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Philippine Rice Research Institute

Be Water-Smart

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ABOUT THE COVER

El Niño is usual in the Philippine rice agriculture setting. What makes it different each time is its level of intensity and frequency; thereby, affecting the already heavily challenged rice farmers.

Various studies have been done, some ongoing, to identify best-fit practices in managing the ill effects of this phenomenon. With the available technologies and interventions, farmers and local executives can better manage the expected impacts of El Niño, and are forewarned not to fear the forecast but to be wise.

As several institutions working on climate change say, let's be "water-smart".

2001 Gawad Florendo Awardee

2007 Binhi Hall of Fame Awardee

2009, 2018, 2019 Binhi Agri Magazine of the Year

2022 Outstanding Institution for Science Journalism

2022 Best Free Food Publications

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EXECUTIVE DIRECTOR'S NOTE

Relevance, responsiveness, resilience

JOHN C. DE LEON

Once again, adversity has come at the doorstep of the Philippine rice industry. El Niño is anticipated to hit the country by June 2023 to mid-2024, and its forecasted probability is increasing.

Just by mere mention of this phenomenon, anyone can easily foresee how it will affect the industry's stakeholders, especially the farmers. They will be facing either drought or flooding, depending on the effect of El Niño in their areas.

At PhilRice, the looming crisis pushed us to live up to three of our new Strategic Plan's core values: relevance, responsiveness, and resilience. Who would have thought that our values will be baptized with fire as soon as we welcome a new phase?

Through our rice research for development and extension (R4DE) initiatives, we remain true to our core with our enduring, mostly collaborative researches on water-crisis-adaptive technologies and practices that readers of this magazine will find in this issue: drought, submergence, and heat-tolerant varieties, *Palayamanan*, dry direct seeding method, controlled irrigation and alternate wetting and drying technology, among others.

Together with our active partners in the ground, we will continue to bring these to farming communities.

We also put forth farmers' stories of adaptation for we know that their experiences resonate the most with their fellows. They know how it feels; they have gone through the actual; thus, their practical approaches.

We also aim to provide a more agile response through the reconstitution of the Institute's El Niño task force, which is part of the whole DA's task force. We hope that the plans and guidelines we will implement can further help local and national support agencies in laying out interventions that are better suited to people's actual needs.

As we resolve to sustain our R4DE efforts to meet adversity of many kinds, we also endeavor to help our farmers so they can bounce back from their previous challenges and stand strong against the upcoming. We hope to boost their confidence to continue planting despite the threats of El Niño. We recognize that farming is their identity, more than their livelihood. We want to nurture and nourish their way of living.

What we are communicating through this Magazine Issue is for our farming communities not to fear but to be prudent and ready as we tread on the El Niño phenomenon together.

Rice researchers reap awards

PhilRice researchers won major awards at the recently held 23rd Philippine Society of Soil Science and Technology (PSSST) Conference, and the 72nd Annual Convention of the Philippine Society of Agricultural and Biosystems Engineers (PSABE).

Amabel Achuela and her team from the Crop Biotechnology Center and Mariano Marcos State University won the best paper under the junior category during the PSSST confab on May 19, for their study, *Root Plasticity Expression and Shoot Growth of Rice under Drought-Stressed Soils with Variable Application of Phosphorus*.

Results of their analysis revealed that drought-tolerant varieties such as NSIC Rc 194 can better absorb applied phosphorus in the soil because of its higher root plasticity expression, or the capacity of the roots to adjust, under drought. This helps maintain crop growth and possibly higher yields in rice under water-scarce conditions.

Under the senior category, Dr. Jayvee Cruz-Kitma and her team also won 3rd best paper for their study, *Development of Practical Approach in Scaling up Silicate-Solubilizing Bacteria Use in Crop Production*.

JG Tallada (C).

AH Achuela.

AJ Espiritu (R).

JA Cruz-Kitma (C).

Alex Espiritu from the Agronomy, Soils, and Plant Physiology Division is one of the recipients of the 2023 PSSST Distinguished Service Award. He served as the society's liaison officer and chairperson of their membership committee from 2015-2023.

Meanwhile, the team of Dr. Jasper Tallada from the Rice Engineering and Mechanization Division also bagged the best paper award during PSABE's convention, April 28, for their study on agricultural drones for direct seeding.

Tallada, the main author and presenter of the paper, said their study found that agri-drones significantly reduced seeding rates to 20kg/ha.

"Agri-drones have much more to offer beyond just a seeding method. Farmers can use them to spray fertilizers and do pest-related treatments. In an era where we must utilize information and communications technology to improve our agriculture sector, we need to be open-minded as these technologies offer overwhelming benefits," he said. **- ANNA MARIE B. BERTO AND CHRISTINE MAE A. NICOLAS**

PhilRice readies for El Niño

As PAGASA confirms an 80% probability of El Niño hitting the country this June 2023 to mid-2024, PhilRice is now crafting plans and guidelines to better help rice industry stakeholders prepare for its perceived impacts.

The El Niño task force of the Institute is recommending key adaptation mechanisms that farmers and local government units can consider. These include using drought/ heat-tolerant and upland varieties, water-saving technologies, crop diversification, and off-farm practices like crop insurance (see related stories on pp 18-21).

"El Niño is not new, but it seems to be occurring more often. Through intensified communication campaigns and partnerships, we can better help the rice stakeholders, especially the farmers, identify and choose adaptation strategies that are better suited to their local context," said Elmer Alosnos, task force member. **- CHRISTINE MAE A. NICOLAS**

RCEF launches online learning platform

RCEF *PalayAralan* TV provides farmers with up-to-date information on rice production. The program features segments such as "Rice *Balita*," "Rice *Chikahan*," "*Palay* Idol," and "*Alam mo ba* Rice," and is a collaboration among RCEF implementing agencies. It aims to reduce production costs, increase yield and income, and provide a united front for RCEF beneficiaries. The program will continue with a third episode airing each month, with the first two aired on March 8 and April 19, respectively. Farmers and enthusiasts can watch these episodes on the Facebook page of RCEF Extension (/RCEFExt) to learn more about rice production.

- CHRISTINE MAE A. NICOLAS

RCEF distributes seeds nationwide

PhilRice is expanding seed distribution from 42 to 77 of the country's 81 provinces starting this 2023 wet season.

Jointly funded by the RCEF Seed Program and the DA's National Rice Program (NRP) with P3 billion and P700 million, respectively, the expansion complements and supplements the hybrid rice production strategy of Pres. Bongbong Marcos under his food security agenda.

Around 4.27 million bags (20kg/bag) of certified seeds are expected to be distributed to 1.69 million farmers these 2023 wet – 2024 dry cropping seasons.

Dr. Flordeliza Bordey, director of RCEF at PhilRice, said that the allocation can plant 1.97 million hectares in 1,319 cities and municipalities nationwide. Batanes, Basilan, Tawi-tawi, and Sulu are not included due to limited rice areas.

"Through the integrated efforts, we are expecting to serve 1.69 million farmers. We will handle the planning, acquisition, and delivery of certified seeds in coordination with the DA-Regional Field Offices, while the provincial, city, and municipal local government units will help in dispensing the seeds to the farmers," Bordey said.

The RCEF Seed Program had distributed more than 11.7 million bags of inbred certified seeds in 42 provinces since its first implementation in 2020 dry season.

PHILRICE PHOTO

Thankful farmers from Los Baños, Laguna.

Results of seasonal monitoring and evaluation showed that the adoption of certified seeds doubled from around 40% to 84% leading to increased yields.

"Farmers' experiences in continuously using certified seeds have somehow prepared them to also adopt hybrid seeds in production," Bordey said.

Varieties to be distributed include NSIC Rc 222, Rc 402, and Rc 480 for their high yields, and NSIC Rc 216, Rc 160, and Rc 218 for their good eating quality. Varieties for less favorable environments, including drought-prone areas, are also allotted for specific locations.

Next-generation rice varieties such as NSIC Rc 506, Rc 508, Rc 512, and Rc 534 that have comparable yields with hybrids are also being introduced through RCEF.

Dr. John de Leon, executive director of PhilRice, said these varieties underwent participatory selection among farmers.

"These next-generation inbreds manifest in part the so-called genetic gain in terms of yield improvement. This is evidenced by the increasing national *palay* production from 12.4 million metric tons (MT) in 2000 to 19.96 million MT in 2021. If farmers continue to adopt certified seeds of the new varieties, they can expect their yields to improve further," de Leon explained.

To further enhance processes and stakeholders' experiences, PhilRice is maximizing the use of mobile and digital applications in seed positioning, delivery, and distribution. **- ANNA MARIE B. BERTO**

RICE ACROSS THE COUNTRY

COMPILED BY VANNEZA B. ISIDRO

Kiwanis, East-West support RiceBIS Zambales

Various public and private entities have joined together to assist the Castillejos Farmers Agriculture Cooperative (CFAC), a Rice Business Innovations System (RiceBIS) 2.0 Community Program-supported group, in their farm-to-table activities.

Advocacy group Kiwanis International - Philippine Luzon District on May 18 sealed its commitment to purchase NSIC Rc 160 brown rice products from CFAC.

This is in support of RiceBIS 2.0's aim to link farming communities to the market, and to a Kiwanis program relating to children's health and well-being.

CFAC members are also set to receive continuing assistance from the local government units of Zambales and Castillejos, DA-Central Luzon, Department of Trade and Industry, DA-Philippine Center for Postharvest Development and Mechanization, and the Ramon Magsaysay State University for their production, post-harvest technologies, agripreneurship, and organizational capacity development.

PhilRice and the East-West Seed Company also agreed to expand CFAC's vegetable production activities and systems through the *Gulayan sa Palayan at Pagnenegosyo* project. The farmer-members attended an orientation for this purpose.

- CHRISTINE MAE A. NICOLAS

More GAD advocates trained

To further strengthen the Agusan station's gender mainstreaming activities, staffers underwent training on the Gender and Development (GAD) Focal Point System, April 4.

GAD advocates from different agencies, including the Commission on Human Rights (CHR), discussed GAD concepts, the international and national frameworks on gender equality and other related concerns. Through this event, the station aimed to ensure that its policies, systems, and initiatives, including its workforce, are socially inclusive and free from any form of gender discrimination.

"Nurture the learning so that it can be reflected in our lives and our work. May we be in tune with the differences, expectations, and needs of people of different genders," Edson Alijo of the CHR Promotion and Advocacy Division said during his talk. **- CRIS MAE T. NECESITO**

Abra produces Mestiso 20 seeds

La Paz, Abra is the first municipality in Cordillera and the second in Luzon to successfully produce F1 seeds of Mestiso 20 (M20). Buenavista in Quezon did it first.

The Isabela station set up a 350m^2 SxP field trial in the said area during the 2022 wet season. The seeds produced here were used in a grow-out test that was recently conducted at Barangay Bulbulala, La Paz through the joint efforts of the station and the local government units. Local officials, partner agencies, and farmers said the performance of M20 was good, and the yield reached 9.07t/ha.

This trial aimed to explore the possibility of localizing the seed production of M20 as most farmers in Luzon are being provided with F1 seeds produced in Mindanao. **- OFELIA C. MALONZO**

SM CABANSAG

Ilocos Sur farmers benefit from digital seed distribution

Farmers from Sto. Domingo town who received RCEF seeds through Binhi e-*Padala* for the first time, said this digitally aided mechanism is more convenient than the conventional process of seed distribution.

"There was no hustle. We presented the printed QR code, and we were immediately given the high-quality seeds. It was fast and easy, unlike before when hundreds of us had to wait in long queues before we could finish our transaction," farmer Lucio Briones attested.

More than 300 farmers from the said municipality have yet to experience the pleasant process this 2023 wet season through the Batac station.

With Binhi e-*Padala*, qualified farmer-beneficiaries undergo a pre-registration process and receive a QR code, which they present during actual seed distribution. This aims to smoothen farmers' experiences under the Rice Competitiveness Enhancement Fund Seed Program.

- SHANNEL M. CABANSAG


KJ ASAGI


PHILRICE PHOTO

Rice-duck farms to rise in Quezon

Around 50ha of rice-duck farms will soon be established in five barangays in Tiaong through the partnership of DA-CALABARZON Regional Field Office and the Rice Business Innovations System (RiceBIS) Community Program under the Los Baños station.

Five RiceBIS farmers' associations from Bula, Bulakin, Lalig, Palagaran, and San Jose will each receive 110 ducks from DA - CALABARZON through a Return-on-Investment scheme. They underwent a training course on integrated rice-duck farming system organized by the DA-Agricultural Training Institute, April 24-26.

The initiative aims to help farmers improve RiceBIS farming communities in their pest control measures and maximize income opportunities.

-KEI J. ASAGI

RICE ACROSS THE COUNTRY

CIELO LUZ C. MONDEJAR-BELLO

Azolla-fertilized rice yields 5t/ha

A recent study has proven that rice grown with azolla between its rows can yield 4-5.3t/ha at a production cost of only P3.84/kg after continuous incorporation.

Azolla is an aquatic fern that hosts *Anabaena azollea* cyanobacteria, which convert nitrogen into ammonia that nourishes rice plants when incorporated into the soil.

Cielo Luz Mondejar-Bello, a member of the Negros station-based research team, said they tested azolla as the source of nutrients of the rice crop for three seasons; no other fertilizers were applied. Its effect was first observed in the second season, when the plants matured well, but the significant increase in yield was recorded after the third cropping.

"In our demo, we only introduced 0.1kg/ha of azolla fresh biomass during the first two seasons. The fern grew and fully covered the farm during the third season. Based on soil analysis, rice-azolla intercropping areas have increased organic matter and the total nitrogen available in the ricefield. Our computation shows that farmers can save P17,500 for two cropping seasons if they use Azolla as biofertilizer for rice," Mondejar-Bello said. **- VANESSA A. TINGSON**

Eastern Samar trained on pest, nutrient handling

Thirty farmers from San Julian town participated in their first training on pest and nutrient management under the RCEF Extension Program this 2023 dry cropping season.

Farmer-trainee Oscar Quiloña said the training was relevant because crop pests and nutrients are the most challenging for them.

"We are in pain because of the rising prices of fertilizers and pesticides. Now that we are equipped to manage them properly, I know there will be improvements in our farming," Quiloña radiated optimism.

The 5-day course aimed to improve farmers' knowledge and skills in accurate pest identification, disease diagnosis, and management, and in proper fertilizer application. Eastern Samar is among the new expansion areas of RCEF under the Bicol station; thus, the training. **- MICHAEL L. SATUITO**

Rice boot camps slated for agri graduates

Advanced lectures and field trainings await the new agriculture graduates of Zamboanga Peninsula, SOCCSKSARGEN, and Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) as the Midsayap station is organizing a series of 3-day rice boot camps for them starting last week of May.

The boot camps aim to help the future agriculturists develop understanding and awareness on rice science and development, particularly on PhilRice-recommended practices and technologies, including the *Palay*Check System, *Palayamanan* Plus, Agro-Ecosystem Analysis, and Minus-One-Element Technique.

Branch Director Ommal Abdulkadil said the participating graduates are expected to become exceptional and competitive in applying for research and development jobs in the future.

The first batch will be composed of 20 boot campers from Jose Rizal Memorial State University and Andres Bonifacio College at JRMSU Katipunan Branch in Zamboanga del Norte. Participants from the SOCCSKSARGEN and BARMM will have their training in July and August this year. **- CHESHIRE FAYE R. PAGARIGAN**

Midsayap and other stations conduct rice boot camps to engage youth and young farmers on sustainable rice production.

Bantay *Palay* app supplies local *palay* price info

ALDRIN C. CASTRO

A mobile application was developed to provide timely, reliable, and collaborative information on *palay* farmgate prices.

The *Bantay Palay* app works by collecting current *palay* price data from verified providers, analyzing, and processing them into a text message advisory that is sent to rice farmers listed in the Registry System for Basic Sectors in Agriculture.

App developer Arturo Arocena of PhilRice said verified providers of price data include *palay* buyer agents, traders, millers, DA Regional Field Offices, local government units, private business, and PhilRice staffers.

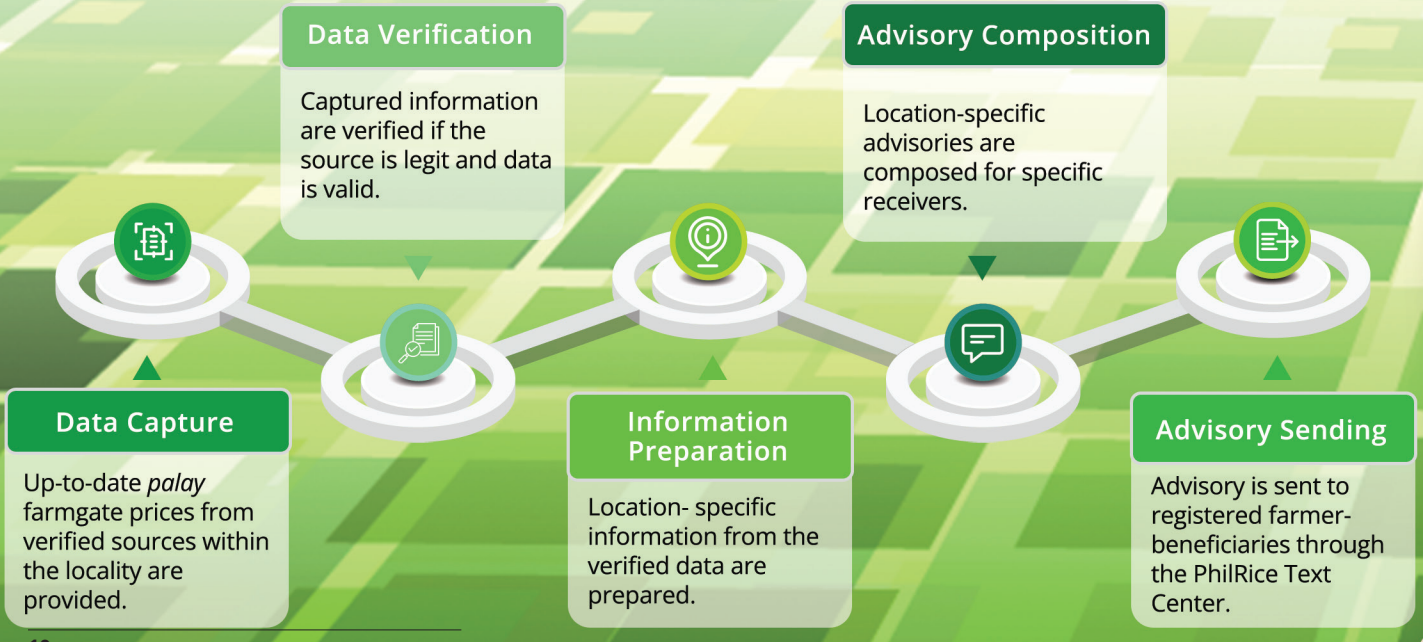
"Data coming from these providers will be validated and verified to ensure their reliability before location-specific advisories are sent to its farmer-recipients," Arocena qualified.

During the 2023 dry season Lakbay *Palay* in Nueva Ecija, PhilRice Deputy Executive Director for Research Eduardo Jimmy Quilang led the initial launch of the app. He said they aim to help farmers have better access to price information so that they can sell their produce strategically.

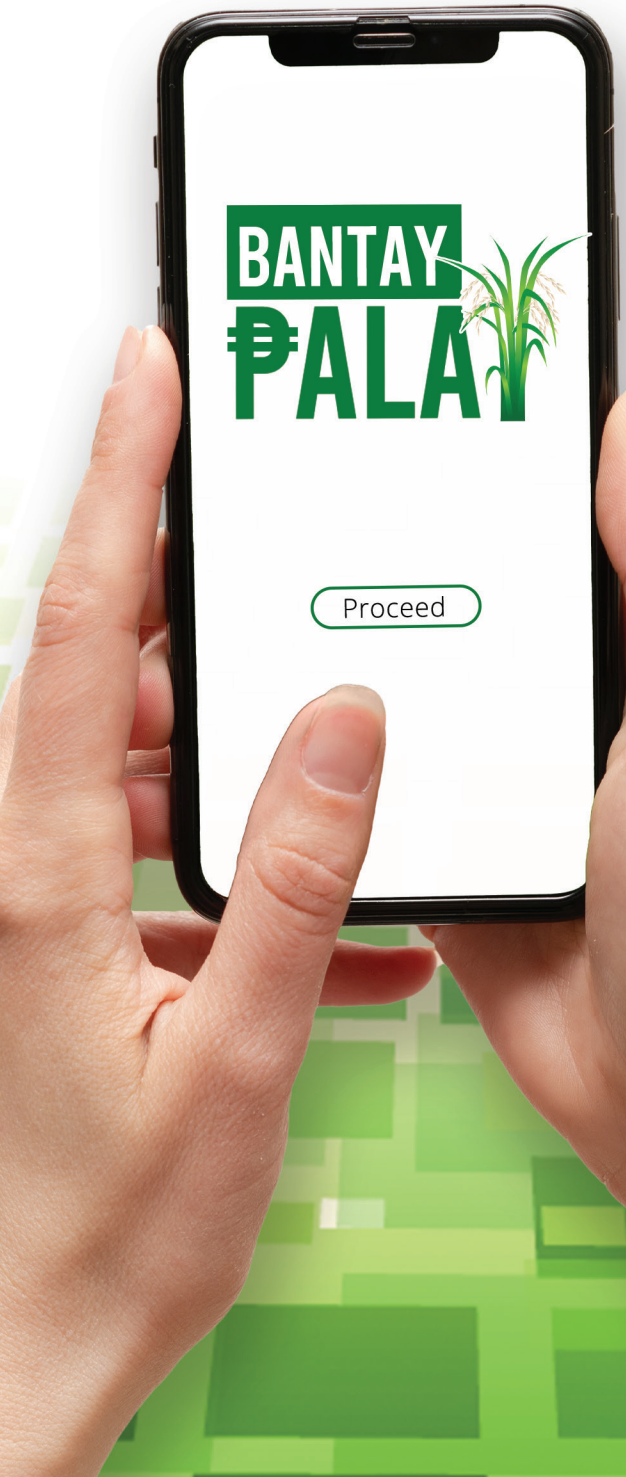
"By knowing current *palay* prices in their locality, farmers can opt to either sell their produce, store it and wait for better prices, or mill it as rice for higher income opportunity," he explained.

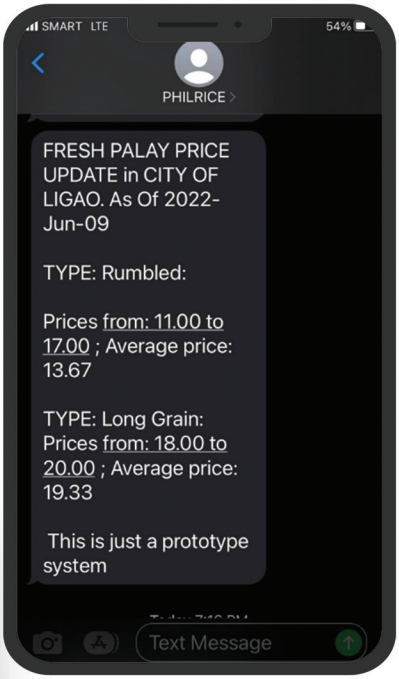
Proponents of the Bantay *Palay* app are the Institute's top officials Dr. John de Leon, Dr. Quilang, and Dr. Karen Eloisa Barroga. They received the Digirati Distinction Award given by the Asian Institute of Digital Transformation for this project.

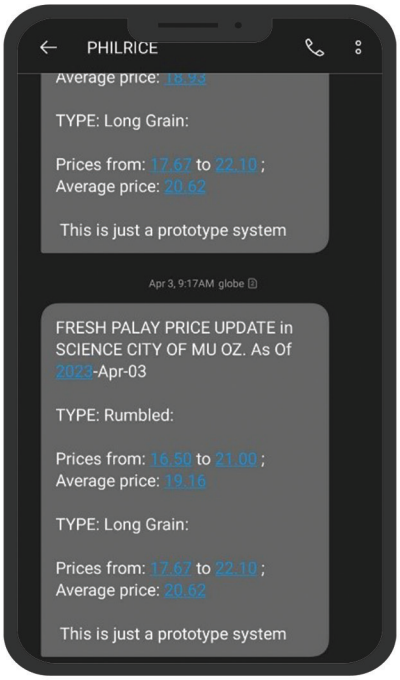
DATA AND INFORMATION FLOW

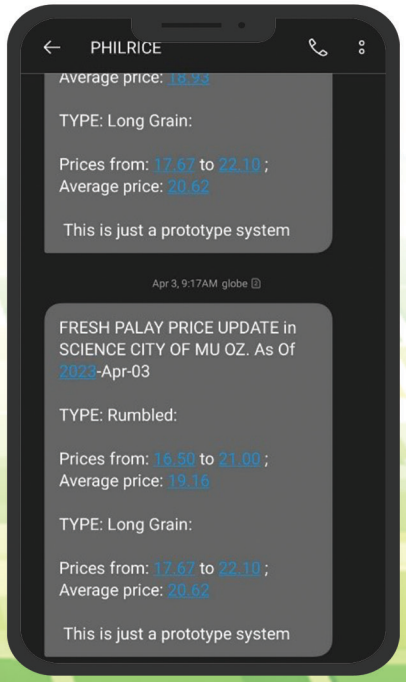


SAMPLE TEXT ADVISORIES









NEW KNOWLEDGE PRODUCTS

COMPILED BY: VANNEZA B. ISIDRO
AND HANAH HAZEL MAVI B. MANALO

MAGAZINE

- For the Love of Country, Farmers, and Rice
- Steady perseverance for the farmers
- Keeping farmers and their communities to heart
- *Serbisyong Maaasahan*, RCEF 'Yan!

VIDEO

- RCEF impact stories
- Be RICEponsible

HANDOUT

- *Responsableng Pamamahala ng Sustansya*
- Be RICEponsible series

AUDIO PLUG

- Seeding rates for direct seeding and transplanting (with translations in Iluko, Bisaya, and Filipino)
- Be RICEponsible series

2023 CALENDAR

BANNER

- Varieties
- Technologies
- RCEF Program Services and Testimonies

RICE SCIENCE FOR DECISION MAKERS

- Reinforcing Right E-A-T for Improved Fertilizer Application
- Policy Imperatives to Increase Uptake of the Alternate Wetting and Drying Technology

MONOGRAPH

- Emerging Outcomes of the Philippine RCEF Seed Program
  - 2021 Wet Season
  - 2022 Dry Season

2021 R&D HIGHLIGHTS

RICE-BASED BIOSYSTEMS JOURNAL

MANUAL/BOOK

- Manual on the use of participatory approaches in studies in agriculture
- #05: *Produksyon ng palay para sa pinapasukan ng tubig-alat sa* Cagayan Valley *at* Bicol Region
- Organic-based Nutrient Management for Rice Production
- PhilRice Blockbusters: Rice Farming Technologies
- Milled Rice Clustering of NSIC-Released Varieties
- RiceBIS Clustering Manual
- 2017-2022 Strategic Plan Terminal Report
- The Model Farm: Guidelines in Developing a Consolidated and Mechanized Farm for Irrigated Rice

ONLINE PLATFORM

- @rice_matters Tiktok page
- RiceLytics
- RCEF *PalayAralan* TV

DROUGHT & EL NIÑO

WRITTEN BY: CHRISTINA A. FREDILES
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SUBJECT MATTER SPECIALISTS:
DR. RICARDO F. ORGE, ENGR. ELMER D. ALOSNOS

According to PAGASA, there is at least 80% chance that El Niño will hit within 2023 to mid 2024.

El Niño is a recurring global phenomenon that has been happening decades ago, with intervals of 2 to 7 years, and lasting between 8 and 18 months. It causes significant warming of ocean temperatures in the tropical Pacific, which affects the atmosphere and climate around the world.

During an El Niño event, regions that typically receive high amounts of rainfall may experience droughts, while normally dry areas may see heavy rainfall and flooding. These weather changes can have a significant impact on water resources and agriculture, which in turn affect the economy.

DROUGHT IN PH OVER THE YEARS*

* SOURCE: National Drought Plan for the Philippines, April 2019

LEGEND
- Areas affected
- Major impacts (Total loss)

1972 – 1973

Areas affected	Major impacts (Total loss)
Central Luzon, Palawan, Visayas, and Mindanao	630,000 mt of rice and corn production damaged

1977 – 1978

Areas affected	Major impacts (Total loss)
All of Mindanao except Davao	750,000 mt of rice and corn production damaged

Oct. 1982 – Sep.1983

Areas affected	Major impacts (Total loss)
Western and Central Luzon, Southern Tagalog, Northern Visayas, Bohol, and Western Mindanao Moderate to severe drought in most of Luzon, Negros Occidental, and Iloilo	640,000 mt of rice and corn production damaged; crop insurance claims climbed to PhP38M

Oct. 1986 – Sep. 1987

Areas affected	Major impacts (Total loss)
Severe drought in Bicol region, mainland Luzon, Central Visayas, Southern Negros, Cebu, and Western Mindanao	Estimated agricultural damages of PhP47M

EFFECTS OF EL NIÑO ON RICE PRODUCTION

7% yield reduction for every 1°C rise in average daily temperature.

10% grain yield decline for every 1°C increase in minimum or night time temperature during dry season.

Rice farmers in flood-prone, laboy, and marshland areas will not have a hard time planting since they will not be flooded as much.

To earn additional income, farmers could plant high-value commercial crops such as watermelon, squash, or melon in areas with insufficient water supply, rather than rice. They could also opt for drought-resistant crops like cassava, sweet potato, and yam.

Drought is declared when there are three consecutive months of more than 60% reduction of rainfall from average.

May 2002 – Mar. 2003

Severe drought in Western and Central Mindanao, Bicol, Eastern Visayas, Southern Tagalog; Northern Luzon moderately affected

0.8% reduction in *palay* production in the first quarter of 2003

2009 – 2010

USD240 million in damages

1991 – 1992

Severe drought in Manila, Central and Western Visayas, and Cagayan Valley

Affected agricultural area: 461,800ha

PhP4.09B in agricultural losses

Feb. 2015 – July 2016

85% of provinces experienced drought. Iloilo, Guimaras, General Santos City, Isabela, Quirino, Bukidnon, Davao del Sur, Basilan, Bohol, and Cebu declared a state of calamity

PhP10B in crop damages; 1.48 Mmt of crops lost including rice, corn, cassava, banana and rubber; over 400,000 farming households and 556,000ha affected; 23% decline in fish catch

Oct. 1989 – Mar. 1990

Drought affected Cagayan Valley, Panay Island, Guimaras, Palawan, and Southern Mindanao

Affected rice and corn area: 283,562ha

Major multipurpose water reservoirs reduced inflow

Estimated 500,000 mt of rice and corn production damaged

1997 – 1998

About 70% of the Philippines experienced severe drought

About 292,000ha of rice and corn area completely damaged

620,000 mt of rice production loss and 570,000 mt of corn worth PhP3B;

water shortages, forest fires;

PhP6.2M estimated losses to aquaculture

EFFECTS OF DROUGHT ON GROWTH STAGES OF PALAY

VEGETATIVE

- Less tillers and plant height
- Slow panicle and pollen development
- Increased spikelet sterility by reducing viability

REPRODUCTIVE

Stagnant panicle dry weight

RIPENING

- Reduced fertility and grain quality
- Decreased grain weight
- Reduced grain filling
- Higher percentage of white chalky rice and milky white rice
- Reduced grain amylose content

INFO FEATURE

Farmers' tactics tackle El Niño's perils

ANNA MARIE B. BERTO

It is not the first time that El Niño is intimidating rice farmers. As if in a cycle, this weather phenomenon has been reported to have occurred every 4-5 years for the past several decades.

The immediate reaction of Zaragoza, Nueva Ecija farmer Rebeck P. Beltran, 54, is not fear but an assessment of his resources to support his irrigation needs.

"When El Niño comes, I first think about the additional cost I need to run my water pump. When I have the budget, I look for a gasoline station offering cheaper fuel so that I can buy more and store it," he said.

Seasoned farmers like Beltran know that there is nothing more sensible than to prepare and adapt to such challenge.

> **. . . commitment to the rice farmer identity influences the decisions made to adapt, or not, to drought. Majority of the farmers highlighted how they would give up everything for rice cultivation. Their thinking focused on how they could continue cultivating rice even in the most trying times. They showed strong attachment to their identity as rice farmers.**

Manalo, et al. (2020)
Rice farmers adapting to drought in the Philippines
International Journal of Agricultural Sustainability

PhilRice senior researcher Jaime Manalo IV and his team, in their 2020 published study *Rice farmers adapting to drought in the Philippines* explained that farmers' adaptation options to drought are based on factors mainly involving efficacy, affordability, and accessibility.

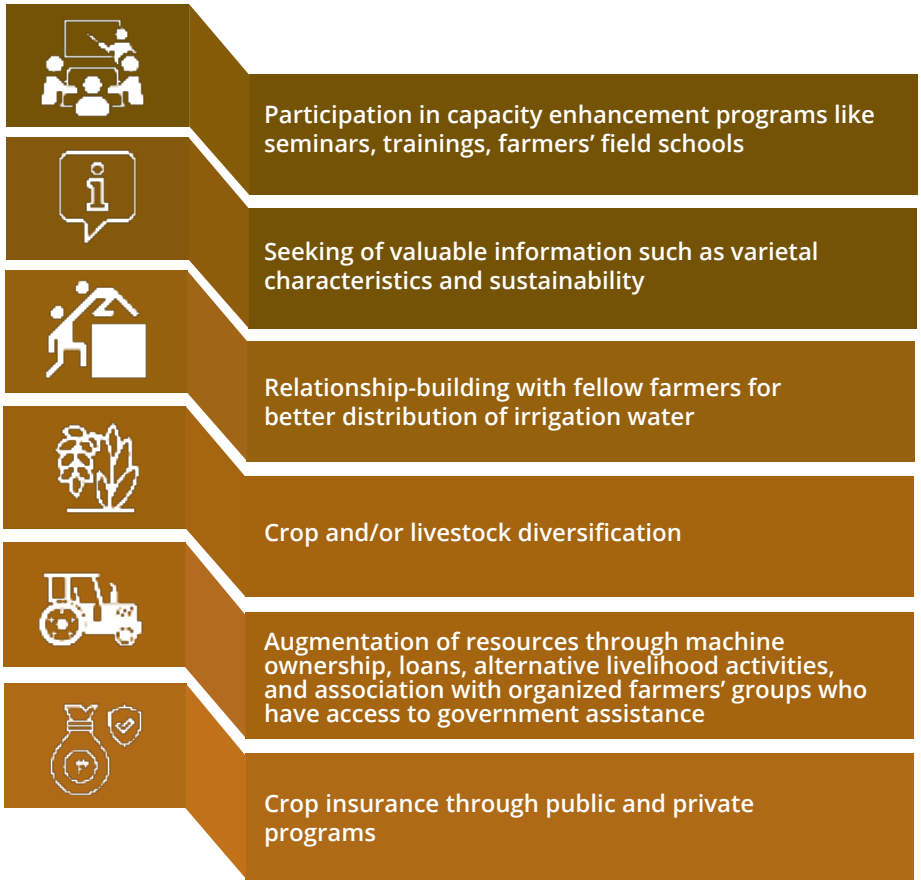
Under situations when they are faced with some form of difficulty, however, the study notes that farmers regard rice production as more than just their bread and butter. It is where their identity lies; thus, they do everything they can to pursue rice farming no matter the odds, or the drought.

Beyond the reach

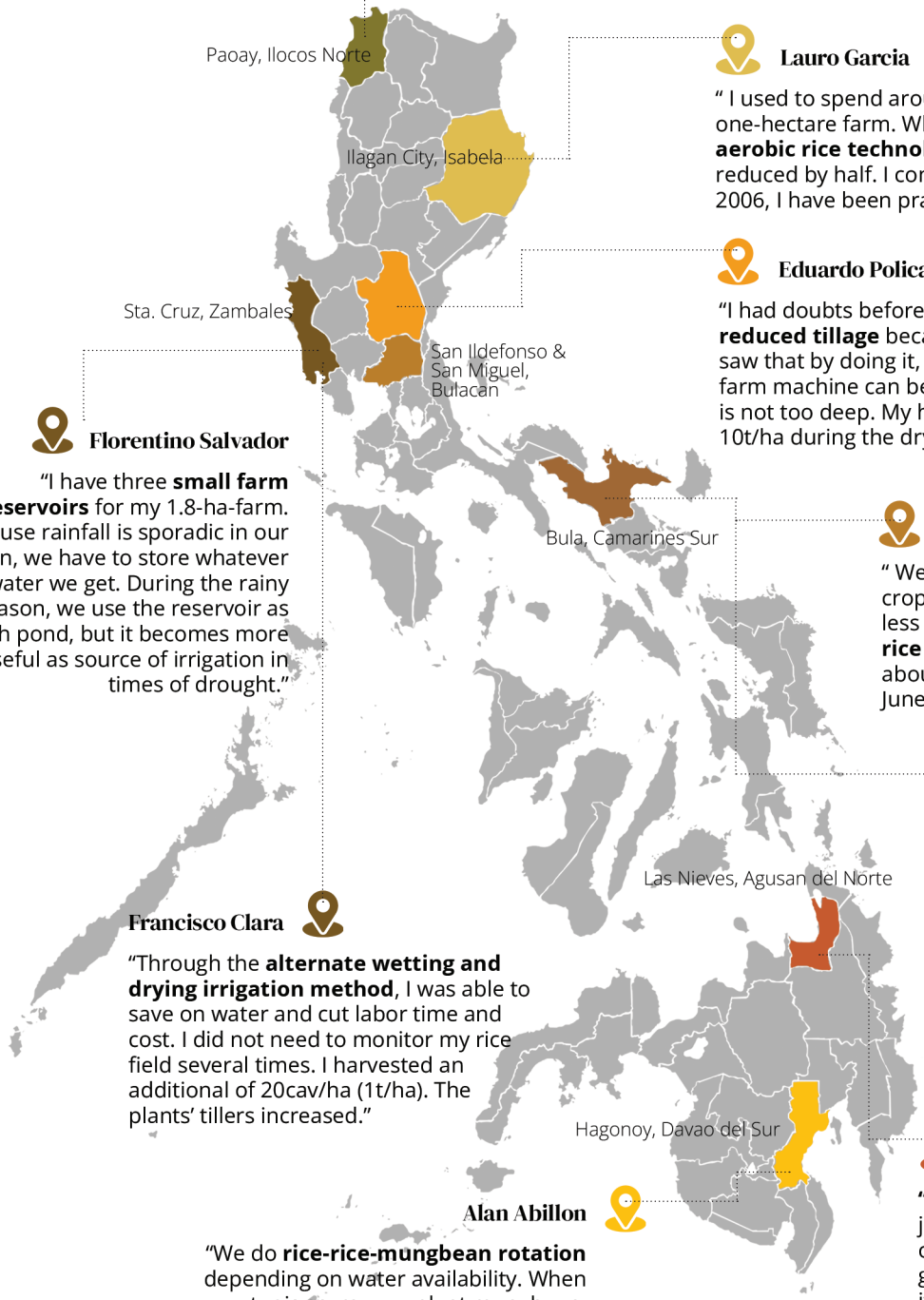
While technologies are important and must be made available to farmers the soonest, interventions must focus on handling the bigger social impacts on farming communities. In Manalo and colleagues' study, they documented issues such as malnutrition, familial separation, cases of turning to prostitution among family members all because of the consequences of chronic poverty due to drought.

"Aside from technologies, efforts must focus on recovery and rehabilitation of the farming households as drought impacts go beyond the episode itself," Manalo said.

Effective, economical, and accessible mechanisms used by drought-prone rice-farming villages in Anao, Tarlac and Libmanan, Camarines Sur based on the study of Manalo's team in 2020:



Meanwhile, farmers from other parts of the country also employ mechanisms that best fit their local conditions. Here are some of the strategies documented in the back issues of the PhilRice magazine.



Samuel Macatbag

"In times of drought, we favor **drought-tolerant varieties** like NSIC Rc 192. This was recommended by the Mariano Marcos State University Climate-Resilient Agriculture Center. Although there is less water, we can still harvest an average of 6.3t/ha from hybrid and 4-5t/ha from inbred. **After rice, we plant garlic, corn, mungbean, or peanut**. Then we wait for the Center's **weather pattern data** to help us plan for our next planting activity."

Lauro Garcia

" I used to spend around P20,000 when I irrigate my one-hectare farm. When I started practicing the **aerobic rice technology**, my expenses were reduced by half. I consume less water, too. Since 2006, I have been practicing this."

Eduardo Policarpio

"I had doubts before about the practice of **reduced tillage** because of weeds. Eventually, I saw that by doing it, the work is easier and the farm machine can better run because the mud is not too deep. My harvest also reached 10t/ha during the dry season."

Florentino Salvador

"I have three **small farm reservoirs** for my 1.8-ha-farm. Because rainfall is sporadic in our town, we have to store whatever water we get. During the rainy season, we use the reservoir as fish pond, but it becomes more useful as source of irrigation in times of drought."

Ricardo Bueno

" We learned that we could grow crops and harvest better even with less water through the **aerobic rice technology**. What's good about it is that we can also plant in June when rainfall is less."

Leonora Dotillos

"I learned that I need to **diversify crops** after attending the Upland *Palayamanan* Farmers' Field School. Half of my 2-ha farm is cultivated with upland rice while half is used to produce mungbean, tomato, petchay, and eggplant. When we don't plant rice, we still gain income from our vegetable produce."

Francisco Clara

"Through the **alternate wetting and drying irrigation method**, I was able to save on water and cut labor time and cost. I did not need to monitor my rice field several times. I harvested an additional of 20cav/ha (1t/ha). The plants' tillers increased."

Jerry Cruzada

"Water pumps provide enough water not just for me but also for farmers around our rice area. But having a pump doesn't guarantee an abundance of water source, it must be used wisely. Farmers here have seen how pumps can help them reckon with the lack of rainfall, and I am glad to see that some have started to invest on it."

Alan Abillon

"We do **rice-rice-mungbean rotation** depending on water availability. When water is scarce, we plant mungbean. Doing this is a good strategy to counter the ill-effects of drought because at least we can still maximize the use of our land resource."

Weather extremes?
Try these varieties!

INFOGRAPHICS BY: YOBHEL LOUISSE P. BELTRAN
SUBJECT MATTER SPECIALIST: DR. OLIVER E. MANANGKIL

Drought, high temperature, storms, or floods all affect rice production. Our experts recommend the use of different varieties that are bred to withstand certain weather extremes. Here are some of them.

LEGEND

- Average | Maximum yield
- Maturity days
- *** Variety distributed under the RCEF Seed Program
- **TPR** Transplanted rice
- **DSR** Direct-seeded rice

DROUGHT-TOLERANT

These varieties grow and mature even when there is less rainfall. They mature early, thereby reducing the water supply needed to grow rice.

IRRIGATED

PSB Rc 10 (Pagsanjan) ***
- 4.8t/ha | 7.5t/ha
- 106 days

NSIC Rc 152 (Tubigan 10)
- 5.8t/ha | 8t/ha (DSR)
- 6t/ha | 8.7t/ha (TPR)
- 102 days (DSR)
- 109 days (TPR)

NSIC Rc 440 (Tubigan 39) ***
- 5.5t/ha | 10.8t/ha
- 109 days

(Other drought-tolerant varieties for irrigated: NSIC Rc 436, Rc 438, Rc 442, Rc 130)

RAINFED

NSIC Rc 222 (Tubigan 18) ***
- 5.7t/ha | 7.9t/ha (DSR)
- 6.1t/ha | 10t/ha (TPR)
- 106 days (DSR)
- 114 days (TPR)

NSIC Rc 480 (GSR 8) ***
- 3.2t/ha | 4.4t/ha
- 107 days

(Other drought-tolerant varieties for rainfed: NSIC Rc 434, Rc 472, Rc 476)

HEAT-TOLERANT

These varieties can tolerate and adapt to high temperatures under irrigated lowland conditions.

- NSIC Rc 600 (Pang-mainit 1): 5.7t/ha | 7.1t/ha; 110 days
- NSIC Rc 602 (Pang-mainit 2): 5.6t/ha | 7.3t/ha; 109 days

UPLAND

These varieties work well in hilly areas and their main source of water is rain. These are bred to survive in areas with less water.

- NSIC Rc 23 (Katihan 1): 3t/ha | 7.6 t/ha; 108 days
- NSIC Rc 25 (Katihan 2): 3.0t/ha | 5.3 t/ha; 107 days
- NSIC Rc 27 (Katihan 3) ***: 2.7t/ha | 4.3t/ha; 107 days

SUBMERGENCE-TOLERANT

These varieties lessen production losses caused by floods. They work well under complete flooding/ submergence for 14 days if water is clear and directly penetrated by sunlight.

- NSIC Rc 194 (Submarino 1): 2.5t/ha; 125 days
- NSIC Rc 590 (Submarino 2): 3.9t/ha | 4.4 t/ha; 144 days

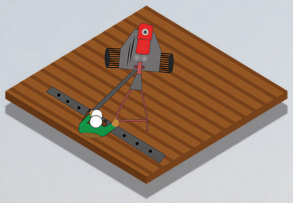
Farm defenses vs El Niño

Written by: Kiara Mae E. Panyo
Infographics by: Sarah Joy N. Ruiz
Subject Matter Specialists: Kristine S. Pascual and Jovino L. de Dios (PhilRice), Patrick B. Espanto (BSWM)

PhilRice and the Bureau of Soils and Water Management (BSWM), collectively put together a list of farm practices and technologies that farmers and policymakers can consider as defense mechanisms against the ill-effects of El Niño.

Proper Land Leveling

Having a well-leveled field contributes to uniform distribution of water in the field. This practice helps control weeds and invasive apple snails. To achieve this, weeds, rice straw, and stubble must be thoroughly decomposed and land is well-puddled and well-leveled.

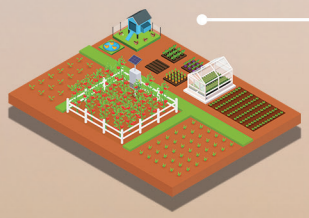


Dry Direct Seeding Technology

Through this, 30% water savings is possible because it eliminates seedbed preparation and land soaking, and irrigating and plowing are shortened. Farmers can shift to this method if rainfall is limited or there is shortage in water supply from the irrigation system. To do this, ungerminated seeds are sown directly onto the soil surface. This can be an alternative option for transplanting to save labor.

Diversified Farming or *Palayamanan*

Diversifying crops maximizes the use of land area and time in farming. It is a good strategy to ensure that there is food even in times of calamities. *Palayamanan* promotes planting of cash crops (e.g., pechay and mustard) in rainfed and drought-prone areas, and drought-tolerant crops (e.g., corn and onion).

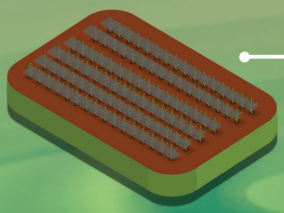


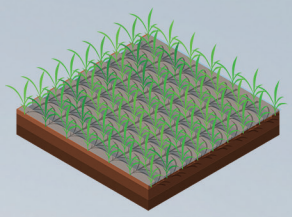
Controlled Irrigation and Alternate Wetting and Drying (AWD) Technology

Controlled irrigation helps reduce water use by 16-35% without yield penalty. It involves intermittent irrigation of rice fields. Before re-flooding, soil is allowed to dry at threshold level, and the rice crop should be at its appropriate stage of growth cycle. In AWD, observation wells are used to monitor the water level in the soil. This can be used by farmers with limited water supply or those with supplemental irrigation.

Mulching

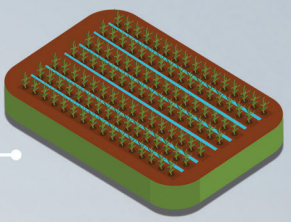
A technique of covering the soil with organic or inorganic materials to conserve soil moisture, regulate soil temperature, suppress weeds, and improve soil structure.





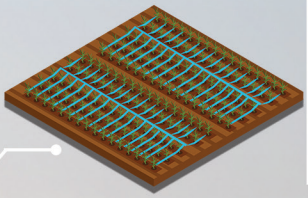
Aerobic Rice Technology (ART)

ART is suitable for farms that are rainfed, upland, or located in the near-end of the irrigation system. In this process, only field capacity water is required. It grows rice in non-puddled and non-saturated soil. Irrigation can be done through flash, furrows, or sprinkler to keep the soil wet but not flooded. Drought-tolerant varieties for ART include PSB Rc 9, NSIC Rc 192, Rc 23, Rc 280, and Rc 284.



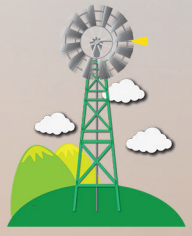
Low-cost Drip Irrigation Method

This technique provides a more precise and efficient way of watering the plants while minimizing water loss due to evaporation or runoff. Although drip irrigation is commonly used for vegetables, this method can also be applied to aerobic rice technology, resulting in water savings of up to 42% compared with flash flooding. Here, water is delivered directly to the roots of the plants in small, frequent doses through a network of pipes and emitters.



Capillarigation

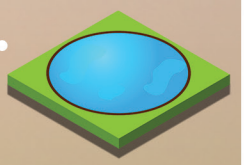
Considered as a cost and water-efficient management method for small-scale vegetable production, it eliminates water loss due to runoff and percolation. It capitalizes on the capillary principle wherein capillary wicks are used instead of drippers. This allows for a stable supply of water within the plants' root zone, making water always available to the crops.



Small-scale Irrigation Systems (SSIS)

SSIS are normally established in rainfed agricultural areas not served by irrigation systems. The minimum service area typically ranges from 0.2 up to 15 hectares. These are categorized into rainwater harvesting facilities, pump irrigation systems, diversion dam, check dam, and spring development.

Pump irrigation systems like solar-powered irrigation, wind pump irrigation, and hydropower help reduce carbon emissions. It consists of a pump and prime mover (e.g., electric motors, diesel, or gasoline engine), and pipes for suction and delivery of water to the service area. It utilizes groundwater or surface water.



Rainwater Harvesting Facilities

These structures harvest or store rainfall and runoff water during the rainy season, which can be used for irrigation during the dry season. They also capture eroded soil and prevent further transport in the downstream areas of the watershed. Examples of rainwater harvesting facilities are small water-impounding projects (SWIP), small farm reservoirs (SFR), and cistern.

Cloudseeding

This is a weather modification technology usually done to induce cumulonimbus clouds to produce rainfall. It uses a seeding agent such as sodium chloride or silver iodide which acts as condensation nuclei. Cloudseeding operations are done in drought-affected agricultural areas and watersheds during El Niño.

Wastewater Reuse

Wastewater can be an alternative source of freshwater for irrigation and other agricultural uses as long as it meets the standards for a specific use. The DA Administrative Order 11, Series of 2019, provides for the revised guidelines on the safe reuse of wastewater specifically for irrigation, aquaculture, and fertilization. Reuse can contribute to water conservation and reduction of pollutants in surface water bodies.

Wells of hope

HANAH HAZEL MAVI B. MANALO

Farmers from Tarlac, Leyte, and Zamboanga Sibugay could still recall how their rice crops suffered from drought more than one decade ago. Their provinces were among the areas highly vulnerable to drought based on data from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA), the country's weather bureau.

Despite the looming threat of El Niño anew, the well of hope never runs dry for these farmers, thanks to weather advisories, good irrigation system, drought-tolerant and short-maturing rice varieties, and water management technologies.

I have been using AWD for years; I save on fuel cost and water, as I can monitor the water status in my field to determine when to irrigate.

Lina Apolonio, 60

VICTORIA, TARLAC

"Because I only relied on rain then, I did not even dare to plant rice when there was a threat of El Niño," Apolonio said. "Even my deep well had no traces of water."

Good thing, she participated in various training activities and seminars of the Department of Agriculture on how to prepare for El Niño. Now, she faces it with a brave heart.

From the training, she learned about the alternate wetting and drying (AWD) option, a water-saving irrigation technology that uses observation wells, which are perforated tubes made of PVC or bamboo in managing water in the rice field. She irrigates only when the water level in the observation well reaches the bottom, unlike her old practice that the field was continuously flooded.

"I have been using AWD for years; I save on fuel cost and water as I can monitor the water status in my field to determine when to irrigate," she explained.

Pepito Castor, 63

SIAY, ZAMBOANGA SIBUGAY

"Drought hit when my rice crop was at the flowering stage. It didn't produce any grain. No harvest at all," Castor shook his head.

The seminars he attended taught him how to be prepared for El Niño.

He planted PSB Rc 82, a variety that matures in 110 days, and NSIC Rc 222, which is drought-tolerant. He also planted vegetables instead of rice alone when water was limited.

He said that water release was properly scheduled; thus, giving farmers equal access.

Because he feared that El Niño would break his heart again, he did not have second thoughts about buying a water pump to save his crops from the calamity.

Allan Alinsunod, 41

DAGAMI, LEYTE

Stunted rice plants with broken dead roots and yellowing leaves were struggling to survive in a field tattered with cracks. There was only one irrigation canal in their area; thus, making it difficult to irrigate their rice fields.

"From my 18ha, I harvested nothing. I had no idea on how to survive El Niño during that time," he sadly recalled.

Now, he is happy that the irrigation system in their area has improved. This helps cushion the impact of El Niño.

The advisories he followed on TV prompted him and his fellow farmers to adjust their planting dates. They prepared their rice fields and seeds earlier than usual.

"El Niño wouldn't greatly affect the flowering of my crops now. I will not be left empty-handed during harvest time," Alinsunod claimed.

FEATURE

Cheers to no-tension days

JOSHUA P. MENDOZA

Nightmares of drought are still vivid in the mind of Nestor Mendoza. At midnight, they are wide awake, watching their fellow farmers from the downstream of the M'lang and Malasila Rivers Irrigation System (MMRIS) march up to avail of their right to farm water, even in darkness.

"When rain is elusive, water supply is not enough for those who are at the tail end of the irrigation," this member from the midstream recalled.

Mendoza, a 63-year-old farmer-member of the Bagontapay, New Barbaza, Buayan, Lepaga (BNBL) Irrigators' Association (IA) in North Cotabato witnessed how conflicts arose every time downstream fields couldn't get sufficient water. He heard every farmer's sometimes - wayward assumption about the situation.

For Angelita Necesito, 59, the case was most unbearable during the 1982-1983 El Niño episode.

"Gamay lang siya (It was little)," she described the amount of water flowing to her field. "The water would go to the large cracks in the soil. I had to 'guide' the water so that it would go directly to the rice plant."

Her 1.5ha field could only produce 1.74t/ha under such condition.

Knowledge flowed

In 2009, the alternate wetting and drying (AWD) technology was introduced by the National Irrigation Administration (NIA) and PhilRice to the member-IAs of MMRIS. Mendoza, Necesito, and other farmers never thought this would lead them to better days.

AWD is a water-saving technology that can help reduce the consumption of irrigation water without reducing rice yield. It is done with the aid of an observation well, used to monitor changes in groundwater levels.

After receiving training, IA leader Mendoza shared his knowledge to other farmers through their monthly meetings.

Roger Celeste, current President of BNBL IA, became an AWD consultant to farmers after completing training.

"Before, we were having a hard time educating them about the technology but now we could see their willingness. They approach us immediately when we put observation wells in the field," Celeste narrated.

It is through the meetings that Jesus Panes Jr., 63, of DLS IA extended his knowledge to his fellow farmers. He also served as AWD lecturer in Sultan Kudarat and South Cotabato.

Gilda Reovoca, member of the BIMADU IA - another group serviced by the MMRIS - said their former president, Manuel Aliaga, was the first and lone farmer-cooperator who used AWD during that time.

Reovoca said Aliaga eagerly shared his AWD experience with them. The members were encouraged to try, but for Reovoca, their obedience was not solely because of the knowledge. It was the credibility of Aliaga that further motivated them to follow.

In 2013, more members of the BIMADU IA also participated in the PhilRice Midsayap-led training courses and pilot demonstration activities on AWD and other associated technologies.

Their federation, the ***Kapisanan ng mga IA ng MMRIS***, also passed the 'One Farmer, One Tube Well' policy, and organized the 'Best Demonstration Farm' contest to give more weight to the initiative.

Quenching results

The participating Cotabato farmers found satisfaction from their obedience and commitment. It did not just mitigate the negative effects of water shortage, but it also helped them increase their yield by 20%.

"If you practice AWD, the rice plant could produce more tillers that would lead to better yield. If we often flood our rice field with water, it could be easily attacked by different pests," Reovoca explained.

Members of the BNBL IA had their average yields soaring to 9.1t/ha during the dry season and 10.4t/ha during the wet season.

More than the tangible effects, the most valuable impact of the technology on them was the harmonious relationship they now enjoy. MMRIS succeeded in irrigating 100% of its service area.

"Today, farmers are kinder and more generous to each other. If they see in their observation well that they still have enough water, they would let the water flow to other rice fields," Celeste attested.

Roger C. Celeste, 3rd from right, is President of BNBL IA

YOBHEL LOUISSE P. BELTRAN

Looming waves

MMRIS, which can irrigate 8,000ha of rice fields, is currently close to reaching its 310-cm critical water level because of lack of rainfall.

NIA has mobilized vehicles announcing the forecasts on the unwelcome El Niño phenomenon. They roam around the farmers' vicinities, informing them to begin their land preparation so that managing the water won't be as difficult as they expect it to be in the upcoming months. Drought might once again befall the lands of Cotabato farmers.

But this time, they'll tread in each other's rice fields, no longer brimming with frustrations and negative assumptions toward each other. They will now face the problem with a 25-cm observation well and a handful of water-saving technologies installed in their hearts.


The MMRIS Dam.

PHILRICE PHOTO

Sensing water levels made digital

SARAH JOY N. RUIZ

Drought has always been an intense foe of Faustino Medina, a rice farmer from Barangay Bantug, Science City of Muñoz, Nueva Ecija. This enemy always left him with low yield - a deep, painful wound for his pockets and their household table.

His story represents most Philippine farming communities whose main staple and source of livelihood is rice. During an El Niño phenomenon, rice production is most challenging as it is water-dependent.

This poses a risk not only to food security but also to every farming family's finances.

They are compelled to seek sustainable solutions to optimize whatever water resource they have to avoid having more 'farming scars'.

In 2016, the WateRice project, a collaborative effort among PhilRice, IRRI, the National Irrigation Administration, and the Bureau of Soils and Water Management introduced AutoMon^{PH} to Medina and the rest of the *Bantug Bakal* Irrigators Association (BBIA). It soon became their proactive approach not only to efficient water management in times of drought, but also to any other season of cropping. AutoMon^{PH} is an electronic device for measuring the rice paddy field water level. It is based on the alternate wetting-and-drying technology.

It uses a sensor to monitor and log the water level. Data is transmitted via a wireless network to a server or the water user.

AutoMon^{PH} has an irrigation advisory service so that farmers receive via SMS their farm's water level information. It comes with advice on when it is time to irrigate. It also automatically sends data to a central database that can disseminate via SMS an advisory to the farmers' association and irrigation system manager on which areas need water.

Its first prototype was installed in Medina's 2-ha field. Every cropping season, he would put the device in the field three days after transplanting. He used it for several seasons.

"The AutoMon^{PH} is helpful. I never imagined that there would be such a

JADE DORADO

AutoMon^{PH} installed in the field

JADE DORADO

> **The AutoMon^{PH} is helpful. I never imagined that there would be such a device that could provide accurate water level readings. It is time-saving as well.**
>
> - Faustino Medina
> (translated from Filipino)

device that could provide accurate water level readings. It is time-saving as well," this 65-year-old chairperson of BBIA was in awe.

Later on, he testified about the technology to his farmer-members. PhilRice then installed two improved AutoMon^{PH} sensors in each member's farm. It covered 252.85ha.

"Before the project, we used to go back and forth to the field to check if our rice crop needed water. But with AutoMon^{PH}, we can now monitor the water level in our farm anywhere and in real-time. We do not need to go out under the Lenten sun, especially our senior members," Medina cautioned.

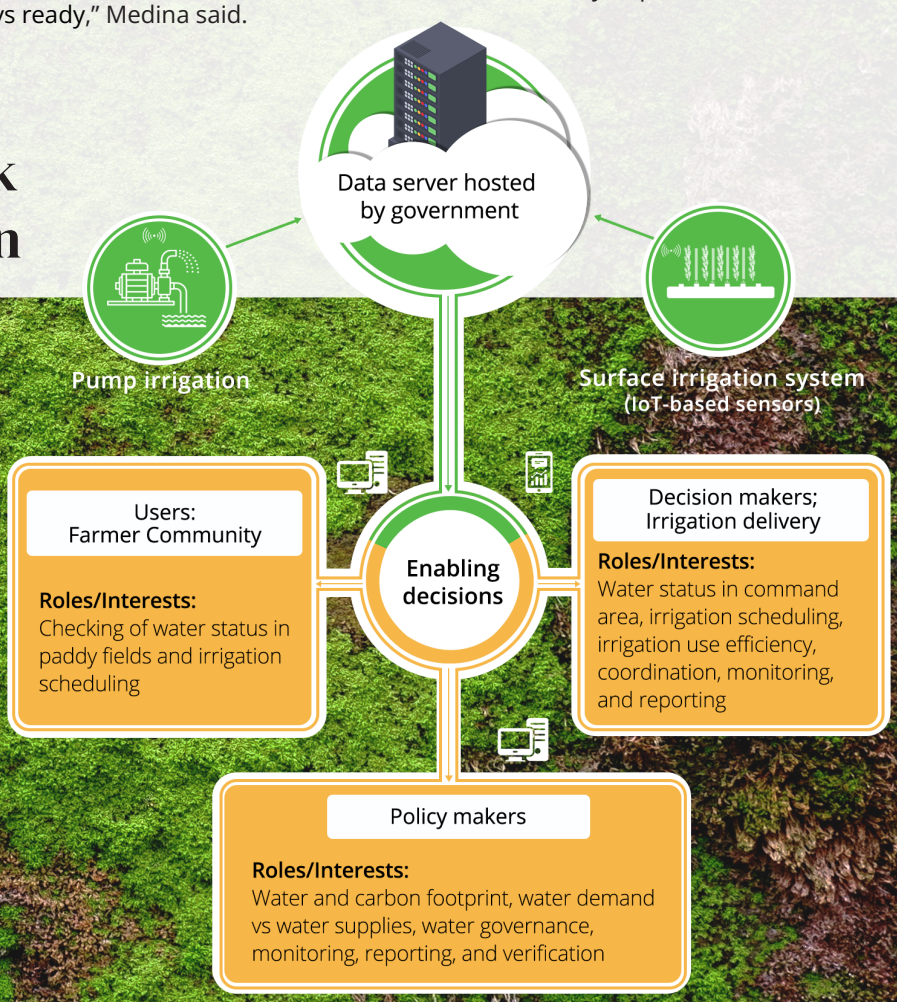
Serving as cooperators of the project, BBIA also provided insights on the technology, which served as valuable input for the members of the technology development team.

"Its sensor battery life only lasts for four days. When the battery is low, it could result in inaccurate data. We dealt with it by ensuring that we replace the battery before it runs out. The replacement is always ready," Medina said.

Recently, the WateRice Project team has improved the AutoMon^{PH} sensor, with battery power now lasting more than 60 days.

Medina believes that while using AutoMon^{PH} works individually, it is also a good avenue for them and for any farmers' group to become efficient managers of irrigation water. For him, water conservation not only helps farmers produce more with less water, it can also help them cut labor and costs together - an act stronger than their intense foe, they hope.

Conceptual framework of AutoMon^{PH} operation



How does it work?

AutoMon^{PH} is an Internet of Things (IoT) solution, a network of objects – things – that communicate with water level sensors using wireless connectivity. It provides:

- Efficient water management
- Continuous, real-time monitoring and reporting
- Verification of water management practices
- Multi-stakeholder interface
- Reduction of transaction times and cost of effective coordination among stakeholders
- Computation of methane emission/ C-footprint in rice with real-time water management information

CGIAR and MARD consult stakeholders at the provincial level to verify the risk maps and the adaptation plans.

CGIAR - CCAFS

How Climate-Smart Maps work for Vietnam's drought problem

Guest contributor:

EISEN V. BERNARDO
Communication Consultant
Asian Mega-Deltas
IRRI-Vietnam Office

The Mekong River Delta (MRD), the "rice bowl" of Vietnam, has experienced severe droughts in recent years, causing huge agricultural economic loss. Drought conditions caused by the El Niño Southern Oscillation (ENSO) have also intensified salinity intrusion into the Delta, which has substantially reduced agricultural productivity. This problem of drought and salinity intrusion in MRD, which frequently happens during winter-spring, has been a problem for rice farmers for decades.

The 2015-2016 ENSO event intensified the drought in the region, causing a rice production loss of 1.2M tons (equivalent to 220,000 hectares). As assessed by CGIAR Centers working in Vietnam, preparations to cope with this particular ENSO event were either lacking, or not informed by the early warnings given by the government. The assessment team found that warnings were not translated into agricultural advisories properly; impacts of climate hazards are site-specific, and communication among government agencies in responding to threats (crop production and hydrological offices) was weak. With these findings, the team recommended localizing risks and their impacts, facilitating dialogues of local stakeholders; identifying practicable adaptive solutions, and developing adaptation plans/scenarios.

As a result, the Department of Crop Production (DCP) of the Ministry of Agriculture and Rural Development (MARD) and the CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia (CCAFS SEA) partnered to develop and implement the Climate-Smart Maps and Adaptation Plans (CS-MAP) approach. In 2016, DCP and CCAFS SEA started to pilot the process of developing relevant location-specific rice crop adaptation maps to manage the conflicts in land and water management in the 13 provinces in MRD.

The CS-MAP approach

CS-MAP is a participatory approach that integrates local knowledge and science-based research to develop climate-related risk maps and adaptation plans, suitable for location-specific conditions. With simple color coding (red-high risk, yellow-moderate, and green-safe), the rice areas were mapped in terms of risk to salinity intrusion and flooding.

Steps in developing CS-MAP:

1. Identify climate-related risks (cropping season and locations affected)
2. Delineate boundary of risk levels based on technical data and local knowledge
3. Propose corresponding adaptive plans (e.g., adjusting cropping calendar or changing cropping system)
4. Fine-tune and verify risk maps and adaptive plans
5. Integrate adaptive plans of individual provinces into ecological zoning and regional plans

Because of its participatory nature, the CS-MAP approach takes into account the actual capacity of local farmers and the adaptation pathways available to them, making its adaptation plans practical and feasible. CS-MAP is also flexible in the sense that it can work in various administrative levels (national, regional, provincial, district, or commune).

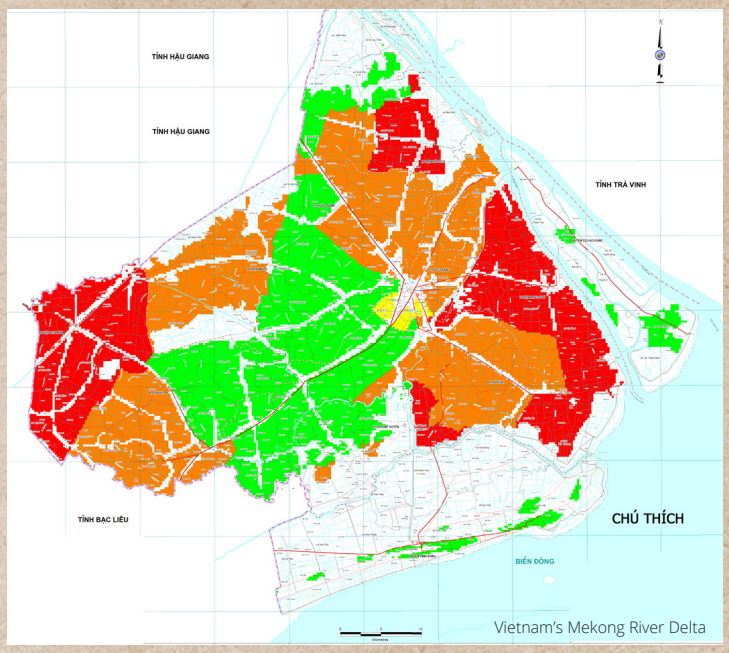
Results and outcome

Early planting, which is the major recommendation of CS-MAP, significantly reduced the impact of El Niño in winter-spring 2019-2020.

Data from MARD reports say adjusting the seasonal calendar – a recommendation based on CS-MAP – successfully mitigated the loss of crops from drought and salinity by 176,000 rice hectares compared in 2015-2016. The early planting saved 73% of the risk areas from the impacts of salinity intrusion.

These results are particularly impressive given that the winter-spring season 2019-2020 was assessed as having more severe saltwater intrusion and worse drought than in 2015-2016.

Recently, CS-MAP has been integrated to MARD Decision No. 3444 on the Action Plan to implement the National Strategy on Green Growth. As the action point on "Developing a climate change adaptation map system for all localities", CS-MAP is selected as one of the strategies under the category of environmental protection to develop green infrastructure that adapts to climate change and reduces GHG emissions.



Drought - salinity intrusion risks for rice in extreme years

Soc Trang province

Scale 1:100,000

Legend:

- High risk
- Medium risk
- Low risk
- Not affected
- Not planted

Scaling the approach

The application of CS-MAP in Vietnam has shown significant outcomes both on the ground and in terms of policy. The approach has been scaled out to other agricultural regions of the country and used at the commune level in MRD.

After successfully implementing CS-MAP in MRD, DCP-MARD brought the same approach in the Red River Delta and the Northern Midlands to address irrigation water shortages and manage reservoirs, and the South Central Coast to help farmers cope with drought and salinity intrusion problems.

In 2021, DCP-MARD also used CS-MAP to develop risk maps and adaptation plans for rice production in the Central Highlands and the North Central Coast, as well as for fruit trees in the Northern Midlands and the mountainous region.

Recently, through the CGIAR Initiative on Asian Mega-Deltas, CS-MAP is being introduced to delta provinces in Cambodia and Bangladesh to promote evidence-based agricultural development planning. PhilRice also intends to work on a similar initiative.

Filled with hope, thanks to AMIA

CHRISTINE MAE A. NICOLAS

As soon as she settled in Barangay Lucban, Benito Soliven, Isabela, the 46-year-old farmer Valentina Ibarra found the community's serious problem on El Niño.

"I transferred from Quirino. When I first arrived in Isabela, I witnessed how the locals grappled with the challenges of water scarcity owing to rainlessness. It significantly affected their lives and stopped them from planting crops at times," she said.

She recalled how farmers in her barangay relied on water pumps to irrigate their rice fields.

"When the small water impounding project (SWIP) couldn't meet their irrigation needs during drought due to low water levels, they turned to the Pinacanauan River as an alternative water source. However, this incurred them some P5,000 additional expense per hectare," Ibarra noticed and later on experienced for herself.

A ray of hope emerged for Ibarra and her fellow farmers when the Department of Agriculture (DA) introduced to them the Adaptation and Mitigation Initiative in Agriculture (AMIA) program in 2018.

AMIA aimed to bring transformative change to rural communities so that they may be able to adapt and enhance their resilience to climate change. They promoted climate-resilient agriculture (CRA) technologies that tailor-fit the community's specific needs. Barangay Lucban soon became one of the AMIA villages.

"Through participatory rural appraisal sessions, farmers in the community were empowered to voice their needs and concerns. This ongoing dialogue ensures that interventions were customized to address the local requirements of farmers here," AMIA Cagayan Valley Regional Coordinator Rayward S. Carlos said.

Aside from the CRA technologies, AMIA also provided the village with a 10-day farm weather outlook through a group chat. They generated a provincial seasonal climate outlook that was posted on the Cagayan Valley AMIA - CREATE official Facebook page for the village members to access.

Change has come

Jerry Gerardo, a 54-year-old farmer who has been working the land for 33 years, attests to the program's effectiveness.

Through AMIA's assistance, he faced the challenges of drought by using alternate wetting and drying (AWD) technology, solar-powered irrigation system, hybrid rice varieties, and soil analysis for personalized fertilizer recommendations.

"These interventions greatly boosted my crop yield. Now, I can produce an impressive 7.2-7.7t/ha. This was difficult to achieve in the past when I relied on inbred seeds and struggled

Farmer-residents of AMIA village in Lucban now enjoy the reward of adopting the technologies.

PHILRICE PHOTO

CARLO G. DACUMOS

with drought using only a water pump," Gerardo declared.

Ibarra also shared a similar success story. She focused on growing rice and corn as the program staffers had recommended.

She employed the same technologies and practices like Gerardo and observed a significant yield increase in her 0.31ha rice field, from 0.8t to 1.7t. She used it solely for her family's consumption.

Barangay secretary and farmer Joseph Justo also attributed his improved rice yield to the key interventions such as a solar irrigation system, AWD, rice varieties that tolerate drought and diseases, effective SWIP management, and water metering to monitor consumption per hectare.

"The AMIA staff provided incredible support, consistently sharing information about technologies and knowledge to us. Before, my harvest was around 4.4t/ha, but with the assistance of AMIA, it nearly doubled to 7.6t/ha," he exclaimed.

> **These interventions have greatly boosted my crop yield. Now, one hectare can produce an impressive 7.2–7.7t, which was difficult to achieve in the past when we relied on inbred rice seeds and struggled with drought using only a water pump**
>
> - JERRY GERARDO

Justo revealed Lucban farmers' dependence on water pumps has decreased significantly due to the assistance provided by the program.

AMIA also introduced other income opportunities like mushroom production, vegetable farming, pig raising, and more to the farmers in the village.

While climate change remains a formidable challenge for agriculture, the right interventions and government support have enabled farmers like Gerardo, Ibarra, and Justo to overcome and thrive despite the challenges of drought.

As they navigate the evolving climate, they express deep gratitude to the DA and the AMIA program for instilling hope when they thought that their situation was hopeless.

Staff EXTRAORDINAIRE

GET TO KNOW SOME OF PHILRICE RESEARCHERS WHO WORK ON WATER MANAGEMENT AND CLIMATE CHANGE (CC) - RELATED TECHNOLOGIES

COMPILED BY MINARD F. PAGADUAN

Dr. Ricardo Orge

CC-related research:
Continuous-type Rice Hull Carbonizer, Capillarigation (capillary irrigation) system, Kwebo in support of the *Palayamanan*

Orge dedicated his 30-year career to developing technologies that can help smallholder farmers cope with the challenges brought about by climate change. He swore to make it his life purpose, hoping he can help prevent farmers from experiencing the same difficulties his father - a farmer, a fisherman, and a carpenter - went through.

Having been assigned as the lead of CC-related PhilRice programs in the past, Orge gained experience in engineering technologies for drought, floods, and typhoons. He now leads the Institute's El Niño task force team.

His works in CC-adaptive technologies for rice garnered him awards and recognitions. He hails from Merida, Leyte.

Dr. Manuel Jose Regalado

CC-related research:
WateRice Project; AutoMon^{PH}

Regalado spearheaded the implementation of the WateRice Project, a DA-Bureau of Agricultural Research (DA-BAR)-funded project in collaboration with IRRI. Through the project, they introduced water-efficient and risk-mitigation technologies in rice production, including the AutoMon^{PH}.

AutoMon^{PH} is a sensor-based technology that provides real-time field water level data. It is an offshoot of the alternate wetting and drying approach (see related story on pp 26-27).

Once during his youth, he witnessed how his father was almost provoked to fight with a fellow farmer because of irrigation concerns. He said this incident inspired him to work on water-related projects during his stint as a renowned engineer and researcher at PhilRice. He was born in Daraga, Albay.

Dr. Roel Suralta

CC-related research:
Root plasticity under drought and fluctuating soil moisture stresses

Root plasticity refers to the capacity of roots to adjust and contribute to the maintenance of crop growth and development under prevailing environmental stress conditions.

Suralta's interest in root-related research was piqued by breeders' efforts on investigating environmental stresses. While the majority of them focus on matters above ground, he recognized the potential of exploring root systems in the context of abiotic stress adaptation. Through the application of his research, ▶

Here's to stress-free days, our public servant

DR. AURORA CORALES, 65

Bagong Sikat, Science City of Muñoz, Nueva Ecija
Position: Chief Science Research Specialist/ Scientist I
PhilRice CES
Length of Service: 23 years

Called by many as Tita Au, this seasoned PhilRice scientist, agricultural engineer, and development worker has spent over two decades pushing for initiatives that matter to farming communities.

Her career began through her involvement in the Philippine Cotton Corporation in 1981, Philippine Rural Reconstruction Movement in 1992-1998, and finally at PhilRice from 2000-2023.

Tita Au was involved in various PhilRice programs. She is best remembered for her leadership in the Rice Business Innovations Systems (RiceBIS) Community Program, which helps rice farmers improve their income through agripreneurship. This initiative brought her and her team to the list of esteemed national projects that received the Civil Service Commission's (CSC) Presidential Lingkod Bayan Award in 2022.

She also received numerous accolades, including the Outstanding R&D Staffer (Level 2) award, the CSC Pagasa Award in 2006, the PhilRice Executive Director's Award in 2014.

Tita Au's immense contribution in rice research, development, and extension helped her become Scientist I.

Born on May 4, 1958 in Mabalacat City, Pampanga, Tita Au inherited her passion for agriculture from her parents, Victorino and Segundina. She obtained her bachelor's degree in Agricultural Engineering in 1980 at Central Luzon State University.

She acquired her master's degree in Rural Management at the same school in 1996, and her PhD in Community Development at the UP Los Baños in 2010.

Reflecting on her 23 years of service, Tita Au's eyes shimmer with anticipation for her life beyond retirement. She envisions a life filled with newfound adventures beyond the walls of public service.

"I think I will go on several travels; my body desires that," she is enthusiastic during her retirement program. She also looks forward to spending time with her grandchildren.

For her colleagues, Tita Au will always be an epitome of a strong and brilliant, yet soft-spoken development worker.

Thank you for your unparalleled service, Tita Au!

a 50% increase in efficiency and a 95% reduction in labor and supply costs were achieved in breeding drought-tolerant varieties. This also led to the development of advanced rice lines that can withstand occasional drought and soil moisture fluctuations while maintaining high productivity.

He understands the need to improve the quality of life of farming families because he came from one. He finds satisfaction in making contributions toward the development of high-yielding and drought-tolerant rice varieties, which not only benefit farmers but also contribute to agricultural research.

Suralta is a well-published scientist and a recipient of numerous awards in the national scene. He is a son of Poro, Camotes Island, Cebu.

Engr. Kristine Pascual

CC-related research:
AWD, drip irrigation, aerobic rice, greenhouse emission removals

One of her researches focused on the potential of AWD to mitigate methane (CH_4) emissions in a typical rice double-cropping system. She found that stubble incorporation during dry fallow tillage, with AWD practiced early during cropping schedule could substantially reduce the CH_4 emissions despite the country's tropical wet season. This influences the intensive promotion of AWD as a means to reduce carbon footprints in rice farming and enhance water productivity.

Pascual also led the project on drip-irrigated aerobic rice, a potential technological solution to grow rice with limited water. She is also involved in the establishment and dissemination of AWD in the national irrigation system.

Her work on water management is motivated by her interactions with farmers who told her how difficult it is to plant without sufficient water. She dreams that one day, the safe use of AWD will be integrated in the existing rotational irrigation scheduling in the national system.

Pascual's research principle is anchored on the idea that generating reliable and accurate data is important to drawing conclusions and making informed decisions. She hails from Tabuk City, Kalinga.

Vox Pop

What on- and off-farm measures do you employ to mitigate the ill-effects of El Niño or drought?

▶ FREDIERICK M. SALUDEZ

Mart Cauilan
Isabela

We make sure that the land is well-prepared, and the dikes are tightly compact to prevent water leakage.

Alma Austria
Sultan Kudarat

We only water the crops when necessary. We also plant trees and fruit-bearing plants to alleviate extreme heat, and in the end, our children will benefit from them.

Gilbert Morente
Albay

We plant varieties suitable for El Niño like PSB Rc 10. It would also be better to plant high-value crops.

Rey Garcia
La Union

If the water supply is extremely scarce, we dig a well to have an additional source. We also reduce our area planted with rice and grow more vegetables that are resilient to heat to conserve water. It would be great if we could also have a solar-powered water pump.

Jenny Valencia
Camarines Sur

We plant our crops earlier while the soil still has enough moisture. We also plant synchronously to maximize the efficiency of water usage. We make sure to enroll our crops in PCIC [Philippine Crop Insurance Corporation] so that even if they are affected by drought, we will still have compensation.

Leonardo Agudon
Negros Occidental

We are maintaining and cleaning our small farm reservoir, as this is where we get our water supply when it is scarce.

Cecilio Nunez Jr.
Cagayan

I am planting drought-tolerant and early-maturing varieties like PSB Rc 10 or NSIC Rc 152. This is to limit expenses on farm inputs such as fertilizers and diesel, especially in areas with weak irrigation or rainfed areas where deep wells are used.

Rice-adlai snack bar for mobile people

▶ KIARA MAE E. PANYO AND MARIEL ESPINOZA

You can include the rice-adlai bar in your list of nutrition-full snack choices soon! Developed by our researchers from the Rice Chemistry and Food Science Division, this food product has high ash and dietary fiber. With a 30g serving size, this snack bar provides 140 calories of energy, similar to commercially available energy bars.

It can be stored for up to eight weeks at ambient conditions, making it a convenient and nutritious option for people on the go.

Ingredients

- Puffed rice (choices of variety to use as follows):
  - NSIC Rc 160 or Rc 222 (unpolished and polished)
  - Chor-chor-os or Dinorado (unpolished)
  - Ittum or Ominio (unpolished)
- Puffed adlai (polished Gulian variety)
- Salt
- Butter
- Sugar
- Condensed Milk
- Nuts
- Dried fruits
- Calamansi juice

Rice-adlai ratio: 40:60

Preparation

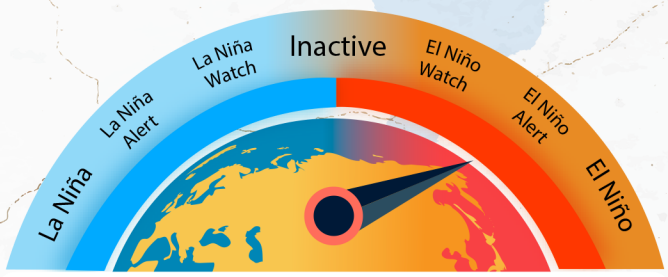
1. Caramelize the sugar with calamansi juice then add condensed milk and butter.
2. Add all the dried ingredients and mix.
3. Mold, cut into bars, and pack.

Nutrition Values

Total Fat	**23.29%**
Sugar	51.38%
Ash	1.48%
Protein	9.23%
Dietary Fiber	1.94%
Moisture	9.24%

ENSO Alert System Status:

EL NIÑO ALERT



A transition from ENSO-neutral to El Niño is favored in the next months, with higher chance of El Niño persisting up to the first quarter of 2024.
(updated 24 May 2023)

El Niño increases the likelihood of below-normal rainfall conditions, which could bring negative impacts (such as dry spells and droughts) in some areas of the country. However, over the western part of the country, above normal rainfall conditions during the Southwest monsoon season (Habagat) may also be expected.

Source: DOST-PAGASA

POLICY PUSH

What can support agencies further do to help our rice farmers adapt to El Niño?

- Make drought-tolerant and early-maturing varieties available and accessible
- Include gender-based preferences in evaluating adaptation strategies
- Intensify promotion of agriculture-based adaptation strategies
- Push weather index-based insurance
- LGUs to invest on other forms of institutional adaptations

(Lifted from the PhilRice publication, Rice Science for Decision-Makers (RS4DM), Volume 10, December 2021 Issue)

Read more

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