, we realized that biotech corn farming has tremendous potential to change our lives, especially since my first child had been sickly from birth. I seized the opportunity to farm biotech corn when it arose. It covered our child's medical expenses and also allowed us to save for our future needs,” Dorenne added.

Looking ahead, Dorenne hopes that scientists will continue to develop crops with stronger resistance to pests and environmental stresses, especially as climate change increases agricultural risks. She remains grateful for current biotech corn varieties, which she considers a life-changing innovation for farmers like her.

Kaymart A. Gimutao is a Senior Research Analyst at the Institute of Renewable Natural Resources Management (INREM) of University of the Philippines Los Baños.

Biotech Innovation Transforms an Engineer into an Agricultural Pioneer

BY MICHAELA JYRA MELO

Although Engr. Raul Carreras is a civil engineer by training, he did not find his true passion in skyscrapers and blueprints. Instead, he found it in the fertile soils of Brgy. Panagan, Tigaon, Camarines Sur, where he is now recognized as a leading farmer-scientist in his community.

Raul initially aspired to pursue a career in civil engineering abroad. However, his path shifted when his wife encouraged him to invest in agriculture, particularly corn farming.

Starting with a modest two-hectare plot in 1985, Raul gradually expanded his farming enterprise after recognizing the potential of corn production. Over time, he increased his landholding to 50 hectares. At one point, he expanded to 100 hectares, but managing such a large area proved challenging. He eventually scaled back to a more manageable 50 hectares.

Embracing Biotech Innovation

In his early farming years, Raul faced major challenges, particularly from corn borer pests that could severely damage crops. "It could result in the loss of up to 95% of the harvest if they strike," Raul explained.

In 2000, the Department of Agriculture sought a demonstration farm to introduce Bt corn, a genetically modified crop designed to resist corn pests. Raul's farm was selected.

His farm in Tigaon soon became a demonstration site showcasing the effectiveness of Bt corn in controlling pests and improving yields. Raul began planting GM corn varieties that resist corn borers and tolerate glyphosate, allowing weeds to be controlled without damaging the crop.

The results were significant. Raul observed improved crop resilience against pests and weeds, marking a shift toward more efficient farming practices.

Raul's Testimony

As one of the early adopters of Bt corn, Raul experienced its advantages firsthand. He recognized its practical benefits, which enhanced both his farming practices and income. He considers it fortunate that Bt corn received government approval.

Bt corn is genetically modified to

produce a protein that is toxic to certain pests, including corn borers. "Using GM crops gives us more reliable harvests," Raul emphasized.

With reduced pest pressure, the need for intensive pest management also declined, streamlining farm operations and lowering labor costs.

A Visionary Leader

Raul's demonstration farm played an important role in encouraging other farmers in the region to adopt Bt corn. His early work helped address persistent corn borer problems while demonstrating the benefits of biotechnology in farming.

Today, Raul leads R2C Agrifarm, a 50-hectare agricultural enterprise. As a supplier of high-quality corn feed, his farm supports local poultry and livestock industries.

His contributions to the agricultural sector have earned him several recognitions, including being named the 2nd National Outstanding Farmer Scientist and receiving the Regional Gawad Saka Outstanding Corn Farmer award twice.

Looking to the Future

Despite his achievements, Raul remains committed to continuous improvement and innovation in corn farming. He envisions a future where biotechnology plays an even greater role in protecting agricultural livelihoods.



He highlighted the importance of continuous education and research. "Especially with emerging insects like armyworm and waya-way or corn planthopper threatening harvests, it is crucial to stay proactive," he noted.

Raul also pointed to the financial burden of managing new pests. The presence of new insects means additional costs for pest control, particularly given the high cost of chemicals. He emphasized the need to explore alternative approaches that reduce costs and lessen reliance on environmentally harmful inputs.

Raul Carreras' journey from engineer to farmer reflects the impact of biotechnology. His work continues to support productivity and better opportunities for Filipino farmers.



Edward C. Banico

Loving What You Once Feared

Growing up, science was never my strength. In fact, it was something I feared. I entered the University of the Philippines Los Baños (UPLB) as a BS Mathematics and Science Teaching student, driven more by my love for mathematics than any passion for science. I often found science lectures overwhelming, filled with unfamiliar concepts and terms that I could barely remember. My grades reflected this struggle, especially in biology, where quizzes and exams constantly reminded me how far behind I felt.

In my third year, I chose to confront that fear and shifted to BS Biology, choosing growth over comfort. I overloaded my units to catch up, but the pandemic forced classes online, and I only had a phone for learning. Writing essays on a small screen often meant unfinished exam answers, and I frequently had to email my professors to ask for consideration. When my father lost his job that time, I felt uncertain about how I could continue. I was close to stopping my studies, but my path changed when I received multiple scholarships, including the Department of Agriculture Biotechnology Scholarship.

With this support, I gained access to a device, a stable internet connection, and the chance to continue my education. These became lifelines during one of the most difficult periods of my life.

Day by day, I began to see the beauty of science. My fear gradually turned into curiosity and purpose. I completed all the courses I needed and graduated in 2022, Magna Cum Laude. To my surprise, I was also named Class Valedictorian of the Institute of Biological Sciences at UPLB.

My Journey as a Researcher

After graduation, I joined the Virology and Vaccine Research

Program under the Department of Science and Technology. For two years, I studied pathogenic swine viruses such as African swine fever virus and Nipah virus. This work focused on identifying key regions of viral proteins that could serve as targets for vaccine development.

This experience allowed me to contribute to scientific publications, present at local conferences, and mentor young researchers in computational biology and bioinformatics. I encouraged them not to fear science, but to approach it with curiosity and confidence.

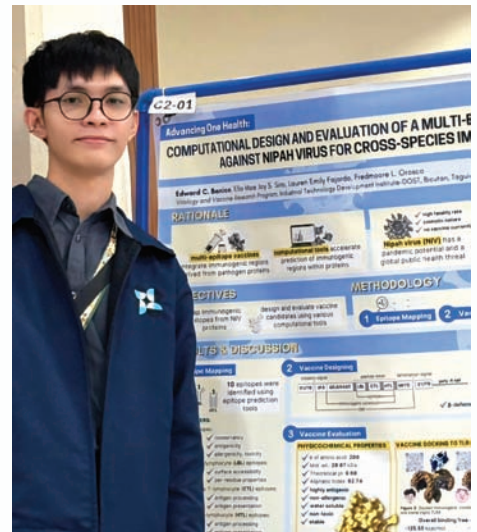
Today, I continue to deepen my expertise through graduate studies in Molecular Biology and Biotechnology at UPLB. My research focuses on henipaviruses, particularly Hendra virus and Nipah virus, where I study potential mutations that may increase their infectivity in humans using mutational scanning and molecular modeling.

Proactive Science for the Philippines: Preparing for the Years Ahead

My dream for Philippine Biotechnology is to maximize the power of emerging technologies for scientific advancement. Artificial intelligence is already shaping many aspects of daily life. In science, it can accelerate discovery and strengthen local research capabilities.

I hope to see a future where Filipino scientists lead in innovation, using technology not just to keep pace with global developments but to create solutions. This includes developing tools, treatments, and strategies to prevent, detect, and respond to diseases and future pandemics.

I also dream that one day, a Filipino scientist will discover breakthrough vaccines or antiviral treatments that



Edward at PSM-Visayas' 31st Annual Regional Conference Poster Presentation.



Edward mentoring a UP Baguio student in computational biology.

will make a meaningful impact on the global stage. To students who may feel intimidated by science, my message is simple: do not be afraid of it. Sometimes, the things you fear the most can become the passions you grow to love and the paths where you can make your greatest impact.

Edward C. Banico is pursuing graduate studies at the University of the Philippines Los Baños under the PREVENT Project.

Centenna B. Silverio

From Mathematics Aspirations to Biotechnology Path

Back in high school, Mathematics was my favorite subject, and I initially planned to pursue a degree in BS Applied Mathematics. However, things did not go exactly as planned. I was eventually admitted to BS Agricultural Biotechnology at the University of the Philippines Los Baños (UPLB), where I also became a scholar under the Department of Agriculture Biotechnology Scholarship Program. This scholarship played a significant role in my science journey. Beyond financial support, it provided hands-on laboratory experience, including a requirement of 40 hours of laboratory work every semester. Through this, I developed skills that later proved valuable in my thesis.

In my first job, I worked as a Science Research Technician II at the Bureau of Plant Industry. This role exposed me to regulatory work, policies, and the application of biotechnology in rice varietal identification. I gained valuable insights into how biotechnology supports public service.

I later transitioned to a Field Application Scientist in a private company, where I provided technical support, conducted training, and worked closely with clients. Through this experience, I realized that I enjoyed interacting with people and supporting their research and laboratory needs.

Currently, I work as a Technical Sales Specialist in another private company. In this role, I provide solutions and sales support. I assist them from project proposal to product use. This allows me to combine my science background with communication and problem-solving, which I find both challenging and fulfilling.

Making Science More Practical and Accessible

My motivation in pursuing a career in science and biotechnology is to make scientific work more practical and efficient. Through my experience in laboratory work, technical support, and sales, I have seen how research can be delayed when the right tools and support are not

available. Because of this, I chose roles where I can directly support researchers and institutions, helping projects move more smoothly from proposal to execution.

Building Impact Through Training and Knowledge Sharing

As a science graduate, I once believed that publishing research papers was the greatest contribution one could make. While I do not yet have formal publications, I now see my most significant contribution to science in knowledge sharing and capacity building.

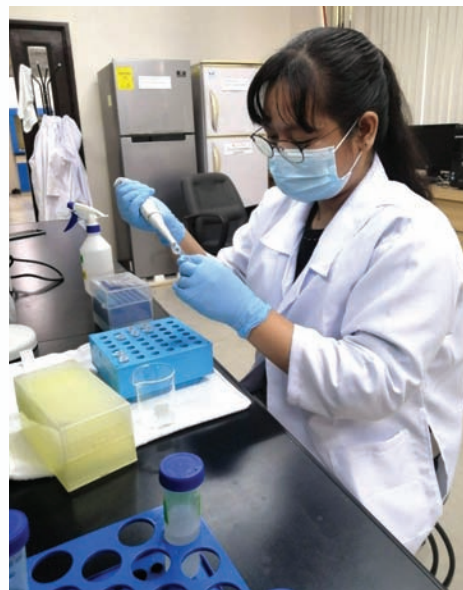
As a Field Application Scientist, I served as a resource speaker and facilitator in several molecular biology training workshops for researchers and faculty members. These trainings aim to “train the trainers,” equipping participants who can pass on their knowledge to research assistants, laboratory technicians, and students. This approach also encourages collaboration with private institutions to expand training efforts and reach more members of the scientific community. Through this, I contribute by helping others develop their skills and capabilities.

Dream for Philippine Biotech

For Philippine biotechnology, I hope to see a more supportive environment for researchers. Many promising research and innovations already exist, but challenges in funding and procurement often slow progress. From my current role working closely with clients in academe and industry, I have seen these constraints firsthand.

I hope that processes become more streamlined and better supported, allowing researchers to focus more on their work and less on administrative requirements. With the right support, I believe Philippine biotechnology can become more competitive globally.

Centenna B. Silverio works as a Technical Sales Specialist at Krypton International Resources Sales and Services, Inc.



PCR mix preparation at the Bureau of Plant Industry, National Seed Quality Control Services Biotechnology Laboratory.



Training workshop at a state university.

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