# PhilRice Magazine

A quarterly publication of the Philippine Rice Research Institute

## Exploring Digital Farming

to enhance agricultural precision and efficiency

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# ABOUT THE COVER

The changing landscape of agriculture grows more challenges and spreads opportunities to explore other tools for cultivation like ICT to enhance precision and efficiency in rice research, development, and extension. This issue of the magazine peeks at the possibilities of integrating ICT in agriculture.

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2009 Binhi Agri Magazine of the year · 2007 Binhi Hall of Fame Awardee · 2001 Gawad Florendo Awardee

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EDITOR'S NOTE

# EXPLORING DIGITAL FARMING

When British mathematician and engineer Charles Babbage envisaged a computer in the early 19th century, he was counting on very little belief that it could be possible. Today, there is not much that the computer cannot do. In farming, the possibilities of letting the computer make life easier for mankind are likewise limitless.

We believe that our practices in agriculture must not remain conventional, without taking its basics for granted. We need to cope with nagging issues such as climate change, volatile markets, and a ballooning population that are extremely irrepressible. The challenge is how to produce enough food for all despite all these odds.

Digital technologies such as mobile applications, automation, artificial intelligence, remote sensing, global positioning system, and drones are at hand. They are loaded with seamless potentials in terms of precision and efficiency. With these technologies, what could be painstaking to accomplish can now be done with less physical exertion. What Charles Babbage did was not an exercise in futility, after all.

This issue of the magazine introduces a great deal of applications of digital technologies in rice farming. It convinces readers that the laser leveler could help farmers in water and nutrient management; the Rice Crop Manager App advises them on effective crop management; the AgriDOC App helps them to record and keep track of their farm activities; the Remote Farm Management allows them to run their farms while they would be somewhere else; the AutoMon$^{PH}$ to supply them with real-time data to guide them on when and where to irrigate; and the MOET App to help them in nutrient management.

While some of these initiatives are still in their so-called "diaper days," they are significant steps forward. Just as "Rome was not built in a day," let's wait for digital farming to ripen in its own time.

Through this issue, we hope to inspire fellow development workers and researchers, policymakers, students, and investors to join the bandwagon in advancing our food production system through innovations.

Carlo G. Dacumos

# PH, PNG TEAM UP TO BOOST RICE PRODUCTION

The Philippine and Papua New Guinea (PNG) governments will work together in agriculture, rice production specifically. A joint declaration to formalize the partnership was signed by Agriculture Secretary Emmanuel Piñol and his counterpart Benny Allen, with President Duterte and Prime Minister Peter O'neill as witnesses in Malacañang, May 6.

According to Piñol, the declaration stipulates that both countries will team up to develop PNG's rice industry that will probably benefit the Philippines. The government, through PhilRice and the Bureau of Soils and Water Management, will provide the technological and technical assistance while a private Filipino corporation will invest on commercial production.

"We agreed that once the rice requirement of PNG is satisfied, excess production will be exported to the Philippines," Piñol said.

At present, PNG has a total population of 8 million, with a land mass of 48 million hectares.

"To satisfy their requirement, PNG would only need 30,000ha to produce rice. In 2-3 years, they can expect sufficient supply for their people if they plant three times a year," Piñol explained.

PhilRice Acting Executive Director Sailila Abdula said planting rice in PNG will be productive given their abundant resources.

"With their fertile lands, huge rivers, and favorable climate conditions, we saw that PNG could yield 6-8t/ha even without the use of fertilizers. We just need to help them improve their technical know-how," he added.

Meanwhile, the PH government is optimistic that the partnership will create more jobs for Filipinos while ensuring a more sustainable rice supply in the country in the coming years.

"We expect to employ at least 60,000 Filipino agriculture graduates, machine operators, and rice farmers in PNG. Soon, their excess produce will be exported to the Philippines. It benefits Filipino farmers and households," Piñol believes.

PNG's Allen, Finance Minister James Marape, and First Secretary Korowa toured PhilRice CES on May 17 to check on some rice technologies that can be adopted in their country. With them were Piñol and PH Ambassador to PNG Bienvenido Tejano.

Among the technologies presented at the FutureRice Farm include farm machines, high-yielding and traditional varieties, climate-smart practices, and rice-based products.

They also visited the Central Luzon State University, BFAR-Muñoz, and the Philippine Center for Postharvest Development and Mechanization. **-ANNA MARIE F. BAUTISTA**

# SENATOR ANGARA, FATHER OF PHILRICE

PhilRice mourns the passing of its founding father, former Senator Edgardo Javier Angara, one of the country's greatest statesmen.

As then UP System President, Angara in early 1985 convened and led the committee that brainstormed the idea of establishing a national rice research center.

"I think the Philippines took for granted the need to have our own research on rice because IRRI is here. And that's a mistake. If you have no domestic organization that will receive findings on improved varieties, and also that will receive the technology, then you will not be able to profit from the presence of an international organization like IRRI," Angara maintained.

In his valedictory speech at the Senate on June 5, 2013, Angara said the establishment of PhilRice and with the biggest appropriation for R&D, among others, the agricultural sector grew by an all-time high of 3.6% when he was Secretary of Agriculture in May 1999 to December 2000.

"We also safeguarded the rights of small-scale farmers, cooperatives, and independent farmers' organizations through the Magna Carta for Small Farmers, and expanded formal countryside financing through the Rural Banks Act," he added.

Angara, who led the search for the first PhilRice director, also pushed for the passage of the Agriculture and Fisheries Modernization Act.

- MARY GRACE M. NIDOY

# NEW PHILRICE BRANCH DIRECTORS

### CAESAR JOVENTINO M. TADO, 56
Director I, PhilRice Negros
Hometown: Tubod, Surigao del Norte

Tado has a PhD degree in Agricultural Science from the University of Hohenheim, Germany. He specializes in Agricultural Machinery and Management, Mechanization and Postharvest Systems. He earned his BS Agri-Engineering from the Visayas State University, cum laude, and his Master of Engineering in Agricultural Machinery and Management from the Asian Institute of Technology, Thailand.

### RHEMILYN Z. RELADO, 37
Director I, PhilRice Los Baños
Hometown: Balingasag, Misamis Oriental

Relado is former head of the Socioeconomics Division. She earned two master's degrees-Agricultural and Extension Education at the Pennsylvania State University and Development Management at the Development Academy of the Philippines. She specializes in Social Impact Assessment, Socioeconomic Research, and Program Delivery and Evaluation. She earned her BA in Sociology from UPLB, cum laude.

### LEO C. JAVIER, 61
Director I, PhilRice Isabela
Hometown: Narvacan, Ilocos Sur

Javier specializes in Irrigation Management and Hybrid Rice Seed Production. He received his BS and MS in Agricultural Engineering from UPLB. He also holds an MS in Public Management from Ateneo de Manila University.

### REYNALDO C. CASTRO, 62
Director I, PhilRice Batac
Hometown: Batac City, Ilocos Norte

Castro specializes in Public Policy and Program Planning and Management, Research Management, Renewable Energy Development, and Technology Promotion. He has a PhD in Engineering from the Clemson University, USA. He also holds a BS and master's degrees in Agricultural Engineering (UPLB) and in Public Administration (UP Manila).


**NEPAL OFFICIALS VISIT PHILRICE.** The Ministry of Agriculture personnel, June 19, learned about new rice farming technologies.The Asia-Pacific Rural and Agricultural Credit Association Center for Training and Research in Agricultural Banking based in Manila facilitated their educational tour.


**AFRICANS BRIEFED ON QUALITY SEEDS.** Government personnel from Burkina Faso, Ivory Coast, Guinea, Mali, and Togo who participated in IRRI's Quality Breeder and Foundation Seed course visited PhilRice, June 1, to learn more about quality seed production. The use of quality seeds can boost farmers' harvests by 5-10%.

# PANGASINAN LFTs TRAINED

"Weeds are rampant in Sual and my fellow farmers often resort to spraying generous amounts of herbicide. We learned that practicing thorough land preparation is important in managing weeds as it even leads to good management of water, nutrients, and pests," said Carolina Badaguas, 54.

"When we know how to identify the kind of disease that infects our crop, it is easier for us to make the right decisions in managing it. We also learned about harmful and friendly organisms," Solomon Ibay, 56, of Asingan was obviously grateful.

Badaguas and Ibay were among 30 local farmer-technicians (LFTs) who completed a costumized training course on pest identification, disease diagnosis, and damage control at the PhilRice Central Experiment Station, June 4-8, in preparation for the wet season when pests and diseases are usually prevalent.

Ev P. Angeles, training coordinator from PhilRice's Technology Management and Services Division, said LFTs are trained to help their fellow farmers in identifying, assessing, and managing major pests and diseases in rice.


They are model farmers being tapped by the DA to complement local agricultural extension workers in providing technical assistance to other farmers.

"We chose participants from major rice-producing areas of Pangasinan who need to sharpen their pest diagnostic skills or those who have not undergone any pest management training. Through practical and hands-on exercises, we hope to have enhanced their competence," she said.

The LFTs learned the principles of Integrated Pest Management, Agroecosystems Analysis, and the *PalayCheck* System to help them in making more informed decisions in pest and disease management.

Pangasinan was the 3rd top rice-producing province in PH in 2017, the Philippine Statistics Authority asserted.

**-MARY GRACE M. NIDOY**


# PALAWAN INTO HYBRID RICE SEED PRODUCTION

Public hybrid rice seeds will hopefully be produced in Palawan itself following a recent intensive training attended by the province's agricultural workers.

Marlon Montero, rice program project officer in Palawan, said their hybrid seeds are normally imported from other regions including Davao.

"Procuring seeds from far places is risky, knowing that this can negatively affect the germination rate. With our current efforts, we may no longer need to buy seeds from other regions in the coming years," Montero was optimistic.

Having an average yield of 3.91t/ha in 2017, Palawan plans to increase rice production by soon expanding to up to 1,000ha of public hybrid rice production, thus it trained 40 agricultural extension workers and project implementers on hybrid seed production.

Trainer Richard Romanillos of PhilRice's Technology Management and Services Division said the training aimed to ensure the high purity of seeds to be produced, and that best management practices are adopted to achieve the highest potential yield of hybrid.

"It is a must for the participants to understand the science of producing public hybrid varieties such as Mestizo 1 and Mestiso 20 so farmers can be guided well in cultivating them," Romanillos stressed.

Mestizo 1 (PSB Rc 72H) averages 5.4t/ha, highest at 9.9t/ha. This hybrid is recommended nationwide for its good eating quality and aroma.

Mestiso 20 (NSIC Rc 204H) thrives under most climatic types in the country, and yields 6.4-11.7t/ha. In 2013, a technology demonstration farm in Puerto Princesa City reported an average of 10.3t/ha.

The initial training is part of the efforts toward a rice-secure Philippines. It is under the Public Hybrid Rice Commercialization Program funded by the Bureau of Plant Industry and is in support of the provincial government's rice program, which provides hybrid seeds and farm inputs to about 400 farmer-beneficiaries.

**- ALLAN C. BIWANG JR.**

## 0917-111-7423: NEW PTC NUMBER

The PhilRice Text Center (PTC) has a new number: 0917-111-7423. Text Center agents answer queries about rice seeds and modern farming practices Monday-Friday, 9am-5pm, through this new mobile number.

A digital platform, PTC provides daily consultation services to rice farmers around the country through call and SMS. Farm advisories, rice technology updates, market information, and other farm insights are also regularly sent to the registered farmer-clients.

Originally launched as Farmers' Text Center by the project Open Academy for Philippine Agriculture in 2004 with 28 users, the PTC now has more than 35,000 registered clients. It receives an average of 200 SMS everyday.

"Our top queries are usually related to seed quality and availability, varietal information, and pest and nutrient management," said Fredierick Saludez, PTC's main agent.

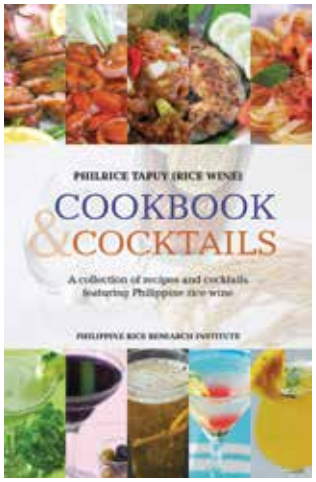
Saludez also said that info-in demand enables farmers to instantly receive information by sending keywords.

For varieties, farmers can type the keyword (name of variety) to get information on yield, maturity period, reaction to pests, and eating quality. For instance, just type Rc160 and send to 0917-111-7423.

Agriculturist Saludez added that extension workers, students, researchers, and other rice stakeholders may also avail of the service.

To register, just type REG<space>NAME<space>LOCATION <space>OCCUPATION (e.g. REG JUAN DELA CRUZ LEYTE FARMER) and send to 0917-111-7423.

**- MARY GRACE M. NIDOY**


# COOKBOOKS AWARDED

Two PhilRice cookbooks were recognized as among the best in the world in the 2018 Gourmand World Cookbook Awards held in Yantai, China, May 26-27.

The Mushroom Feast: A Collection of Filipino Mushroom Recipes, which features as main ingredient locally cultivated mushrooms on our rice-based farms, won 2nd place in the Truffles and Mushrooms category along with entries from France (1st) and Sweden (3rd).

The cookbook was edited by Rosaly Manaois, Riza Abilgos-Ramos, Josefina Ballesteros, and Amelia Morales of PhilRice's Rice Chemistry and Food Science Division, together with faculty members of the Department of Hospitality Management, Central Luzon State University. Carlo Dacumos of the Development Communication Division (DevCom) set the overall layout and design. He also served as photographer together with John Glen Sarol, also from DevCom.

Meanwhile, the PhilRice Tapuy (Rice Wine) Cookbook & Cocktails, a collection of recipes and cocktails using rice wine, bagged 3rd place in the Cocktails category together with entries from Canada (1st) and USA (2nd).

The flip-type cookbook was a project led by Chona S. Narvadez and Elga Magliocchi-Manangkil of the Business Development Division in collaboration with top chefs around the Philippines. The editorial team includes Joy Bartolome A. Duldulao, Hanah Hazel Mavi Biag-Manalo, and Mary Grace V. Lanuza. Carlo G. Dacumos designed the cookbook and served as main photographer. Duldulao and chef Bruce Lim provided additional photos.

Established in 1995, the Gourmand World Cookbook Awards honors the best food and wine books, printed or digital, as well as food television every year and is regarded as the 'Oscars' of the food-and-drink industry. This year, 1,372 entries were chosen as finalists from 215 participating countries and regions for 100 categories in Food and 30 categories in Drinks.

Previous winners from the Philippines include celebrity chef Tatung Sarthou (1st place) and actress Judy Ann Santos (3rd place) in the Best Authors and Chefs Outside Europe category.

**-REUEL M. MARAMARA**

# PHILRICE BREEDER IS 2018 REGIONAL GAWAD SAKA AWARDEE

Dr. Norvie L. Manigbas, 57, Scientist I and Chief SRS of the Plant Breeding and Biotechnology Division, is Central Luzon's 2018 Outstanding Agricultural Scientist.

Manigbas is one of the seven DOST-conferred scientists at PhilRice. He finished PhD in Agronomy (Crop Physiology and Plant Breeding) as a scholar of the Philippine Sugar Research Institute where he served for 4 years working on molecular markers in sugarcane. He was once a Post-doctoral Fellow at the Functional Crops Division, Rural Development Administration, South Korea where he published six ISI journal papers and developed protocols for stress tolerance in rice in less than two years. **-HANNAH MAE A. TOLENTINO**

# NEW KNOWLEDGE PRODUCTS*

**COMPILED BY REUEL M. MARAMARA**


## MAGAZINES

**Quality Seed Matters** features the benefits of using quality seeds to encourage more rice farmers to use them for bigger production.

**Fuel Up with TRAIN-Friendly Technologies** shares strategies and practices farmers can adopt to cushion the effects of increased fuel costs.

**Putaheng Rice-Secure Philippines** presents the ingredients to achieving local rice security. It tells the experiences of individuals and cooperatives in maximizing profits in rice production amidst the challenging market, limited resources, and changing climate.

## MANUAL

**Rice-Based Mushroom Production Manual** outlines the step-by-step process of producing mushroom using rice as base medium (e.g. rough rice and rice straw) and other agricultural by-products.

## CATALOGUE

**Weeds in Irrigated and Rainfed Lowland Ricefields in the Philippines (2nd edition)** introduces weeds common in our ricefields, describing their characteristics and effects on rice to properly identify and manage them.

## RICE SCIENCE FOR DECISION-MAKERS

**How the Tax Reform for Acceleration and Inclusion Law Impacts Rice Farmers** summarizes the ramifications of TRAIN on rice production and provides advice for policy development to help farmers adapt to fuel price hikes. •

*These knowledge products are available at www.pinoyrice.com, www.philrice.gov.ph, and PhilRice Development Communication Division.

# WHAT'S NEW IN RICE RESEARCH?

ZENNY G. AWING

Online Gene Bank

Capillarigation

PhilRice Photo

## "CAPILLARIGATION"

This hybrid drip irrigation system (Drip) for rice-based crops helps enhance farm productivity and ensure water availability when it is limited.

Following a setup patterned after the Drip, capillarigation offers an efficient and affordable micro-irrigation system that uses capillary wicks instead of drippers as a tool for dispensing scarce water frugally.

Project developers Dr. Ricardo Orge and Derose Sawey of the Rice Engineering and Mechanization Division (REMD) said the irrigation system was designed to be as low-cost and highly efficient as possible. By using local materials like cotton yarn for capillary wicks as replacement for drippers, the capillarigation system costs up to 80% less than the commercialized Drip. Farmers can also install it by themselves as most of the parts are easy to fabricate.

"We developed this technology to help farmers cope with extreme drought, which is becoming more frequent. We also encourage them to store rainwater so they can have water to use during the dry season through capillarigation," Orge said.

Field trials conducted showed that the capillarigation system yielded the highest water productivity compared with other irrigation practices tested. More tests will confirm the performance of the system in other fields with less desirable conditions.

The system is currently being pilot-tested with selected farmers' cooperatives to further gauge its performance and identify problems to attract acceptability among its target users.


Hanna Joyce B. Macawili


Powdered Rice Water
Carlo G. Ducumos


Rice Variety App
Hanna Joyce B. Ma

## ROBOTIC DRUMSEEDER

The robotic drumseeder project is being conceptualized by a team headed by Peter John S. Quierra from the REMD.

"We're moving toward agriculture 4.0, where we massively make use of ICT, electronics and control technologies to automate farming," said Dr. Jasper G. Tallada, one of the project's brains.

The robotic drumseeder will be remote-controlled and battery-operated. Signals from the controller will enable it to perform commands such as distance to travel, turning, and planting seeds. With this, seeding operation will be faster and uniform.

Team member Maelyn P. Reselva, also from REMD, said through this ambitious innovation, people could expect agriculture to be more fun and interesting. "This will entice the younger generation to venture in agriculture," she said.

The motor parts of the robotic seeder have been tested and are now ready for assembly. A prototype will be made public in this year's wet season *Lakbay Palay*. The institute's first robotic model hopes to be launched early 2019.

## ONLINE GENEBANK

The Genetic Resources Division (GRD) has made the Germplasm Management System (GEMS) database online. GEMS aims to manage and store all the important information about rice varieties available in the Institute's genebank.

This will provide researchers and breeders information about the characteristics of rice varieties and their availability for their breeding works. The database helps plant breeders search and select fast the rice germplasm with desirable traits for varietal improvement programs.

"Without the database, the activity of conservation will be much more difficult. We would not know what we will re-generate or plant," asserted Malvin Duldulao, database manager of the GRD.

Half of the online version has been completed as of yet. The developers hope that the full database will be accessed by breeders and researchers in December 2018.

## POWDERED RICE WATER FOR BABIES

Many mothers still supplement-feed their infant children with boiled rice water known in Pilipino as 'am.' Owing to its nutritional value, a powdered version of the beverage has been created for longer storage and easier accessibility.

Ladies of the Rice Chemistry and Food Science Division are into developing nutrient-dense supplementary food for older infants and beverage for young children using rice and other nutrient-rich crops.

Being one of the non-breast milk foods or nutritive liquids fed to young children, the instant beverage has an improved storage quality, accessibility, and safety.

Waxy/glutinous rice flour appeared to be the most soluble material on both cold and hot water, and was comparable with the traditionally prepared rice water (a.k.a. rice wash). The researchers have initially concluded that this type of rice will make the best powdered rice wash for children.

"After the refinement of the product, the team plans to produce it for further tests like enriching it with soybean powder," said Evelyn Bandonill, leader of the component activity.

Product refinement and mass production are slated this year. The team proposes to enrich it with other crop powders in 2019.

## RICE VARIETY APP

The Philippine rice seed variety catalogue application was developed by the Information Systems Division (ISD) in partnership with the Plant Breeding and Biotechnology Division–National Cooperative Tests Unit.

According to Roger F. Barroga, lead of the FutureRice project and head of the ISD, the app informs farmers about the agronomic characteristics, pest and disease resistance, and grain quality of all released rice varieties. Farmers also receive notifications on the newly released rice varieties, the most recommended varieties per location, and the most preferred varieties by other farmers. This prototype app is still undergoing improvements. •

# RICE ACROSS THE COUNTRY

HANNAH MAE A. TOLENTINO


## BATAC JOINS "TIENDA NI GOB"

PhilRice Batac participated in the Bicentennial "Tienda ni Gob" trade fair to showcase rice production technologies and the product of its Rice Business Innovations System (RiceBIS) community, Laoag City.

Themed *"Natibker a Komersio para iti Nadur-as nga Ilokano"* (Stable Business for a Progressive Ilocano), the fair took pride in various food, clothing, wood furniture commodities, to rice technologies and farm products.

The station featured the low-cost drip irrigation system, carbonized rice hull-insulated silo for seed storage, treadle pump, multi-purpose seeder for rice dry direct seeding, top 5 performing inbred varieties, and the *PalayCheck* System.

Also, farmers from the RiceBIS community in Batac City sold their own-produced brown rice during the trade fair.

The community participated in a recent pre-membership seminar with the Cooperative Development Authority to formally organize themselves into a coop. The DOST is assessing its application for assistance in brown rice packaging. *With report from Ms. Maribel Alupay*

## BICOL HOLDS LAKBAY PALAY

More than 200 participants joined the station's 2018 dry season field day that highlighted the relevance of using quality seeds in achieving rice security.

PhilRice Bicol Acting Director Victoria Lapitan said the use of quality seeds together with other technologies supports rice security.

Owing to the region's vulnerability to climate extremes, Dr. Jonathan Niones, head of PhilRice's Genetic Resources Division, urged farmers to become more climate-resilient by using quality seeds.

Aside from high-yielding varieties, the use of the drone sprayer was also demonstrated in the station's FutureRice Farm.

Among the *Lakbay Palay* participants were heads and personnel of government agencies, seed growers, and farmers from Albay, Sorsogon, and Masbate. *With reports from Dr. Victoria Lapitan, Kristine Paliza, and Allan Biwang*

## MIDSAYAP DOES S&T UPDATES

PhilRice Midsayap conducted rice science and technology (S&T) updates in Cotabato City to enhance the technical capacities of regional and provincial rice focal persons.

Sixteen (16) focal persons from the offices of the provincial agriculturist of Sultan Kudarat and Maguindanao, Department of Finance-ARMM, DAF-Maguindanao, North Cotabato, Lanao del Sur, and Zamboanga del Sur benefited from the updates.

Their 2-day training focused on the *PalayCheck* System and *Palayamanan* Plus. *With report from Mohamad Said Gandawali*

## NEGROS JOINS FESTIVAL

PhilRice Negros participated in the 25th Panaad sa Negros Festival held at the Panaad Sports Complex in Bacolod City to promote the Institute's programs and products.

Acting Branch Director Rizal Corales introduced PhilRice and its programs during the Farmers and Fisherfolk Congress. Food scientist Marissa Romero presented special rice investment opportunities.

Displayed were tarpaulins of rice technologies and knowledge products, which were sold together with seeds and brown rice. Farmers, fisherfolk, and other agriculture-related institutions from the province also introduced their merchandise and services.

About 800 farmers and fisherfolk from the cities and municipalities of Negros Occidental attended the activity. *With report from Vanessa Tingson*

## ISABELA LEADS PARTICIPATORY VARIETAL SELECTION

To promote varieties and introduce a sustainable rice seed multiplication and distribution scheme in the region, PhilRice Isabela showcased newly released and farmers' preferred rice varieties to more than 200 farmers from Isabela, Quirino, and Cagayan. Five farmer-seed growers served as cooperators.

Project leader Helen Pasicolan guided farmers on-field and offered other related services. Provincial and municipal agriculturists, barangay chairmen, and farm cooperators also supported and facilitated the program.

With 160 votes, NSIC Rc 226 won as the most preferred inbred variety. *With reports from Helen Pasicolan and Jerome Galapon*

## LOS BAÑOS BOLSTERS CLIMATE RESILIENCY

PhilRice Los Baños conducted studies and training in San Andres and Looc, Romblon and Mulanay, Quezon to help develop climate-resilient rice-farming communities in the marginal rainfed and upland ecosystems.

In Romblon, the low-cost drip irrigation technology was introduced and established for trial. Farmers were educated about climate change.

In Quezon, farmers' field school, variety trials, and techno-demo helped to emphasize the relevance of using appropriate varieties in adapting to climate change. *With report from Dr. Edelweiss E. Sajise*

## AGUSAN STANDARDIZES INTERNSHIP CURRICULUM

PhilRice Agusan has developed a curriculum for college students taking up agri-related courses for a more meaningful and holistic on-the-job training (OJT) at the station.

Dr. Gerardo Estoy, the station's acting branch director, said with the standardized curriculum, they expect the students to gain deeper knowledge in rice production and eventually share their learnings to their farming communities.

The curriculum combines lectures and practical activities focusing on the country's rice industry situationer, *PalayCheck* System and its principles and advisories, climate change, rice-based production systems, agribusiness, and communication strategies.

Thirty (30) students from Agusan del Sur State College of Agriculture and Technology (ASSCAT) and Surigao State College of Technology-Mainit Campus have finished the said curriculum. Another batch from ASSCAT and Camiguin State Polytechnic College–Tangaro Campus is currently engaged in OJT exercises at the station. *With reports from Anna Marie F. Bautista and Shareen T. Rivas*

# FARM AWAY FROM YOUR FARM

**ANNA MARIE F. BAUTISTA**
ILLUSTRATION BY JUDE KLARENCE C. PANGILINAN

As the dawn breaks and the rooster crows, Mang Jonjon rubs his sleepy eyes and welcomes another day to work on his farm. He is set to observe how his crops have been growing, to check if they need some watering, and to look for any damage caused by pests or disease. He wants to check if his rice and vegetables need more fertilizer. He will do all these things in front of his computer.

This is how Remote Farm Management (RFM) frames the future of agriculture. At PhilRice, RFM found its way in the 5-ha rice-based production and research area of the FutureRice Farm. What's more, the rising generation of professionals bring this futuristic concept into realistic action.

RFM is a new concept where ICTs are integrated with agricultural operations to capture and transform farm data into something useful, specifically for decision-making. RFM is slowly being practiced in other countries (such as Canada, Israel, and Thailand) and is a work in progress in the Philippines.

"In RFM, the farmer can manage his farm without being physically present in the area. Every moment, we can capture images of the farm, track changes in its temperature, humidity, water level, and rainfall, and document plant health using some indicators," Rice Farm Modernization and Mechanization Program Leader Dr. Jasper Tallada said.

In 2014, the FutureRice team fancied on the idea of RFM by turning smartphones and computers into dashboards that displayed necessary information about the farm. With the help of ICTs installed in the production area, certain data were captured to remotely monitor and manage field operations from a distance.

"From the name itself, we at FutureRice envision to provide ICT-based smart farming solutions for the future and to attract youth in agriculture," PhilRice ICT specialist Nehemiah Caballong said.

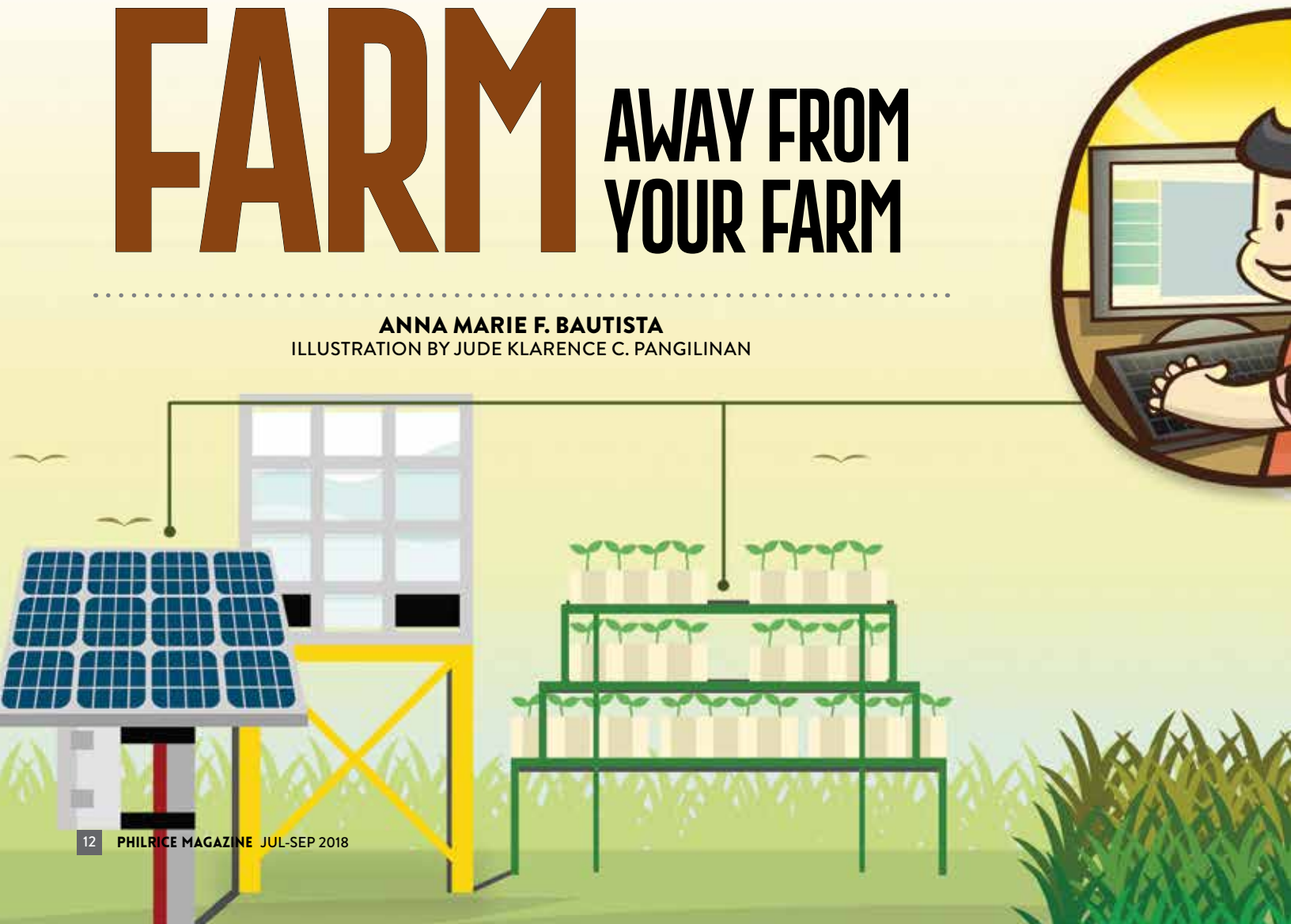
## SENSING SYSTEMS

How did the idea come into being?

"We collaborated with the DOST-Advanced Science and Technology Institute for the installation of an Automatic Weather Station (AWS), also called the Field Monitoring Station within FutureRice," Caballong narrated.

AWS monitors weather parameters such as air temperature and humidity, wind speed and direction, solar radiation, soil temperature and moisture, and rainfall intensity within the farm, up to a 4-km radius.

From tracking wide-scale conditions, FutureRice zeroed in on the micro-climatic level with the installation of a Wireless



Sensor Network (WSN) in its canopy. Now, they can gather air temperature and humidity in every plot!

"Micro-climate data may vary from one plot to another. Getting precise data in every corner can help farmers determine the right intervention for their crops," PhilRice engineer Peter John Quierra, co-developer of the WSN, said.

WSN is a system of nodes wherein sensors and transducers are attached to collect and transmit data. At present, there is one coordinator node and nine nodes strategically installed in some plots of FutureRice.

"With WSN, farmers can be updated every 10 min, 24/7. The more nodes installed, better data will be generated," he described.

Aside from temperature and humidity, Quierra and his team are currently programming the WSN to monitor water quality and electrical conductivity.

"Rice farmers can monitor their farms real-time. For instance, when the WSN data shows high temperature, they can start irrigating their crops to avoid sterility and yield losses," Tallada explained.

## AUTOMATING IRRIGATION

Drip irrigation is a growing practice among areas with scarce water. According to Tallada, the most common setup requires the farmer to manually switch on the water source to reach the plots. At FutureRice, watering vegetables is becoming care-free with the newly developed automated drip irrigation system model.

This system uses a 1-$m^3$ water tank to irrigate small-scale vegetable plots. Each plot has its own sensor that detects soil moisture. When wetness drops to 30% and below, the sensors transmit data to the node that can send alert messages to the farmer.

At present, this dream irrigation system and its android application is still being tested.

## MAPPING IMAGES

As a work in progress, Caballong's team is moving toward the development of a digital map that will become the interface of the whole RFM system at FutureRice.

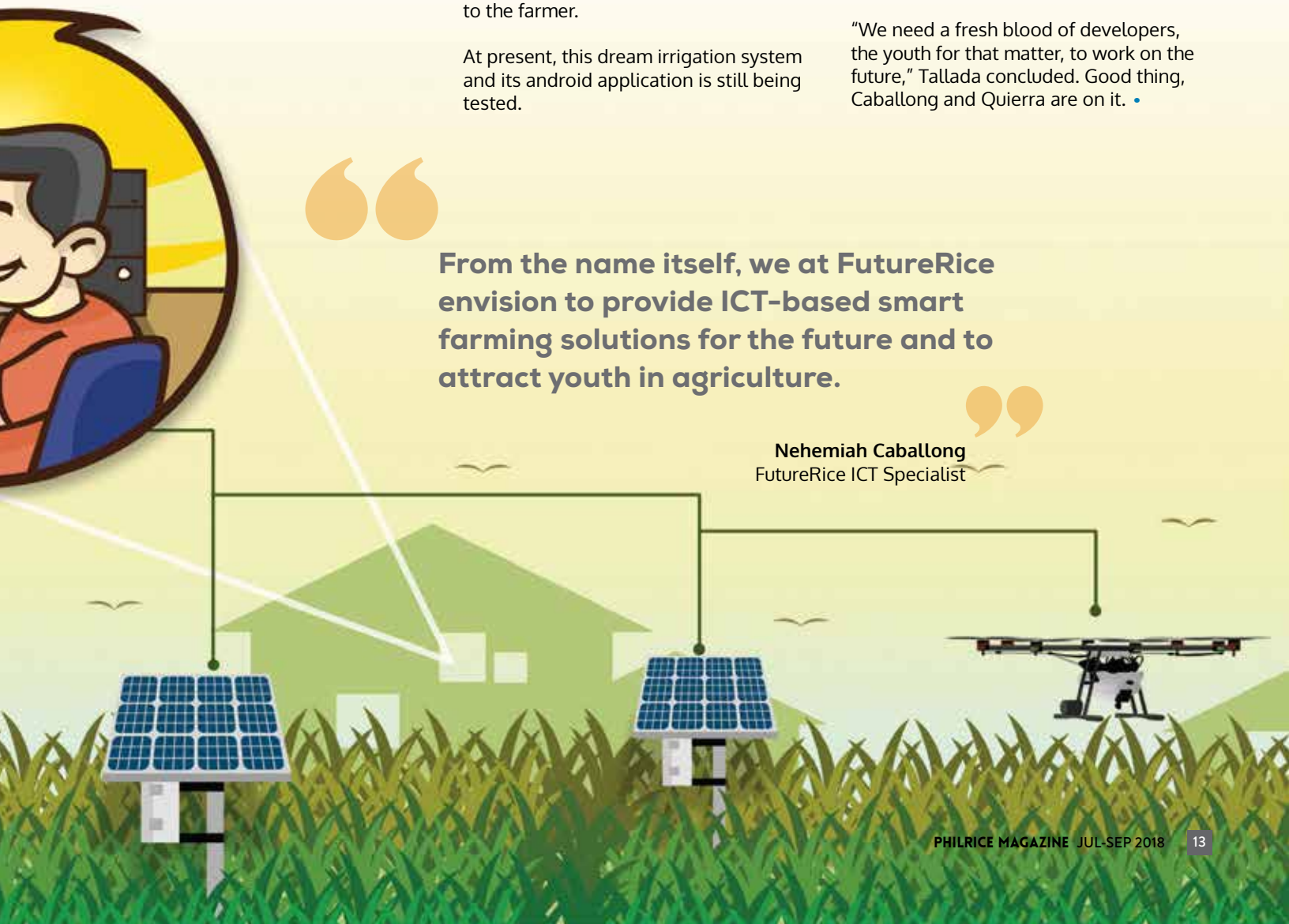
"We dream of creating a comprehensive, digitized farm map that will gather and keep farm-related data for farmers that can be accessed anytime, anywhere," he calculated.

Drones and the Geographic Information System will be used to capture the whole farm from a certain angle – an imagery similar to the Google Map. It will contain all data captured by the sensors and record all farm activities.

Like a remote controller, buttons will be used to manage the digital map and a WiFi system will enable all operations.

Meanwhile, for Tallada, the challenge for RFM now lies in the need for 'right minds' to develop an efficient system that can combine all these technologies.

"We need a fresh blood of developers, the youth for that matter, to work on the future," Tallada concluded. Good thing, Caballong and Quierra are on it. •

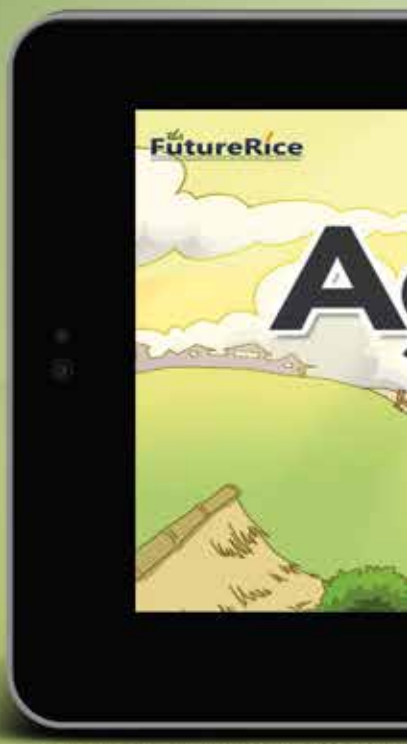


**From the name itself, we at FutureRice envision to provide ICT-based smart farming solutions for the future and to attract youth in agriculture.**

**Nehemiah Caballong**
FutureRice ICT Specialist

# AGRIDOC APP: YOUR

**JAYSON C. BERTO AND JESSICA C. RAMENTO**
Subject Matter Specialist: Nehemiah L. Caballong




This App is a farm management tool for tech-savvy farmers, researchers, and extension workers. It allows users to record and keep track of their farm activities, finances, and expenditures.

It doesn't always need internet connection to function.

## STEP 1

Download the app from www.bit.ly/AgriDOCApp and install it on your Android smartphones (at least 4.1 version) or tablets.

## STEP 2

**Open the app and click start.**
Fill up your profile and draw your farm for geo-visualization. This allows you to view your farm through images being generated by google map.

To draw, long-press the map to show the marker that will serve as boundary of your field. You can also move the marker depending on your area.

Next, you need to sign up the form. And since you have already drawn your farm, the area would automatically fill up.

Save the data by clicking the icon at the upper right corner.

## STEP 3

**Add crop.** You can now name your farm. Label your plot, crop, cropping season, and year.

Save!

This App was conceptualized by Roger F. FutureRice Program, and funded by the

# FARM ALLY


Barroga, developed by Nehemiah L. Caballong and Paul Austian A. Alday of Project IPAD of the National Rice Program through DA-BAR.

## STEP 4

You can click or select the icon that corresponds to the activity you made, then record the details of your activities.

- ✔ Seed selection
- ✔ Land preparation
- ✔ Crop establishment
- ✔ Nutrient management
- ✔ Care and maintenance
- ✔ Pest management
- ✔ Harvest management
- ✔ Harvest

KeyChecks provide tips, assessments, and recommendations!

## ☑ OTHER FEATURES

**INFORMATION.** Highlights the *PalayCheck* System and other farm management Apps.


**VARIETY PROFILE VIEWER.** Highlights the agronomic data of inbred and hybrid rice varieties from different ecosystems. Also, you can save rice varieties to your favorites.


**RICE CROP INSIGHTS.** Inform the user about the priority needs and concerns of rice plants for every crop age and growth stage.


## STEP 5

**Click the journal.** You can see your records in the journal icon (the 2nd icon at the bottom right corner), and can keep and see it by listing the activity, amount, and date in every corresponding icon.

The note icon lets you encode and take photos for your record.

# Smart and Intelligent Farming at FUTURERICE FARM

Infographics by: Andrei B. Lanuza
Subject matter specialist: Roger F. Barroga

**Zero-Waste Pig (ZWaP).** This pig-farming system eliminates odor through Bioplus Activator, a concoction of 25 beneficial microorganisms, on the rice hull. It also has low-cost biogas digester that converts pig waste into fuel.




**Automated Drip Irrigation Controls.** Automated passive-type drip soil moisture sensor is connected to a processor that controls the water gate valve.



**Wireless Sensor Network (WSN).** This system is a model platform for remote monitoring of crop health indicators as well as environmental parameters. It can also monitor water-level and temperature for farm water-harvesting systems.



**Capillarigation.** It is a practical and efficient way of irrigating crops especially if water supply is very limited. In this method, a stable supply of water is provided at the bottom portion of the root zone of the plants and is distributed upwards by capillary action, which makes water always available to the plants.

**Solar Smart House.** This house is equipped with solar energy for electricity, alternative cooking fuel from biogas, water-harvesting system, and a compact urban garden with capillarigation and automated drip controls. It also has an aquaponics setup where farmers can grow fish and vegetables at the same time.



**Solar-Powered Street Lights.** They store electricity via lithium-ion batteries, which automatically switch on at night and can light up even in heavy overcast or rains for 3 days.


**Seedling Trays Assembly.** This mechanical seedling machine has several compartments where soil, seed, and water are layered in sequence. It ensures the successful germination of rice seeds in seedling trays, which will be used in mechanical transplanting.


**Bioethanol Distiller.** This produces ethanol from plants containing sugars and starch. PhilRice is testing the use of bioethanol fuel, as an alternative to petrol for water pumps.

**Mobile Rice-Husk Gasifier.** This is used for low-cost electricity production and water pumps. It burns rice hull biomass to generate power.

**Kwebo.** A low-cost structure built from bamboo, wire mesh, and cement. Rice farmers can use the kwebo to store and protect their resources against super typhoons.

**Remote Farm Management.** The whole farm is covered by wireless CCTVs. It can be viewed from a smartphone through the internet as long as the farm has wifi connection.

**WiFi Connectivity.** The farm's 10-mbps internet connectivity makes various online services and applications available in the farm.

**Mechanical Rice Transplanter.** The farm uses a Japan-made walking-type mechanical planting machine, with four rows of seedlings. One operator and an assistant can plant 2-3 ha in one day.

**Automated Field Monitoring Station (FMON).** This portable weather station captures relevant weather data and transmits them to a computer server via SMS.

**Unmanned Aerial Vehicles (UAVs) or Drones.** Drones are being used in rice farming for digital mapping, pest management, stress assessment, and agronomic data collection for nutrient management.

- Hydroponics and Aquaponics Monitoring and Control
- Aerobic Rice Drip Irrigation and Fertigation Control
- Water Quality Monitoring for Agriculture
- Ardu Boat Floating Aerator
- Solar Wind Turbine
- Water Quality Monitoring for Aquaculture
- Mushroom House Humidity Monitoring
- Vermi-culture Moisture Monitoring
- Water Gates with Stepper Motor
- Solar, wind, and micro-hydro electricity management
- Aquaculture Floating Aerator
- Aquaculture Feeder
- Deep Well

# DO WE NEED PRECISION AGRI? PRECISELY

**ELSIE E. REYES AND JOHN HAROLD D. DELA ROSA**
ILLUSTRATION BY JUDE KLARENCE C. PANGILINAN

**In a 2017 Philippine Statistics Authority report, labor accounts for the biggest component of rice production cash cost, followed by fertilizers, seeds, and pesticides. These costs, if reduced, can be converted into income for rice farmers. Precision agriculture could be one of our farmers' lifelines.**

Precision agriculture is a management strategy that makes farming more accurate and controlled thus enhancing efficiency, productivity, and profitability. It utilizes information and communications technology to ensure precise farm management practices. This could entail high investment in the short run but could reduce production cost in the long run.

Some of the technologies applying the principles of precision agriculture are the laser leveler and drone sprayer. However, majority of their end-users are still at the level of research and development, and technology transfer to farmers is not yet forthcoming. Field demonstrations are just some of the few instances where farmers would catch a curious sight of these technologies, which at times engenders more questions than answers. According to Dr. Elmer G. Bautista, a supervising researcher of PhilRice, the laser leveler is not yet commercialized in the country. On the other hand, distributors and service providers of the drone sprayer are already in business.

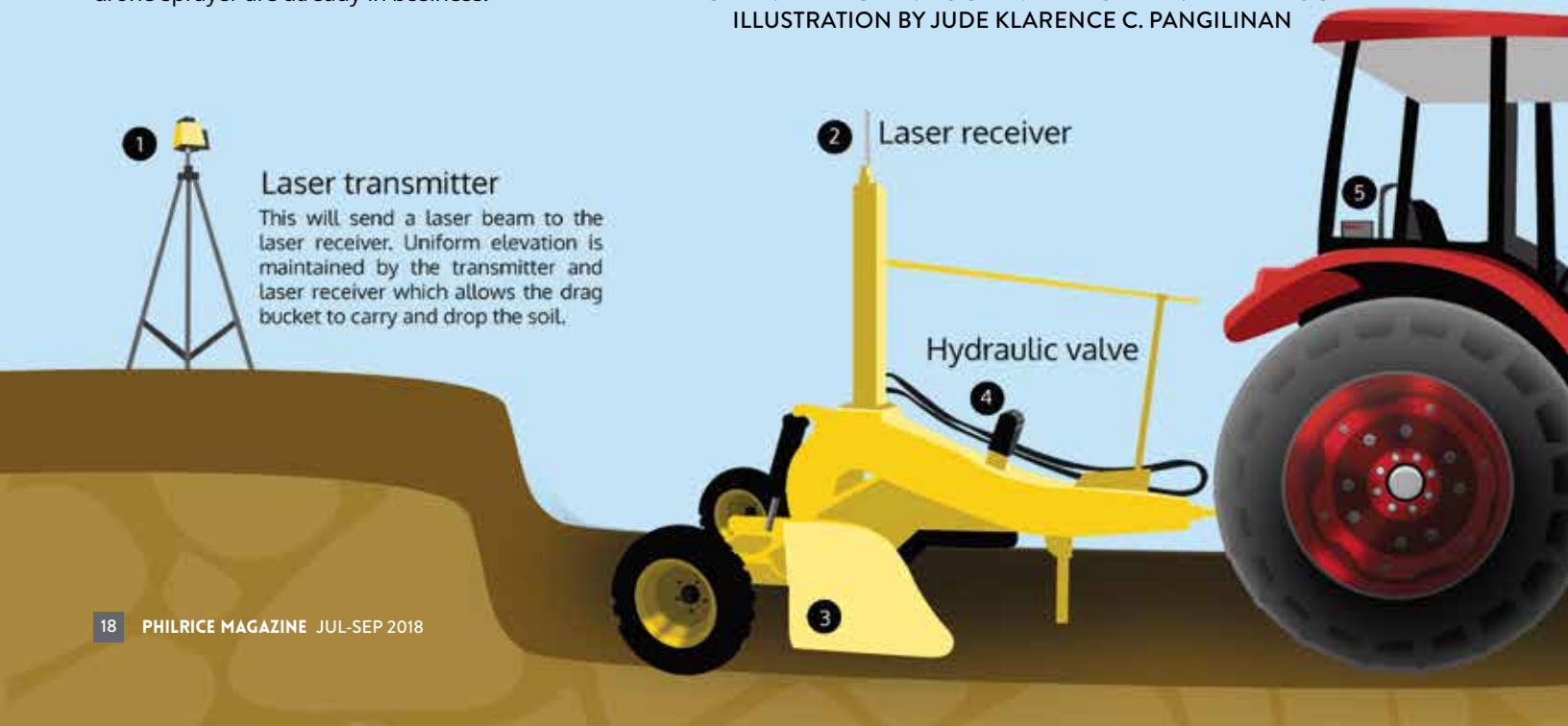
## WHAT'S IN IT FOR US?

The use of the laser leveler could help farmers achieve well-levelled field, which enables better water and nutrient management. It works by collecting the excess soil from the mounted parts through its drag bucket and spreading the mud evenly across the plot. Using a laser transmitter, the automated operation makes sure that the area is evenly flat. With a perfectly flat field, the farmer is assured that water and fertilizer will be used evenly, resulting in less wastage. Bautista added that one round of leveling is already good for two planting seasons, thus saving a significant amount of time.

Meanwhile, Ben Solomon Organo, IRRI's assistant manager for crop production, said aside from the cost-saving perks, the use of precision agriculture technologies can ensure the safety of farm laborers. The use of power sprayers puts the laborers in close contact with the pesticide unlike in operating drones. With the latter, all they have to do is to hold the controller and oversee the operation. Additionally, pesticide application using the drone can be done at night to lessen the risk of adversely affecting people who are normally around during daytime.

With the shift to the drone sprayer, labor cost and time are reduced in the long run. Organo said five people do pesticide application in 1 ha for 40 min to 1 hr; with the drone sprayer, two people alone can finish the job in 10-15 min.

Organo explained that through GPS, they can monitor the precision of drone sprayer application; they can tell if some plants were missed. The machine can also be programmed to resume spraying exactly where it stopped to recharge its battery.



While IRRI's experience magnifies the advantages of using the technology in pesticide application, let it be told also that the drone sprayer could also administer and distribute other sprayable materials.

## SOME CHALLENGES

The laser leveler and drone sprayer alike entail huge monetary investment. One unit of the leveler could cost P300,000 to half-a-million, excluding the tractor. The drone sprayer can range from P500,000 to a million.

Another challenge in using the drone sprayer could be the training necessary on the part of the operators. Organo said if the operator is well-trained, operation mishaps that could damage the drone and require high repair or replacement cost would be avoided.

The use of both technologies is also more economical in large plots, which are not very common in the Philippines. A study conducted by the team of Dr. Bautista showed that Filipino farmers have more plots in a hectare than what is ideal for them to benefit from the so-called economy of scale. Some 65% of respondents had 1-3ha each, 24% of whom owned less than a hectare; only 11% of the farmers studied had more than 3ha. Bautista conservatively estimates that 4-5 plots per hectare would be most desirable to benefit from the economy of scale.

## LOOKING AHEAD

Organo nurtures optimism in the future of precision agriculture in the Philippines. He qualified, though, that the most probable early adopters of these technologies will be the large organizations or farmer associations that could tap service providers of these technologies. To optimize these technologies for farmers' use, support from the government is needed. The government could invest its resources in precision-agriculture technologies.

Bautista echoes the same sentiment as he talked about land reformation depending on the terrain as one piece of solution to a holistic approach in resolving high production cost in *palay* production. He said if lands would be clustered, use of resources like machines will be more efficient and effective for the farmers.

These challenges seem to make the picture of precision agriculture in the country a bit blurry. So, shall we run after these technologies? Our answer is still "precisely." Yet, only time can tell when the Philippines and the technologies being developed can blend a common rhythm and finally complement each other to help our farmers become more competitive. •

Drone sprayers vary on how they are operated. Some need to be fully operated using remote control while some allow for presets that let the drone fly by itself. Aside from technical considerations, operating it might require a permit from the Civil Aviation Authority of the Philippines (CAAP), depending on the drone characteristics like size and weight. For better information, drone operators should get in touch with CAAP.

**3 Drag bucket**
Collects and releases soil depending on the height of the area it passes by.

**5 Control box**
Through the signal it receives from the laser receiver, this device regulates the opening and closing of the hydraulic valve, which controls the up and down movements of the drag bucket.

Reference: IRRI. Farmers tell their stories: Laser leveling of rice fields in Southeast Asia. 2012. Retrieved from https://www.youtube.com/watch?v=6Dl3_V1XfnM.


# LEVEL-APP YOUR NUTRI, PEST MANAGEMENT PRACTICES

**PAMELA V. CARBUNGCO**

**Achieve additional yield in just one click.**

**Bring nutrient and pest management to the next level with these mobile and web applications! These apps offer precise and timely fertilizer application recommendations generating savings from fertilizer, soil test, and labor costs.**

## MOET APP

The Minus-One Element Technique (MOET) App was developed to complement the MOET Kit, which identifies the limiting nutrients in the soil that constrain the growth of the rice plant in a setup. With the MOET app, more precise recommendations on the quantity and timing of application of nutrients are provided.

According to MOET app main developer Ailon Capistrano, he and his team are currently improving the app algorithm and the correlation between the pot setup and actual field scenarios. Through this correlation study, they are hoping to fine-tune fertilizer recommendations and help farmers generate savings.

Currently, this mobile app has 466 active users.

**MAJOR FEATURES:**

**Fertilizer Requirement Calculator** computes the precise fertilizer application recommendations based on your MOET results.

**Yield Predictor** calculates the expected yield based on MOET results and the amount of fertilizers to apply.

**Users:** Agricultural extension workers (AEW), farmers

**Benefits:** Save on fertilizer and soil analysis costs

**Developer:** PhilRice (Agronomy, Soils, and Plant Physiology Division)

**Status:** Downloadable from Google Play Store


## LCC APP

The Leaf Color Chart (LCC) app can determine the level of nitrogen (N) concentration in the rice plant. This mobile app can generate similar results despite different camera resolutions of various smartphones.

**MAJOR FEATURES:**

**N application recommendation** analyzes the photographed leaves of the rice plant and recommends the right amount of N and timing of application

**Users:** AEWs, farmers

**Benefits:** Save on fertilizer and soil analysis costs

**Developer:** PhilRice

**Status:** Improvement ongoing

## RICE CROP MANAGER

The Rice Crop Manager (RCM) is a web and mobile advisory service that provides rice crop and nutrient management recommendations that match its users' specific farm conditions. It gives timely and appropriate crop management advisories by asking field information, rice variety, and other crop management practices. For farmers whose yields are relatively low, RCM could be more applicable to use though new algorithm is being developed for RCM to cater to high-yielding farmers.

According to Wilfredo Collado, RCM project leader at PhilRice, he and his team are planning to integrate information from the Philippine Rice Information System to provide more timely and appropriate recommendations based on weather conditions and pest incidences.

RCM had provided 1.3 M recommendations to Filipino rice farmers and AEWs since its launching in 2013.

**MAJOR FEATURES:**

**Holistic Crop Management Recommendations** – advisories are given as a one-page print-out or text message

**RCM Farmer and Field Registration** – through this, farmers can record their personal and field information

**Users:** AEWs, farmers

**Benefits:** Save on fertilizer and labor costs, and time

**Developers:** IRRI, PhilRice, and UP Los Baños

**Status:** Available at http://webapps.irri.org/ph/rcm/

## WEED IDENTIFICATION APP

Since weeds steal nutrients from rice plants, they should be reckoned with properly. This app helps in the identification and management of weeds.

By simply taking a photo of the weed, the app can identify its kind and generate appropriate management options. One recommendation could be to change how nutrients are being managed.

Paul Austian Alday, one of the main developers of the app, said it uses TensorFlow, a machine learning framework, and Inception v-3 for image recognition. This will work in smartphones with at least 2 megapixel cameras.

The app's development began in early 2017 when FutureRice's Roger F. Barroga and ICT Specialist Nehemiah Caballong recognized the need to design a weed identification app specifically for Philippine rice fields.

**MAJOR FEATURES:**
Weed Identification
Weed Management Recommendations

**Users:** Farmers

**Developer:** PhilRice

**Status:** Improvement ongoing

# MANAGE WATER WITHOUT SWEAT

DONNA CRIS P. CORPUZ

PhilRice Photo

AUTOMATED DRIP IRRIGATION SYSTEM

**Under the unforgiving heat of the lenten sun, the farmer is drenched in his sticky perspiration as he goes back and forth to the field to check if his rice crop is being dehydrated. However, because he can't afford to lose even a cavan of his potential harvest, he'll irrigate his field and sweat it out even if it takes more than a thousand steps to reach his field.**

According to Dr. Bas Bouman of IRRI, about 2,500 L of water is needed to produce a kg of rough rice. But with irrigation water becoming scarce at times, it is important to also develop technologies that optimize limited water resources without decreasing yield while providing convenience.

PhilRice and its partners are going the extra mile in advancing these technologies through modern Information and Communications Technologies (ICTs).

## AUTOMATED DRIP IRRIGATION SYSTEM

Drip irrigation system (DIS) allows water to drop slowly and rhythmically to the plant's root system or soil surface using a network of pipes and valves. Looking at it as an efficient method, researchers from PhilRice are creating an automatic version of the system. It uses a 1-$m^3$ water tank to irrigate small-scale vegetable plots.

Like AutoMon$^{PH}$, the automatic DIS will provide real-time information so farmers can decide when and how much to irrigate their farms. It measures soil moisture levels using a pre-defined moisture range, and analyzes which areas need water. If it detects that the soil is dry, the system opens the valves to start irrigating the plots. Water flows from a water tank through the pipes installed. If the soil is wet enough, the dripping stops.

Powered by solar energy, it has two modes: auto and farmer. In auto mode, the system becomes fully automatic and decides when, where, and how much water to release. Farmer mode allows the farmer to command the system through SMS.

"Once the farmer replies in the system, the valve of the water tank will automatically open and the water will start dripping from the pipes to the vegetable plots until soil moisture climbs to 90%," illustrated Maelyn Reselva, an electronics and communications engineer and co-developer of the technology archetype.

ICT expert and co-developer Nehemiah Caballong, said the system is being designed for food producers who have work other than farming.

"Some professionals want to grow crops but do not have much time to physically manage them. Through this water sensor, we can monitor soil moisture and manage irrigation even in our homes or offices," he said.

The system was tested on the 5-ha FutureRice demonstration farm.

AUTOMON PH

PhilRice Photo

WATER-HARVESTING SYSTEM AT FUTURERICE

Hannah Mae A. Tolentino

## WATERICE/AUTOMON PH

PhilRice and IRRI work in tandem on the project *Water-Efficient and Risk-Mitigation Technologies for Enhancing Rice Production in Irrigated and Rainfed Environments (WateRice)*. Funded by the DA-Bureau of Agricultural Research, it aims to increase production and reduce inputs through the development, dissemination, and adoption of appropriate crop management technologies.

One of the banner technologies of WateRice is the Automated Monitoring (AutoMon$^{PH}$) system capable of remote water-sensing. It is hinged on the principles of Alternate Wetting and Drying (AWD), a technology scientifically proven to save water by 16-35% without compromising yield. AWD can be practiced using an observation well to manually monitor the water status in the field to determine when to irrigate it.

"Farmers have seen the advantages of using AWD on their farms. However, some of them find AWD too laborious to use because it needs manual field observation. To "pamper" farmers, developers of the technology are working to automate it. AutoMon$^{PH}$ hopes to provide real-time data to help farmers decide when and where to irrigate," explained Engr. Kristine S. Pascual, one of its researchers.

The system will allow busy farmers to monitor field water level in real time right from their homes or offices. It operates through sensory objects using a wireless network to gauge water level and automatically sends information to a central database that can be used to determine which areas need to be irrigated. It even alerts farmers about their fields' water level via SMS.

At PhilRice, the project is led by Dr. Manuel Jose C. Regalado with a counterpart at IRRI.

## WATER-IMPOUNDING FACILITY

A fellow can also create a water-impounding facility to manage and maximize water availability. Its main job is to harvest rainwater and store it for use during the dry season.

Caballong said the FutureRice team is into automating this facility to remotely manage water distribution. It is now equipped with water sensors to monitor acidity level and conductivity.

But wait, there is more. The FutureRice Farm creations do not only provide moisture for crops but also amusement for visitors who can try fishing and kayaking. *With reports from Steven Matthew H. Sajonia and Elah Camille A. Bonilla* •

RISE WITH RICE

# THUMBS-UP FOR RCM APP

ALLAN C. BIWANG JR.

Dream come true! This was how Ernie Lazarte, 38, from Tanauan, Leyte described his success in achieving the highest yield in the rice farm he managed. Thanks to the recommendations from the Rice Crop Manager (RCM) application, it changed not only his farm practice but also his life.

## OUTPOURING OF GRATITUDE

Forty percent yield increase in a hectare-the rate stunned Ernie and his neighbors as it was a phenomenon of sorts in their village. "I was very happy at that time. For many years, I settled for 100cav/ha and I thought that was the best yield we could ever get from the type of soil we have, and with the varieties we used. With the interventions of RCM, we harvested as high as 140cav each weighing 50kg," Ernie reported with a smile. He planted NSIC Rc 222 during the dry season of 2017.

In compliance with the RCM recommendation, he used additional two sacks of fertilizer per hectare that meant shelling out more money, reluctantly at that. However, the thought of having a good yield in the end pacified him. Aside from nutrient management, he also followed the weed and water management warnings from RCM.

With the money windfall since he started in 2016, he was empowered to purchase a farm trailer, two handtractors, and a thresher. In April 2017, he pocketed an P80,000 net income from a hectare. All of a sudden, Ernie generated more savings and even secured extra sacks of rice for their own consumption.

Ernie used to manage 8ha of rice fields but he has reduced it in half to have more time for his livestock venture. He does not actually own a rice farm as of yet. However, by heeding RCM instructions every cropping season, he hopes to personally acquire a farm in the next few years for higher income.

> **I am open to trying new technologies, especially if these can increase my yield. When RCM was explained to me after the short interview, I was thinking that I should give it a try.**
>
> - Ernie Lazarte, Tanauan, Leyte

## FIRST ENCOUNTER WITH RCM

In 2016, Ernie joined a training conducted by DA-RFO in Leyte. He was interviewed by a farm technician with questions about his farm and plans for the next cropping season. He admitted that he had no clear idea what the interview was for. After his last answer, he received a printed copy of RCM guidelines with clear recommendations.

"I am open to trying new technologies, especially if these can increase my yield. When RCM was explained to me after the short interview, I was thinking that I should give it a try," Ernie remembered.

The RCM app provides crop and nutrient management suggestions to farmers in irrigated and rainfed lowland areas. Extension workers, crop advisers, and agricultural technologists are tasked to conduct interviews among farmers and key-in answers to available devices such as computers, smartphones, and tablets.

Collected information will be analyzed using the app, which then automatically generates a one-page rice management guideline based on the farmer's answers to the questions.

PhilRice's Wilfredo B. Collado, RCM national technical coordinator, assures the printed copy provides easy-to-adapt and unique advisories for the crop that are consistent with the location-specific cropping management practices and needs of a farmer. "The RCM database contains the most recent data available to ensure accuracy of recommendations," Collado explained. It is advised to get guidance every cropping season as farmers tend to change varieties and practices as often. "If you are a really skilled farmer, you can actually combine the recommendations with your best practices," Collado calculated.

The RCM also sends advisories through a text message with actual date of fertilizer application.

Benedict Jardinero, IRRI associate scientist for Nutrient and Crop Management, said phone calls are also initiated by DA-Agricultural Training Institute (ATI) staff when there are significant changes in sowing dates, varieties, crop establishment methods, seedling ages, or actual planted farm areas. The app can also be used to know if a farmer needs help via phone call. SMS reminders in these cases will contain updated suggestions for the farmers.

## RCM ACROSS THE LAND

To ensure the maximum use of this technology, ATI together with DA-RFOs is currently disseminating the functions and benefits of RCM by providing training to agricultural technologists (ATs) and farmers in strategic areas. These trained individuals will then interview more rice farmers who will receive recommendations. PhilRice and IRRI provide the technical assistance.

On orders of the DA, every municipality must have at least one farm technician or extension worker equipped with RCM app. As of February 2018, 4,586 extensionists across the country had been trained on the use of the app. Collado intimated that RCM app was introduced but not sustained in certain areas owing to issues of connectivity and staff complement.

Apart from the training for ATs, youth infomediaries were also engaged to accelerate the use of the automated text messaging service of the RCM. Effective youth infomediaries for RCM are those with good academic standing and high involvement in farm activities.

The RCM website reports that over 345,000 recommendations were generated in 2017, and 33,564 farmers were registered. RCM's Farmer and Farm Lot Registrations were developed to generate unique ID numbers for farmers and farm lots to systematize record-keeping of their historical farming practices and information in RCM database.

PhilRice and IRRI worked collaboratively to develop the RCM app through the funding of DA-BAR.

Farming with ICT tools like this app is believed to be the next big thing in agriculture. For Ernie, the government needs to double its efforts in promoting them. "Our government should reach out to more farmers especially those in far-flung areas who are reluctant to go to agriculture offices to ask for assistance," he contended. •

PARTNERS IN THE FIELD

Students from TUP

# YOUTH'S INTEREST IN AGRI GROWS

REUEL M. MARAMARA

**LEARNING ON THE FARM IS MORE FUN - A REALIZATION FROM KAMILLE, 22, RHUWIN, 23, AND ANGELO, 23.**

FutureRice


Students from TIP

Students from TUP

## 'YOUNG' SOLUTIONS

"Farming is actually cool. I enjoyed it," recalled Kamille Almirio, who did her research on using drones to assess crop health and nutrient requirements. Almirio and her peers Aaron Aquino, Mary Grace Munoz, Luisito Reyes Jr, Mario Rolluque Jr, and John Carlo Salinas, Electronics and Communications Engineering (ECE) students from the Technological University of the Philippines (TUP), thought of developing an easier, faster, and more efficient alternative to ocular inspection in gauging crop health.

"Our project uses a modified camera attached to a drone. You just have to make the drone fly and do the work. It will tell you which part of the rice field needs more attention," Almirio explained.

She said the camera can capture near-infrared light and other visible bands reflected by plants. These can be used to analyze rice health and nutrient requirements. Almirio explained that healthy vegetation absorbs most of the visible lights and reflects a large amount of infrared light. Unhealthy plants do otherwise.

Meanwhile, Rhuwin Riberal, Angelo Conwi, Jameson Asadon, Zyron Eusebio, and Eunice Joaquin, also ECE students from the Technological Institute of the Philippines (TIP), developed a microclimate-sensing network to guide farmers in decision-making.

**Our goal is to help the farmers come up with informed decisions to minimize losses and increase their yields.**

- Angelo Conwi

Conwi explained that using wireless connectivity, the network records local climate conditions and can forecast weather possibilities for the next few days. It also tracks water loss through evaporation and transpiration. This enables farmers to promptly plan their irrigation and fertilizer application.

However, Riberal and Conwi recognized that most farmers do not have the technical capacity to operate modern technologies like what they have developed for academic purposes. The now registered engineers suggested that developers should also think of making technological innovations more farmer-friendly. They also emphasized the need for training.

"Automating our farms is a good move, but we have to train our farmers," Riberal advised.

The two groups of students were under the supervision of FutureRice Farm's Nehemiah Caballong, an expert in the use of ICT in rice farming.

## 'YOUTHFUL' SUPPORT TO THE RICE SECTOR

"We're fond of modern technology. Marrying this with agriculture can entice the youth to love farming," Almirio and Conwi agreed. Kamille believes that the youth plays a major role in attaining food security in the Philippines taking into consideration the aging Filipino farmers.

"In developing new technologies, we're slowly taking the drudgery out of rice farming. We need not be agri-students to support the rice farmers," Riberal concluded. •

# RICE FARMING FROM SPACE

**JANICA M. GAN**
ILLUSTRATION BY JUDE KLARENCE C. PANGILINAN

**Satellite technology and ground data collectors are making possible the availability of near real-time and integrated information on rice production nationwide.**

"If we want to deliver integrated information that is more accurate and timely, we have to use state-of-the-art technologies. It is the only way," Dr. Eduardo Jimmy P. Quilang, Philippine Rice Information System (PRISM) Project leader, said.

Now operated and managed by PhilRice, PRISM uses advanced technologies to deliver actionable information on rice. It integrates data using ICT and remote sensing-based technology to produce information. This is developed by PhilRice in collaboration with IRRI and funded by DA-BAR.

## HOW PRISM WORKS

Satellite images are verified through ground collectors. The regional partners assigned as data managers are to check the accuracy and validation of the data sent by the data collectors. Additional data are collected by DA and PhilRice personnel using smartphone applications- PRISM Collect and PRISM Data.

PRISM Collect improves on the paper-based data collection method by providing an electronic form installed in android phones capable of geolocation. It was designed to collect PRISM data nationwide such as field conditions, farmers' interviews, GPS, and images in the field. The data stored in the PRISM Collect will be sent to the PRISM server using the internet. Without internet connection, the data can be saved in the mobile phone and be sent once online. It can also be copied from the device and be uploaded directly to the server. PRISM Data, on the other hand, is an app used to notify the data collectors on the status of their data sent to the server using PRISM Collect.

These apps will ease the data collection process of PRISM providing fast and reliable data that would help decision-makers formulate policies favorable for the farmers. "The PRISM apps make data gathering faster and easier. We can now send our data anytime and anywhere. Internet connectivity is not a problem as we can save the data we have collected," said Maria Cristina C. Angeles, PRISM data collector in Bicol Region.

## DATA FOR ALL

All PRISM outputs including detailed maps of rice areas, seasonality, yields, reports on pest injuries and disease observations, specifically graphs and tabular representations of the pest occurrences, yields, fertilizers, pesticides, and rice varieties used, can now be accessed by the PRISM stakeholders and decision-makers anytime and anywhere using any internet-connected device through the PRISM website: www.riceinfo.ph. More detailed reports from the national to municipal levels are available to authorized PRISM partners through its analytics page.

"By using this tool, we can help the R&D workers and decision-makers in crafting projects, programs, and policies to improve the rice farmers' productivity and profitability," said Christopher V. Morales, PRISM national program coordinator from DA.

The DA recognizes the need to acquire more innovative, ICT-driven, and highly collaborative initiatives for the agricultural sector to be successful. The creation of PRISM is one of them. •

# VOX POP

**COMPILED BY CHRISTINA A. FREDILES and ALLAN C. BIWANG JR.**

## WITH MODERN ICTs, HOW DO YOU SEE RICE FARMING IN THE PHILIPPINES BY 2050?

Rice buy-and-sell/networking apps combined with Facebook features will be more common where farmers can just take photos of their rice, include details, post, and sell their rice. If farmers would have access to internet connection and mobile devices, it will be easier to sell their rice directly to consumers. This way, they can truly gain from what they've put so much effort on. It will make their produce more accessible to people from various locations, giving them a chance to be recognized.

It will also allow them to expand their network by communicating with other farmers and researchers. This will facilitate both communication and trade. It will allow researchers and experts to easily relay innovations to farmers who will reach out to them.

This can also be a platform where more people can share information with one another. It will help people understand the importance of rice production and the hard work that farmers, researchers, and specialists invest to provide rice on every table.

**Judy Ann Sonido, 21, Calamba City, Laguna**

ICT must come together with biology and engineering. No structure can stand with only one leg.

**Eufemio T. Rasco Jr. (former PhilRice ED), Los Banos, Laguna**

Farming activities will be done digitally. Farmers whether young or young-at-heart can manage their farms using their computers.

Robots are right in the fields doing the actual farming. Humans are just inside their homes controlling the robots.

Also, I imagine the youth enjoying digital farming.

**- Jess Bryan Alvarino, 23, North Cotabato**

Gadgets and computer apps will make farming easier and faster, thus giving more time for farmers to do other works. Hence, farmers should learn a new skill- how to also troubleshoot their gadgets.

However, we will have more junks in the farms by that time since more drones will be disposed.

**Rolando Castili Benosa, 57, Sison, Pangasinan**

Farming would be a lot easier and farmers will have more yield. What we should look into is the issue on climate change. With modern ICTs, I suppose weather forecasting will be more accurate to help contain yield losses due to heavy rains or severe drought.

**Andrei Esteves, 22, Calamba City, Laguna**

EXPERT'S CORNER

# PROSPECTS OF DIGITAL RICE FARMING IN PH

**ROGER F. BARROGA**
Head, Information Systems Division

## WHAT IS DIGITAL FARMING?

The advent of new and advanced ICTs – space technology, satellite sensors, high-speed internet, cloud-computing, big data analytics, artificial intelligence, robotics, and smartphones – is changing the face of agriculture worldwide. The era of digital farming has dawned on agriculture– a lot of data in agriculture are now being collected and rapidly processed into knowledge by smart machines to make farming more precise, more efficient, and safer to humans and the environment.

## WHAT DOES IT TAKE TO GET INTO DIGITAL FARMING?

This farming model is data and knowledge-intensive. It counts on the rapid collection of farm data in real time, stored, and processed rapidly to provide "intelligent" information, which can be used for farm automation. We need monitors and sensors to collect data; wireless connectivity to capture and process them; and analytical tools, softwares, and algorithms to make sense out of the data and execute the programmed actions, controls, and operations. Examples are the laser or GPS-guided land levelers and tractors, and drone sprayers that distribute the right amounts of seeds and fertilizers per hill.

## WHAT ARE THE PROSPECTS OF LOCAL DIGITAL RICE FARMING?

PhilRice has, over the years, started migrating into the digital rice farming era, though our efforts were slowed down by our access to and the available type of ICTs, funding, and institutional commitment. A few examples come to mind.

**DA-FSSP (2014-2017).** From 2014 to present, the PRISM uses space technology to get near real-time satellite images of the country's rice-growing areas. This technology guides our policymakers at the DA on the potential harvests per season, the potential shortfalls during floods and droughts, and extent of pest infestations. The RCM uses cloud-computing to give farmers a personalized fertilizer guide for the season and variety. It provides the farmer graphical information on what fertilizer to use, when and how much to apply based on the interactions of several remote databases, and a yield calculator. Project IPaD equipped the new breed of agricultural development officers with smart tablets pre-loaded with PhilRice digital resources on rice, useful websites, and various apps for their development work.

## PHILRICE APPS

Using smartphones, our researchers have programed a rapid soil analysis app called the Minus-One Element Technique app, which is downloadable from Google play. A digital weed catalogue was also developed to help extension workers identify field weeds species through the downloadable web app.

## FUTURERICE FARM (2014-2017)

A 5-hectare smart farm was established in 2014 to serve as testbed for various farm automation innovations. The entire farm has wireless internet and CCTV. A farm management app, the AGRIDOC app, was developed that can create a virtual



FutureRice team working on basic Arduino programming

FutureRice

map of any farm, which the farm owner can monitor and manage remotely. A weed recognition app used an artificial intelligence service of Google to recognize weeds by capturing several unique characteristics of a weed as layers of reference points, until a match is arrived at.

FutureRice started using drones for aerial imaging and topography mapping, and monitoring the rice plants' health and growth status through the green leaf color index. Drone sprayer technology was also demonstrated to farmers, which can spray a 1-ha ricefield in 20 min using just 16L of spray. A wireless network backbone was installed in the entire farm. The Rice Intel platform was started to provide PhilRice decision-makers with important ground information presented in thematic map layers.

## RICE FARM MECHANIZATION AND MODERNIZATION (RFMM, 2018-2022)

One of the compelling reasons to fully mechanize is to raise the efficiency and competitiveness of our rice farmers, hence the inclusion of the RFMM in the seven new programs of PhilRice. Led by Dr. Jasper Tallada, RFMM combines the innovations in engineering, energy and ICTs. The rapid advancement in these fields is seen to provide additional sources of growth in rice production. For ICTs, the work started earlier in FutureRice will be continued in this program and expanded under the Smarter Rice Farm Project, which has five components, namely: (1) the rice intel platform (RICEINTEL); (2) rice apps development (RAPPS); (3) automated rice farming machines (ROBORICE), (4) Rice Internet of Things (RIOTs), and (5) application of UAVs in rice farming (RDRONE).

The advent of ARDUINO, a tiny programmable electronic device with CPU, RAM, data storage, and several devices interface, will enable young minds to create "intelligent" or autonomous systems and machines that can monitor paddy water level, pond water quality such as pH, dissolved oxygen, nitrates, NPK, EC; soil moisture level for drip irrigation; humidity and temperature for sprinkler systems; ammonia gas level in piggery; and energy level of solar batteries, among other things. A farm dashboard is under construction to control all these systems. Aside from UAV, we are now building a robotic seeder, boat, weeder, and irrigation water gates.

So what are the prospects of digital rice farming locally? I believe we have the programs, talents, and technology. However, our data sets need to be linked and shared and processed quickly to provide us with new intel for decision-making and farm automation. But most of all, we need to have an enabling policy and a new legal framework to move the Philippines into the era of digital rice farming or Agriculture 4.0. •

# RICE Blends

COMPILED BY MARY JOY Y. JUAN


CARLO G. DACUMOS

## STIR-FRIED BROWN RICE SPROUTS

From 2018 PhilRice Personal Planner

**INGREDIENTS:**

| | |
|---|---|
| 1 tbsp | vegetable oil |
| 1 tbsp | garlic, minced |
| 2 tbsp | onion, minced |
| 2 tbsp | oyster sauce |
| 3 cup | sprouted pigmented brown rice, boiled |
| ½ cup | squid ball, sliced and fried |
| ½ cup | kikiam, sliced and fried |
| ½ cup | Baguio beans, julienned |
| ¼ cup | celery, minced |
| ½ cup | carrots, julienned |
| ½ cup | chayote, julienned |
| ½ cup | yam bean (singkamas), julienned |
| 1/8 tsp | iodized salt |
| 1/8 tsp | pepper |

**How to prepare sprouted Brown Rice**

1. Soak brown rice in water overnight.
2. Drain, spread in cheesecloth, and let stand for 24 to 36 hr.
3. Rinse and cook with 1:2 rice: water ratio or boil for 15 min with 1:4 rice: water ratio.
4. Sprouted brown rice can be stored in refrigerator for 1-2 days or in the freezer for longer shelf-life until use.

**PROCEDURE:**

1. Heat oil and sauté garlic and onion.
2. Add oyster sauce, sprouted brown rice, squid balls, and kikiam.
3. Stir in Baguio beans, celery, carrots, chayote, and yam bean.
4. Season with salt and pepper.
5. Mix until cooked.

Makes 5 servings

**HEALTH & NUTRI TIDBITS**

The dish offers most of the vitamins and minerals from the rice and vegetables combined. Pigmented rice sprouts contain antioxidants and the memory booster gamma-aminobutyric acid (GABA).


CARLO G. DACUMOS

## CRUNCHY MUSHROOM FRITTERS

From MUSHROOM FEAST: A COLLECTION OF FILIPINO MUSHROOM RECIPES

**INGREDIENTS:**

| *For soaking* | | *For fritters* | |
|---|---|---|---|
| 2 tbsp | clamansi juice | 1 tbsp | sugar |
| 2 cup | water | 2 cup | pepper, ground |
| ¾ cup | oyster mushroom, dried | ¼ tbsp | baking powder |
| | | ½ tbsp | chives, chopped |
| ¾ cup | rice flour, pre-cooked in water | 1 tbsp | margarine |
| | | 2 tbsp | garlic, fried |
| ¼ cup | rice flour | 2 cup | cooking oil |

**PROCEDURE:**

1. For soaking, mix the calamansi juice with water in a bowl. Soak the mushroom in the mixture and set aside for 5 min.
2. Drain the mushroom without squeezing it. Chop and mince.
3. Mix the mushroom with all the remaining ingredients and make a dough.
4. Roll out into small circles on a board with some rice flour. Press lightly with palm and finger.
5. In a frying pan, deep-fry minced mushroom mixture until golden brown.
6. Remove excess oil on paper towel.
7. Serve hot.

Makes 5-7 servings

# STAFF EXTRAORDINAIRE

## Getting to know more of PhilRice R&D brains

**ZENNY G. AWING**

### DIADEM B. GONZALES-ESMERO

Birthplace: San Mateo, Isabela

**Academic Profile:**

- PhD in Anthropology (Australian National University)
- MS in Development Communication (UP Los Baños)
- AB in Social Science (Central Luzon State University)

She revitalized museum work at PhilRice and led the development of multi-sensory and interactive exhibits as alternative venues for learning rice science.

Through her, the role of a science museum in Philippine rice R&D was duly recognized in the 2016 Museum Conference held in Italy. The creative educational program offered by the Rice Science Museum (RSM) was also a finalist in the 2017 Reimagine Education Awards that was co-sponsored by the Wharton School at the University of Pennsylvania and QS Quacquarelli Symonds, USA.

Today, the Department of Tourism-accredited RSM is one of the top tourist destinations in Nueva Ecija. Through her, RSM received of a project grant from the National Commission on Culture and the Arts to develop a rice cultural hub in the province.

She is currently a Supervising SRS and designated as Senior Curator of the RSM, focal person of Gender and Development, and Head of the Community Relations Office.

### PERNELYN S. TORREÑA

Birthplace: Madaum, Tagum City, Davao del Norte

**Academic Profile:**

- PhD of Graduate Research Field in Plant Sciences, Research School of Biology (Australian National University)
- MS in Crop Protection (University of Southern Mindanao, [USM])
- BS in Agriculture (Major in Plant Pathology, USM), *magna cum laude*

She tackles diseases and insect pests (i.e., tungro, bacterial/sheath blight, blast, rice black bugs, stem borers).

She's involved in the screening of NCT entries for tungro, bacterial/sheath blight, and blast. She also leads the project "*Sustaining productivity through efficient use of Metarhizium anisopliae for the management of rice black bugs*" and the study *"Field evaluation of traditional rice cultivars against white stem borer".*

A Supervising SRS, she was recognized as the Most Outstanding RD&E Staffer during the 2005 PhilRice Anniversary. She is a member of the Australian Society of Plant Scientists.

### FIDEL M. RAMOS

Birthplace: Roxas, Isabela

**Academic Profile:**

- PhD/MS in Agricultural Sciences (Major in Crop Science, Isabela State University [ISU])
- BS in Agriculture (Major in Agronomy, ISU)

For 18 years, his R&D work has revolved around hybrid rice seed production (HRSP).

He served as deputized seed inspector for Kalinga and Northern Cagayan for 4 years, maintaining the quantity and quality of F1 hybrid seeds. His work had contributed to the expansion in HRSP area in Kalinga. He is also tapped as resource speaker on HRSP topics.

Currently, he serves as PhilRice Isabela's Business Development coordinator, and in charge of seed production in the station.

Under the Public Hybrid Rice Commercialization Program, he is the national F1 seed production project leader.

## CONGRATULATIONS TO OUR NEWLY APPOINTED AND PROMOTED STAFFERS!

**JOEY P. MIANO,** SRS II, Rice Engineering and Mechanization Division, CES

**NONILON I. MARTIN,** SRS I, Development sector, Batac

**BETHZAIDA M. CATUDAN,** Senior SRS, Development sector, Batac

**MEL ANTHONY T. TALAVERA,** Senior SRS, Agronomy, Soils, and Plant Physiology Division, CES

**RONA T. DOLLENTAS,** Supervising SRS, Bicol

**VICTORIA C. LAPITAN,** Chief SRS, Los Baños

**DATU ALI N. SUMLAY,** SRS I, Research sector, Midsayap

**DANTE C. DELA CRUZ,** SRS II, Research sector, Midsayap

**PERNELYN S. TORRENA,** Supervising SRS, Research sector, Midsayap

**JOSE ARNEL E. CORDOVA,** SRS II, Research sector, Negros

"We're fond of modern technology. Marrying this with agriculture can entice the youth to love farming."

Students Kamille Almirio, 22, and Angelo Conwi, 23

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PHILIPPINE RICE RESEARCH INSTITUTE


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