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Tooling up Agriculture RDE with ICT

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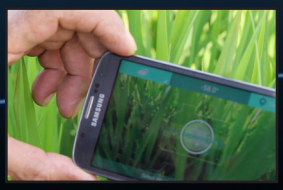


BAR R&D Digest is the official quarterly publication of the Department of Agriculture-Bureau of Agricultural Research (DA-BAR). A staff bureau of DA, it was established to lead and coordinate the agriculture and fisheries research and development (R&D) in the country. Specifically, BAR is tasked to consolidate, strengthen, and develop the R&D system to improve its effectiveness and efficiency by ensuring customer satisfaction and continous improvement through work excellence, teamwork and networking, accountability and innovation.

This publication contains articles on the latest technologies, research results, updates, and breakthroughs in agriculture and fisheries R&D based from the studies and researches conducted by the National Research & Development System for Agriculture and Fisheries (NaRDSAF).

BAR R&D Digest welcomes comments and suggestions from readers.

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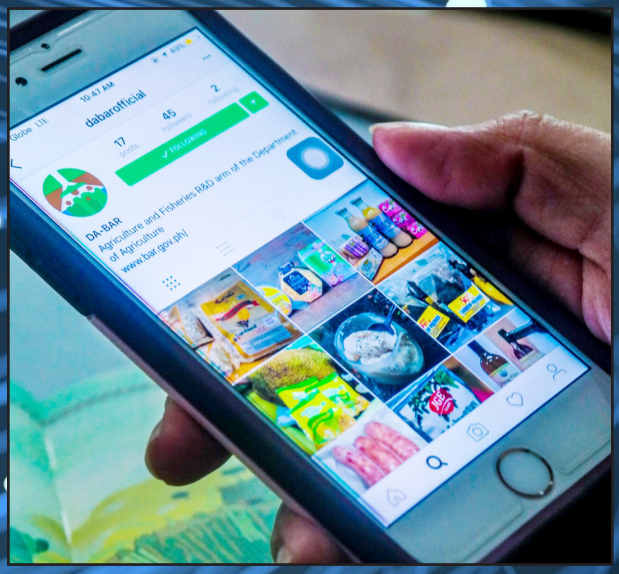

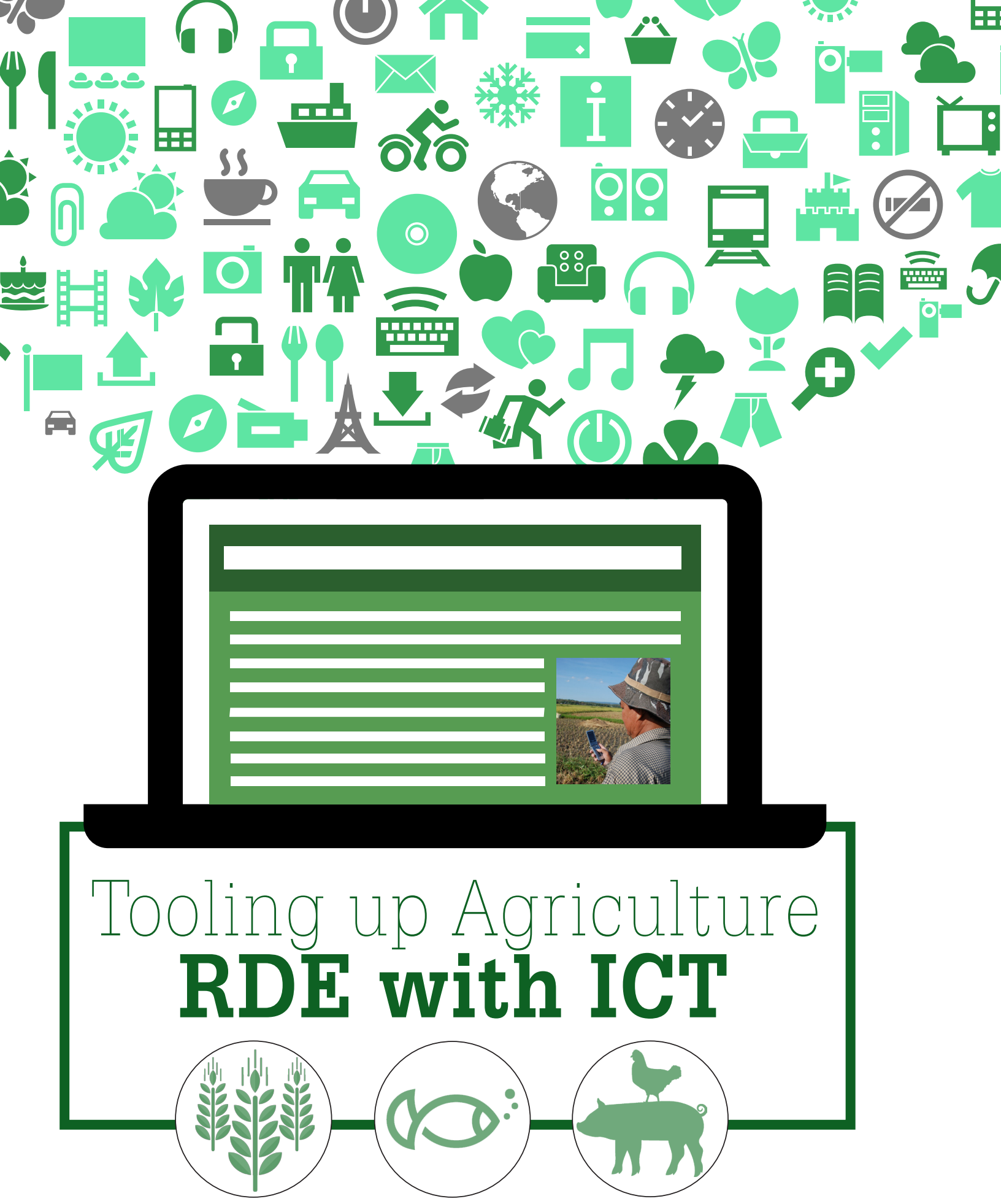

Tooling up Agriculture
RDE with ICT

R&D NOTES

BY: DR. NICOMEDES P. ELEAZAR, CESO IV

Getting technology and other results of agricultural research into the production mainstream has been a challenging mission for workers in research and extension. But with the development of Information and Communication Technology (ICT) in other industries which have successfully applied new information and communication tools to businesses such as business process outsourcing and marketing, agriculture has began to take ICT to heart with its use now in bridging the gaps between research and extension and between the agricultural bureaucracy and its clientele. This has also been assisted by today's e-communication infrastructure that makes possible the receipt and transmission of information through internet and SMS to wherever the recipients happen to be.

It has been noted that government really needs to support ICT adoption in non-IT industries. Mr. Alon Anthony Rejano of International Data Corporation, an international provider of market intelligence, said that this is a must for agriculture and resources and was quoted as saying that "a vision of digital agriculture in the long term is needed" (Reyes, Mary Ann in her column, Hidden Agenda, that appeared in the 4 May issue of The Philippine Star). He was further cited with the observation that "this process should be done gradually and that collaboration between the public sector and service providers will be the most important stage right now". And this is where the meeting up of agriculture RDE with ICT is headed to.

The Bureau of Agricultural Research (BAR) is now taking advantage of the availability of social media. It is now making much use of this to spread its messages on developments coming from agricultural research to a wider audience. The adoption of the popular Facebook is a level up for the bureau in reaching out to the clienteles of the Department of Agriculture (DA).

The bureau has also partnered with other agencies in the development of decision support systems (DSS) for agricultural entrepreneurs tailor-made for those engaged in rice and corn production. The Nutrient Expert ® is a tool developed for corn with the guidance of International Plant Nutrition Institute (IPNI) and the University of the Philippines Los Baños (UPLB) and implemented through the DA regional field offices which provides fertilizer management guidelines that are specific to the farmer's location and locally available fertilizer sources. The Rice Crop Manager (RCM) is another tool that delivers personalized information on nutrient, pest, weed and water management based on the actual conditions of the rice farmer. Both make use of SMS and emails to reach producers.

A DSS tool that is now getting much attention by government agencies that monitor current rice production situations, gains and even losses is the PRISM or the Philippine Rice Information System. Developed jointly by IRRI and PhilRice with funding provided by DA through BAR in collaboration with an array of DA units, this is expected to generate highly accurate information useful for forecasting and planning of government interventions to improve food and nutritional security in rice.

The use of networking is now a staple in DA. BAR has been involved with the development of three networking arrangements at local and international levels. The AFACI-ATIN is an ICT network of 11 member-countries that seeks to improve linkages and interactions across the pan-Asian region. It also envisions the establishment of a super network of existing agriculture database systems and networks among these countries.

The electronic delivery of extension services or e-Learning

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Making agriculture sustainable through ICT

BY: RITA T. DELA CRUZ

Humans are highly social beings. And the advent of Information and Communication Technology (ICT) is changing the way people live. Our need for social belongingness and interpersonal exchange has enabled us to create various social networking tools and platforms to serve as avenues wherein experiences and learnings are easily shared and communicated to others.

Progress in and adoption of ICT are coming at virtually explosive rates, changing the way we work, do business, how we educate our children, and even the way we conduct research either inside laboratories or on-farm. Flow of information becomes more flexible, participatory, and decentralized transcending both time and space.

ICT has no universal definition, as its concepts, methods and applications constantly evolve. But simply put, ICT refers to all computer-based advanced technologies used in managing and communicating information. A convergence of audio-visual and telephone networks with computer networks through a single cabling or link system, ICT covers any product that can record, store, retrieve, manipulate, share, transmit or receive information electronically in a digital form.

ICT in agriculture

Like in any other sector, ICT plays an important role in the development of agriculture. The onset of technological innovations has positioned the sector in a better spot to reach and connect to more people in the most productive and easiest means possible.

ICT in agriculture is constantly being developed and applied in the rural domain, providing solutions and innovations to the many challenges that beset the sector.

Provisions of standards, best practices, methodologies, and tools as well as individual and institutional capacity development, and policy support are key components for the success of ICT in agriculture.

Through ICT, communication between the researchers and its intended users is easily facilitated making their interactions more participative and substantial at any given time.

The Internet provides farmers and fisherfolk with the most relevant and up-to-date information on the cheapest production inputs, highest paying markets, and better technologies ready for adoption. ICT also enables the exchange of more reliable information cheaply and quickly.

Many ICT interventions have been developed and tried, with varying degrees of success, to help farmers and fishers improve their livelihoods and increase their productivity and profitability. Perhaps the biggest impact of ICT in agriculture is in precision farming. Using information technologies, data from

multiple sources are brought on-the- ground to quickly come up with decisions associated with crop production. ICT can provide tools for developing production inputs tailor-made for specific plots within a field, thus potentially reducing input costs, increasing yields, and reducing environmental impacts by better matching of inputs applied to crop needs.

Platforms and networks for R&D

In ICT, a network is a series of points or nodes interconnected by communication paths while platforms refer to the underlying computer systems on which application programs can run.

Applying these to agriculture, these are tools that can be tapped to design strategic research agenda and priorities as well as inspire innovation on the ground particularly to encourage participatory learning.

The government acknowledges the importance of ICT in spurring development in the country. In coordination with the private sector, it leads in the development of ICT infrastructure to provide high speed connectivity and expand linkages even in hard- to-reach places of the country.

The government looks at ICT as a catalyst that can propel different economies throughout the world revolutionizing a transition from a resource-based society to a new information-based society.

The Bureau of Agricultural Research (BAR), as the research and development (R&D) arm of the Department of Agriculture, has been collaborating with various research agencies to promote various platforms and networks that will enable the sector to explore strategies relevant to increasing production and profitability of the farming and fishing communities.

Decision support systems

BAR has partnered with other agencies in the development of decision support systems (DSS), particularly IRRI and PhilRice, to assist farmers in crop management. The recently developed DSS have been specific for farmers who are into rice and corn production. These are Nutrient Expert (fertilizer management guidelines for corn that considers locally available fertilizer sources) and Rice

Crop Manager (personalized information on nutrient, pest, weed and water management based on the actual conditions of the individual rice farmer). Both make use of SMS and emails to reach the users.

Another DSS tool is the Philippine Rice Information System (PRISM) that monitors current rice production situations, gains and even losses. The main client for this are government planners and policy makers who can make use of the highly accurate information for forecasting and planning government interventions to improve food and nutritional security particularly for rice.

Network system

Networking for increasing the reach of information is increasingly resorted to. Under networking arrangements, existing databases and information resources of partners are interconnected to share agricultural information and knowledge. This promotes and improves linkages and interactions not only among the clientele of individual partners but across the collected sets of clientele. This can happen both locally and internationally.

In the Philippines, BAR and other agricultural institutions have banded together to form the Philippine Agricultural Network (PhilAgriNet) to provide access to knowledge sources and technologies from R&D efforts for agricultural researchers and other users, and encourages exchanges and contributions to a central database. The ATI is leading in the use of the e-Extension modality or the electronic delivery of agriculture and fisheries extension services, also functioning as a learning-teaching portal through which courses on various topics in agriculture can be accessed.

International networking is also a reality now with the establishment of the Agricultural Technology Information Network (ATIN), an ICT network of 11 member-countries in the pan-Asian region, the Philippines included, under the Asian Food and Agriculture Cooperation Initiative (AFACI). With the linking up of existing databases and systems of the member-countries, the ATIN collaboration makes possible the sharing of agricultural knowledge and technology outputs, and improves linkages and interactions among countries in the region.

Social Media

One important platform that BAR is fully utilizing is the social media. It allows sharing of information in real time, reaching a far greater audience. The adoption of the popular Facebook and Instagram has leveled up the bureau's mileage when it comes to audience reach, which is now wider and more diverse as even those in remote locations can participate in the exchanges through the use of the internet.

With the advent of social media, information sharing becomes flexible and decentralized allowing much participation from the industry players. This has helped improve decision making, keeping people informed, and providing them better options. ###

Tooling up... from page 5

has been adopted by the ATI to provide an additional avenue in reaching out to various audiences on top of traditional systems for agriculture, fisheries and natural resources sectors. To date, more than 30 e-learning courses on various topics in agriculture have been developed by ATI that are accessible through its internet-based e-Learning facility.

BAR was directly involved with the setting up of the PhilAgriNet, a network of agricultural institutions in the country that is providing access to knowledge sources and technologies from R&D efforts. It takes advantage of the country's participation in the FAO AGRIS project. Ultimately, it seeks to electronically link major agricultural institutions in the Philippines and encourage exchanges and contributions to a central database.

With its support to ICT systems for enhancing the uptake of research-generated technology and information, BAR and the research system are now riding the "next wave". The momentum is gathering and this bodes very well for the strengthening of linkages in the RDE continuum. ###

Rice Crop Manager:

Helping farmers manage rice crops better with personalized advice

BY: VICTORIANO B. GUIAM

In 2013, a revolutionary computer app, Rice Crop Manager (RCM), was launched in the country. Accessed via a smartphone or a computer with internet connection, this application allows extension agents to give farmers specific recommendations on nutrient, pest, weed and water management, depending on the variety that they used, their yield from the previous season, and the site-specific conditions of their field. It was jointly developed by the international Rice Research Institute (IRRI) and the Department of Agriculture-Philippine Rice Research Institute (DA-PhilRice) with DA-Agricultural Training Institute (ATI). Funding was provided by the DA under its Food Staples Sufficiency Program (FSSP) which was facilitated by the Bureau of Agricultural Research (BAR).

The target use of RCM is an increase in yield or productivity with an additional 300 kg of unmilled rice to each crop per season per hectare and raising the net income of rice farmers by about Php 4,500 per crop per hectare. The RCM makes this possible as it provides irrigated and rainfed lowland rice farmers with a crop and nutrient management guideline customized to the individual farmer's needs. The application uses a farmer's answers to questions as to their rice farming practices to automatically generate cropping guidelines.

The RCM concept and framework was developed by IRRI using its expertise with Web and mobile phone applications. The nutrient management guideline provided by the app is based on the principles of Site-Specific Nutrient Management (SSNM) for crops which was further developed for rice by IRRI. The earlier Nutrient Manager for Rice that IRRI developed in 2010 serves as the vehicle for the SSNM-based, nutrient management component of the RCM. RCM also complements existing approaches like PalayCheck which gives additional advice during the cropping season.

The RCM was designed to be used by extension workers, crop advisers, and other input and service providers who interact with farmers using a personal computer, smartphone, or tablet. After an interview, the collected information is stored on the device until it is connected to the Internet through a Web browser. This is then transmitted to the Rice Crop Manager 'model' which calculates and transmits back a crop management guideline

within moments. Each guideline provides an actionable and unique recommendation for the crop which matches the location-specific cropping practices and needs of a farmer. This reaches the farmer as a one-page printout or by SMS to his/her cellphone. As it provides individual farmers with 'modern precision farming' information, RCM empowers them to make well-informed decisions and plan wisely for inputs and effective management of their crop.

As with other decision tools, the RCM had to undergo field evaluation and improvement to ensure confidence in its ability to benefit rice farmers. In addition, the Information Technology (IT) power of RCM still needs to be fully enhanced in the use of SMS and geo-referencing of fields to reach more famers.

The project, "Rice Crop Manager: A comprehensive decision support tool for increasing yields and income for farmers in the Philippines, Year 3" was submitted by IRRI to BAR in 2015. The overall objective is to provide RCM, with an accompanying Rice Adviser, as a field-tested and research-verified decision tool, through personal computers and mobile phones, for DA staff, LGU staff, and farmers in rice-growing regions. The Rice Adviser will provide farmers with personalized advice on crop protection from major pests and on crop management in the growing season.

The Year 1 of the project (April 1 2013 to February 28, 2014), data were collected from five provinces, and an initial RCM version 1.0 was released through the DA in November 2013 as a web and mobile phone application that upgraded and replaced Nutrient Manager for Rice. It included crop management decision-making logic drawing upon the research collaboration between IRRI and PhilRice and the expertise of each organization in rice cultivation. The RCM was field-tested in five provinces in the Philippines, namely: Isabela, Nueva Ecija, Northern Samar, Agusan del Norte, and Oriental Mindoro.

Monitoring in 2013-2014 (dry season at sites in Luzon and Mindoro and wet season at sites in Samar and Mindanao) revealed that farmers' adoption of RCM recommendations increased yield by an average 400 kg/ha across 135 farmer's fields in 10 municipalities. While the RCM recommendation increased fertilizer cost and fertilizer use compared to the farmer's practice, the RCM

PHOTO COURTESY OF IRRI

> *"RCM is a web-based application that provides a farmer with a personalized crop management recommendation after he/she answers a series of questions. It is only for use with irrigated and rainfed rice grown in fields surrounded by bunds."*

recommendation still generated additional income relative to the farmer's practice by an average Php 4,731/ha in the season.

At an average increase of Php 4,700 per hectare in income for farmers adopting RCM recommendations, this would correspond to an increase of about Php 23 million from 5,000 hectares of rice grown per season. If RCM is applied on 500,000 hectares in each of two rice-growing seasons nationwide, this would theoretically correspond to an annual increase in income for rice farmers of about Php 4.7 billion.

Year 2 was about building of the capacity of local partners in the regions in the use and promotion of RCM (2014-2015), the collection of essential data for updating RCM and preparing the accompanying Rice Adviser application (2014-2015), and building the capacity of PhilRice staff in the development, testing, and maintenance of RCM (2013-2015).

Project objectives for Year 3 were revised to include: a) Collection of essential data for enhancing RCM for irrigated and rainfed rice and preparing an accompanying Rice Adviser; b) Release of an upgraded version 2.0 of RCM and release of an accompanying Rice Adviser; c) Provision of technical expertise on RCM to DA-RFOs and partners in the regions in use and promotion of RCM; d) Maintain uninterrupted operation of RCM and provide DA-RFOs with information on use of RCM; and e) Build capacity of PhilRice staff in the development and testing of RCM. The project's research area was expanded to include three additional locations with rainfed rice to test and refine RCM for rainfed rice. The research will contrast the farmer's current crop management practice with management recommendations provided through RCM.

PhilRice is leading the field research activity with assistance from DA-RFOs, RIARCs, LGUs, and IRRI. In addition, PhilRice field staff help test and evaluate new features of RCM such as capabilities for use of SMS, the use of GPS to determine field size, and monitoring of famer's practices. Determinations of in-season performance of the rice crop obtained through remote sensing in PRISM Component A will be interfaced with Rice Adviser in order to provide farmers with nutrient and crop management recommendations that closely match current climate and crop-growing conditions. PRISM is a planning and monitoring tool developed by IRRI and PhilRice for the DA with Component A serving as a databank of actual rice area and yield, and maps of specific rice-growing areas affected by flooding and drought.

From January - August 2015, some 250,000 RCM recommendations with improved crop management practices had been provided as one-page printouts to farmers. Field trials in farmer's fields continued to show increased net income for farmers using various RCM recommendations. ATI established an RCM-based SMS advisory service in June 2015 which provides RCM farmers with reinforcing and supplementary farming advice at appropriate crop growth stages. The prototype of a new web-based tool to help farmers diagnose and solve rice crop health problems was presented at a meeting on RCM meeting on 24-28 August 2015 and may be available to extension workers and farmers in December 2015.

Rice Crop Manager can be accessed for free at www.webapps.irri.org/ph/rcm. It can also be downloaded as an app named 'RCM PH' via the Google Play Store. ###

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Decisions made easy: Precision farming through Nutrient Expert®

BY: DARYL LOU A. BATTAD

In this modern age where technology translates into necessity, it is equally important to recognize its value in the field of agriculture. While there are many forms of technology, one particular resource finds its way and stands out in the agriculture sector.

Precision farming, which makes use of an information and technology-based system for within-field management of crops, is already extensively and widely used in most developed countries such as the United States. In yet-developing countries like the Philippines, this agricultural breakthrough, although at a slower pace, is already gaining some popularity.

The International Plant Nutrition Institute (IPNI), a non-profit, science-based organization dedicated to the responsible management of plant nutrition, took the initiative to develop a tool dedicated to help researchers, farmers, and other stakeholders in a high-precision nutrient management specifically for corn.

The challenge on Philippine corn

Corn is considered the second most important crop in the Philippines. It is a versatile crop which is used as human food and animal feed. Over 1.8 million farmers depend on corn as their major source of income. In periods of rice shortage, farming families bank on white corn as substitute. Yellow corn, on the other hand, is the primary source of livestock feed, and is increasingly being used in the manufacturing sector.

Such vital role portrayed by corn opened many opportunities for stakeholders to revive, boost, and sustain corn production in the country. Data showed that corn production in the Philippines increased at an annual rate of 1.7 percent over a 20-year period from 1980 to 2000. However, after production peaked in 1990 at 4.9 million metric tons, a sharp decline was posted in 1998 when the El Niño phenomenon affected the region. The total area devoted to corn was also highest in 1990, at 3.8 million hectares, but was observed to be on the decline at 1.9 percent per year from 1985 to 2001.

Although many contributing factors were established to have caused this downgrade in the industry, researchers and experts attribute it to inefficient fertilizer and nutrient management, among others. Over and imbalanced fertilization, according to a study conducted by IPNI, has been the limiting factor in the yield increase of maize among the Southeast Asian regions.

The rise above the challenge

With a thriving precision farming and the upsurging challenges posed by the corn industry in the Philippines, IPNI developed the Nutrient Expert® tool attuned to the country's agricultural setting. In 2005, the Department of Agriculture (DA) through the Bureau of Agricultural Research (BAR) started a partnership with IPNI to develop site specific nutrient management (SSNM) measures leaned towards productivity.

SSNM refers to science-based nutrient management recommendations that take into account the soil, crop to be grown, and growing conditions of a specific location. It considers the timely application of fertilizers at optimal rates to fill the gap between the nutrient needs of a high-yielding crop and the nutrient supply from naturally occurring indigenous sources, including soil, crop residues, manures, and irrigation water. Further, it aims to sustain higher yields while assuring soil fertility restoration.

The three-year project on SSNM for corn carried out the evaluation, participatory appraisal, and finally the delivery of SSNM. In a span of 10 years, through collaborative efforts of IPNI, BAR, DA regional field offices, and the University of the Philippines Los Baños (UPLB), SSNM was validated on-farm with significant, promising results both for white and yellow corn.

These developments served as milestones in the systemization of the Nutrient Expert® tool.

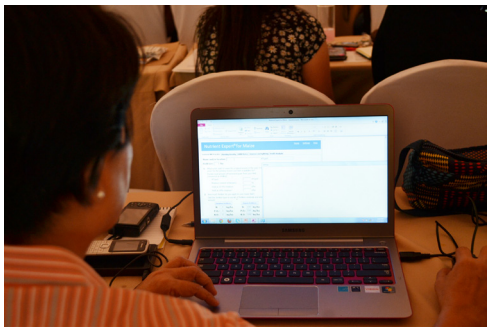
Birth of the precision farming tool

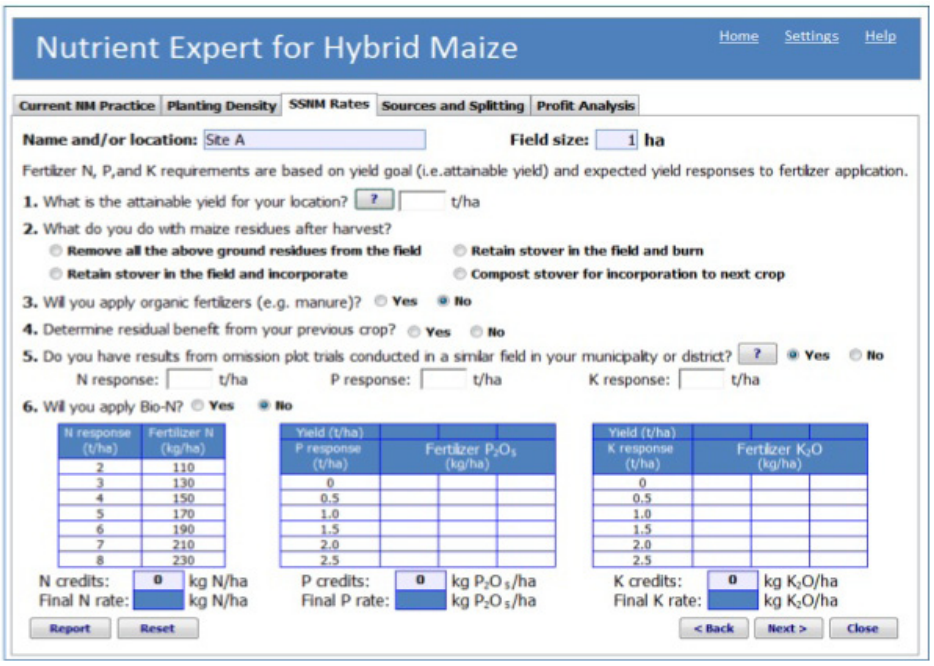
Integrating the SSNM principles, the Nutrient Expert® was devised to simply increase farmers' yield and profit in corn production by generating high-precision fertilizer recommendations tailored to the farmers' given conditions — agronomically and economically.

Nutrient Expert® is an easy-to-use, interactive, and computer-based decision support tool that can rapidly provide nutrient recommendations for an individual farmer field in the presence or absence of soil testing data. Additionally, it follows the Quantitative Evaluation of the Fertility of Tropical Soils (QUEFTS), a method to estimate site-specific marketable yield and the effect of fertilizer application on the yield for a given crop on the basis of soil and crop characteristics.

Dr. Mirasol Pampolino, deputy director of IPNI Southeast Asia Program (SEAP), led the development of the Nutrient Expert®. According to her, this tool simplifies the implementation

"Nutrient Expert® is an easy-to-use, interactive, and computer-based decision support tool that can rapidly provide nutrient recommendations for an individual farmer's field in the presence or absence of soil testing data."





of SSNM, as farmers and crop advisers alike can easily provide site and farming information which include current yield and nutrient management practice; farmer's current planting density; characteristics of the growing environment or estimate of the attainable yield; soil fertility indicators or estimates of yield responses to fertilizer specifically nitrogen (N), phosphorus (P), and potassium (K); and crop residue management and use of organic inputs. Information on nutrient carryover from previous crop is also necessary to adjust fertilizer P and K requirements as merited.

Once the initial information are supplied, guidelines on fertilizer management are generated and tailored according to the farmer's site location and locally available fertilizer sources. The final report on the SSNM recommendation can be sent to the user's email or through SMS, for greater accessibility. The decision rules for calculating fertilizer requirements were developed from on-farm research data, carefully validated over five years of testing.

In addition, the software also presents simple profit analysis, comparing costs and benefits between the farmer's current practice and the recommended alternative practice. Depending on budget and the anticipated fertilizer cost and gross profit, the farmer has the liberty to choose a lower or higher yield.

Moreover, Nutrient Expert® was designed in a way that it can be used as a learning tool — providing quick helps, determining risk management, instant summary tables and graphs, plus allowing a great amount of flexibility in navigating through the modules in the software.

Crop performance

Through various trials and field validations of the Nutrient Expert® on maize conducted in 31 fields across seven sites in the country, Nutrient Expert® for hybrid corn increased yield by 1.6t/ha. Compared to farmers' fertilizer practice, Nutrient Expert® on hybrid corn gave higher rates of all three nutrients (+25 kg N/ha, +4 kg P/ha and +11 kg K/ha), increasing fertilizer costs, but still increasing profit by about six times the additional investment in fertilizer.

In the 2011-2014 report on the field performance of the Nutrient Expert® in 190 experiments across the country, data on the farmers' fertilizer practice reveals significant gaps in the P and K application against Nutrient Expert® recommendations. With the software recommendations, however, crop performance in terms of yield and profit grew by 1.1 t/ha and over Php 11, 000 respectively.

In conclusion, the increase in yield through the use of the Nutrient Expert® decision tool was fundamentally attributed to the increased rates of essential nutrients applied at critical growth stages of corn. The field validation activities conducted by

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Increased rice production through

PRISM

BY: PATRICK RAYMUND A. LESACA
PHOTOS COURTESY OF PhilRice and IRRI

Rice, as the country's main food staple, plays an important role in Philippine agriculture, not only for its contribution to food security and its nutritional value, but also as one of the bases used by government planners and economic managers in determining the growth of the agriculture sector.

Having accurate rice information pegged on current situations, gains and even losses, helps the government and rice farmers calibrate planting and harvesting schedules based on weather forecast conducted by government institutions like the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), among others.

Disturbing weather patterns like El Niño, La Niña, floods, and the like, can affect production as a result of huge damages, and can alter government's rice target policies. These scenarios can also affect pronouncements on food security and other related concerns, and therefore requires precise information immediately. The Department of Agriculture (DA) has remedied the situation by institutionalizing the Philippine Rice Information System or PRISM.

The PRISM

With funding support from the DA-National Rice Program, through the DA-Bureau of Agricultural Research (BAR), the DA-Philippine Rice Research Institute (PhilRice) collaborated with the International Rice Research Institute (IRRI) and other government agencies on a three-year project titled "PRISM: Philippine Rice Information System

– An operational system for rice monitoring to support decision making towards increased rice production in the Philippines".

PRISM is a field-based crop health and production situation monitoring system that aims to gather and provide rapid, detailed and accurate information on the rice crop status from the field during the growing season. The system provides damage assessment information on crop damage and losses resulting from flood and drought.

"PRISM is a field-based crop health and production situation monitoring system that aims to gather and provide rapid, detailed and accurate information on the rice crop status from the field during the growing season. The system provides damage assessment information on crop damage and losses resulting from flood and drought."

At the end of the season, crop cuts were done to validate the yield estimates and farmers were surveyed to gather information on the practices that they used during the growing season. These data were collected using smartphones and uploaded to a centralized database. This demonstrated that the use of mobile technology could be used to facilitate data collection in the field and facilitate the rapid flow of information. This also demonstrated that data collection methods could be standardized across the regions for improved data analysis and policy making. Cleaned data, graphs, maps, and other summaries of data collected were shared with the regions.

Based on the June-September 2015 progress report submitted by the project proponent from rice growing areas, except for Region 12, 780 fields across 42 municipalities in 25 provinces and 15 regions were monitored. There were 2,094 crop health and 910 yield (based on crop cut), pesticides and fertilizer field observation records submitted to the database for further analysis. A total of 754 sattellites images (Synthetic Aperture Radar images) and regular ground information captured from 2014 to present were

used to develop a technological process that will dynamically map the physical rice growing areas and monitor the developmental stages of rice production, estimate yields, estimate yield lost due to calamities, and monitor pest and diseases in country's 16 regions where rice is grown. PRISM generated preliminary maps of flooded areas and flooded rice areas resulting from the major typhoons within 2014 and 2015. Rice yields were estimated using ORYZA, a process-based and weather-driven crop growth simulation model. A total of 741 participants from DA-Regional Field Offices (RFOs), provincial and municipal agriculture offices, and DA central office and attached agencies were trained on the use of technologies for rice crop monitoring and pest and disease diagnosis. The trainings included training of trainers, re-tooling, and assessment workshops and protocols on pest injury and disease identification, use of field equipment such as moisture meters and smartphones, GIS and remote sensing.

The PRISM's main purpose is to gather and organize information on rice yield, yield gaps and the causes of these yield gaps, and to provide information to key stakeholders for policy support. It also supports the vision of a strengthened DA with the capacity and infrastructure to use information technology for a more food secure future. The PRISM's mission is to support the DA in regional and national decision making process for rice security by using state-of-the-art technologies to generate rice crop information and enhancing the capacity of the DA to collect, analyze, disseminate, and use this information.

Other government agencies involved in the project are the DA-Regional Field Offices, Bureau of Plant Industry, Bureau of Soils and Water Management, Philippine Statistics Authority - Bureau of Agricultural Statistics (PSA-BAS), Bureau of Plant Industry (BPI), Regional Field Offices (RFO) and Regional Crop Protection

Centers (RCPC). DA-PhilRice has commissioned Sarmap (a Swiss-based software developer), which facilitated the acquisition of 443 Synthetic Aperture Radar (SAR) remote sensing images over the monitoring locations. Each partner has a strong commitment to facilitate capacity building and trainings, which are essential to sustain PRISM beyond the project. PRISM works closely with several DA agencies that act as advisors to the project who receive training and conduct fieldwork and validation of products

The PRISM can also assist the DA's Food Staples Sufficiency Program by supporting decision-making toward increasing sustainable rice production in the Philippines. It will achieve this by identifying the major factors that adversely affect production each season and by quantifying the opportunities to improve productivity in the major rice-growing areas of the country. It is also expected to benefit the rice farmers by the provision of right information on when and where they can improve rice planting through new and appropriate technologies. It is a worthwhile project of the DA which will enable planners and policy makers to quickly respond to the needs of the farmers. ###

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The former website of PhilAgriNet

Agricultural literature is a valuable resource in an agricultural country such as the Philippines. Making agricultural knowledge available and accessible to people, particularly to researchers and scientists, enables the development of viable solutions to challenges confronting the sector. While some of the local researches and technologies are being captured in existing databases of some agricultural institutions, the need to gather and efficiently link them to people brought to existence the Philippine Agricultural Information Network, Inc. or simply PhilAgriNet.

Tracing the network's roots

In July 2003, a capacity-building training workshop for the Food and Agriculture Organization (FAO) of the United Nations was conducted at the International Rice Research Institute (IRRI). Organized by the Agricultural Librarians Association of the Philippines (ALAP), the workshop aimed to raise awareness and encourage the country's participation in the FAO AGRIS project. AGRIS, or International System for Agricultural Science and Technology, is a global public database being maintained by Coherence in Information for Agricultural Research for Development (CIARD) that provides access to bibliographic information on agricultural science and technology.

Back then, the national source of agricultural bibliography, the Philippine Agricultural Bibliography, stopped publication. Hence, the workshop participants were encouraged to participate in AGRIS, realizing the need for an electronic central database of Philippine agricultural literature that will provide access to scientists and researchers both in and out of the country.

A week after the activity, information providers from key institutions including IRRI, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), University of the Philippines Los Baños (UPLB), and Department of Agriculture-Bureau of Agricultural Research (DA-BAR) convened and conceptualized the creation of an agricultural information network. This paved the way for the emergence of PhilAgriNet, a systematized network of Philippine agricultural institutions intended to provide enhanced access to knowledge sources and technologies generated in R&D through equitable, cooperative, and cost-effective means.

The PhilAgriNet was formally launched in December 2004 during its first general assembly held at BAR. Charter members were composed of BAR, IRRI, Philippine Rice Research Institute, ALAP, and 10 state universities and colleges (SUCs) including UPLB. BAR and UPLB were given the task to host and maintain the electronic database.

PHILAGRINET:

Providing access to **Philippine agri knowledge**

BY: ANNE CAMILLE B. BRION

Establishing the network

Since its inception, PhilAgriNet has engaged in training workshops and capacity-building activities for the development of the central database alongside capability enhancement for member institutions. With funding support from FAO and DA-BAR, coupled with logistics provided by ALAP, a series of activities were conducted. These included refresher cum intensive training course on WebAGRIS; seminar workshop on retooling Filipino librarians on digital resources, database creation, and management; and enhancing the capacity of information professionals for effective agricultural information management, sharing, and dissemination; among others.

In June 2010, BAR provided a server to PhilAgriNet to serve as the central database. It was also the time when the PhilAgriNet website was launched in UPLB. Found in the website were information about the network, activities, library services, and membership details.

According to Ms. Julia A. Lapitan, project coordinator and head of DA-BAR's Applied Communication Division, the database has almost 7,000 records to date consisting of agriculture and fisheries-related thesis and dissertations from SUCs. Apart from these, research outputs and other information, education, and communication materials from DA-Regional Field Offices were also included in the database. "Currently, the website is undergoing changes in its interface to make it more user-friendly and provide a mechanism for information exchange among members through a forum. Continuous improvement of the online portal is being undertaken to cater to the growingmember of institutions who are interested to join the network," Ms. Lapitan said.

> *"PhilAgriNet is a systematized network of Philippine agricultural institutions intended to provide enhanced access to knowledge sources and technologies generated in R&D through equitable, cooperative, and cost-effective means."*

Ultimately, PhilAgriNet aims to link major agricultural institutions in the country electronically and encourage contribution to the central database. PhilAgriNet recognizes that strong commitment and dedication among its members, active leadership and management support by DA-BAR, continuous technical assistance from FAO and other lead agencies including IRRI and UPLB, as well as sustained capacity building by ALAP, will help the network provide responsive and high quality programs and services that will allow for efficient knowledge sharing, thus contributing to agricultural research and development. ###

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Networking agriculture research and extension in Asia through ICT

BY: MARA SHYN M. VALDEABELLA

With a population of over 4.2 billion and with two-thirds of the world's one billion hungry as its residents, Asia faces a tremendous challenge of responding to the growing and increasing demand for agricultural products. Further threatened by the effect of climate change coupled by human-induced threats to natural resources, the region's agricultural productivity growth and development continue to decline.

Adapting to these changes and challenges, the region invests on developing and innovating agricultural knowledge. The focus areas of agricultural research shifted. From yield improvements and productivity then, agri-fishery R&D initiatives are now focused on sustainability, climate change adaptation and mitigation, and non-technological innovations, such as institutional, policy, and marketing innovations. Strong advocacy on systematic rural development is also being looked upon. On top of these, the region gives emphasis on advancing research and disseminating research findings as necessary steps to sustain agricultural productivity.

Asian R&D interaction to extension through ICT

With more than two billion Asians relying on agriculture for their livelihood, various research initiatives have been implemented to generate information and technologies that ensure agricultural productivity, thus, the availability of thousands of information materials relevant to agriculture and fisheries research and development. In order to optimize the use and benefit of these materials to the sector, they must be disseminated and shared. Opportunities for more interaction between research and extension to benefit the rest of the world, most especially the farmers and fishers, must be established.

To better facilitate linkages and interactions between regional and international organizations, a network wherein members can enhance research-extension

partnerships across and beyond the region becomes a viable solution. Further, a system or tool that can facilitate communication between diverse agriculture and fishery stakeholders must be utilized. Revolutionizing the way people interact and share information across the globe, Information and Communication Technology (ICT) is being tapped to, not only ensure communication, but networking and interaction among key players in the industry.

AFACI-ATIN project

The International Technology Cooperation Center (ITCC) of the Rural Development Administration (RDA) of the Republic of Korea led the implementation of the project, "Establishment of Agricultural Technology Information Network (ATIN) in Asia" in 2010. Funded under the Asian Food and Agriculture Cooperation Initiative (AFACI), the project sought to establish a collaborative network of existing agri-based database systems and networks among the 11 AFACI member countries, one of which is the Philippines.

Under the project, a standard content management system platform, in the form of a website, was created to house and facilitate agriculture-related materials and literatures contributed by the member-countries of AFACI. With this, an avenue for information sharing and networking —where each can mutually learn and compare situation to other countries for individual and collective development —becomes readily available to the other members.

The Bureau of Agricultural Research (BAR) serves as the Philippine-partner to this project. With the goal to utilize modern technology as a logical, fast, and manageable means of information dissemination among the AFACI-member countries and beyond, BAR has uploaded and shared through the ATIN website a total of 10 info materials. Apart from

this, the project also allowed BAR to support the production of various forms of IEC materials including books, manuals, flyers, crop calendar, audio visuals, and others that the bureau has shared to farmers, fisherfolk, and its R&D partners all over the country. Specifically, three AFACI-ATIN-sponsored agriculture books were uploaded and shared:1) *Mga Pamamaraan sa Organikong Gulayan* (Organic Vegetable Farming) of the University of the Philippines Los Baños, 2) Package of Technology of Different Vegetable Crops of the DA-Regional Field Office 4A, and 3) Handbook on the Identification and Control of Pigeonpea Insect Pests and Diseases of the Mariano Marcos State University. These publications were produced and launched in 2012 in South Korea.

Through the project, Philippines was able to obtain valuable pieces of agricultural information that guided our agri-fishery researchers in generating technologies that are tailored to the local needs of our farmers and fishers. By having an access to these agricultural innovations and information, the country was able to capacitate and enhance its knowledge-pool and be abreast with the agriculture developments that worked for other countries. Likewise, the country's collaboration with AFACI enabled BAR to reach out and contribute to the delivery of agricultural research of other AFACI member countries like Bangladesh, Cambodia, Indonesia, Korea, Lao PDR, Mongolia, Nepal, Sri Lanka, Thailand, and Vietnam.

By making agriculture research knowledge available through ICT networks such as ATIN, a more convenient way of access becomes available. Through the use of ICT, creating a strong link between research and extension has become easier. This translates to improved communication and may open possible collaboration and cooperation not only among AFACI-member countries but also with other agricultural countries all over the world. Through these interactions, together, these member-countries continue to find solutions to the threats and challenges being faced by the agriculture sector. ###

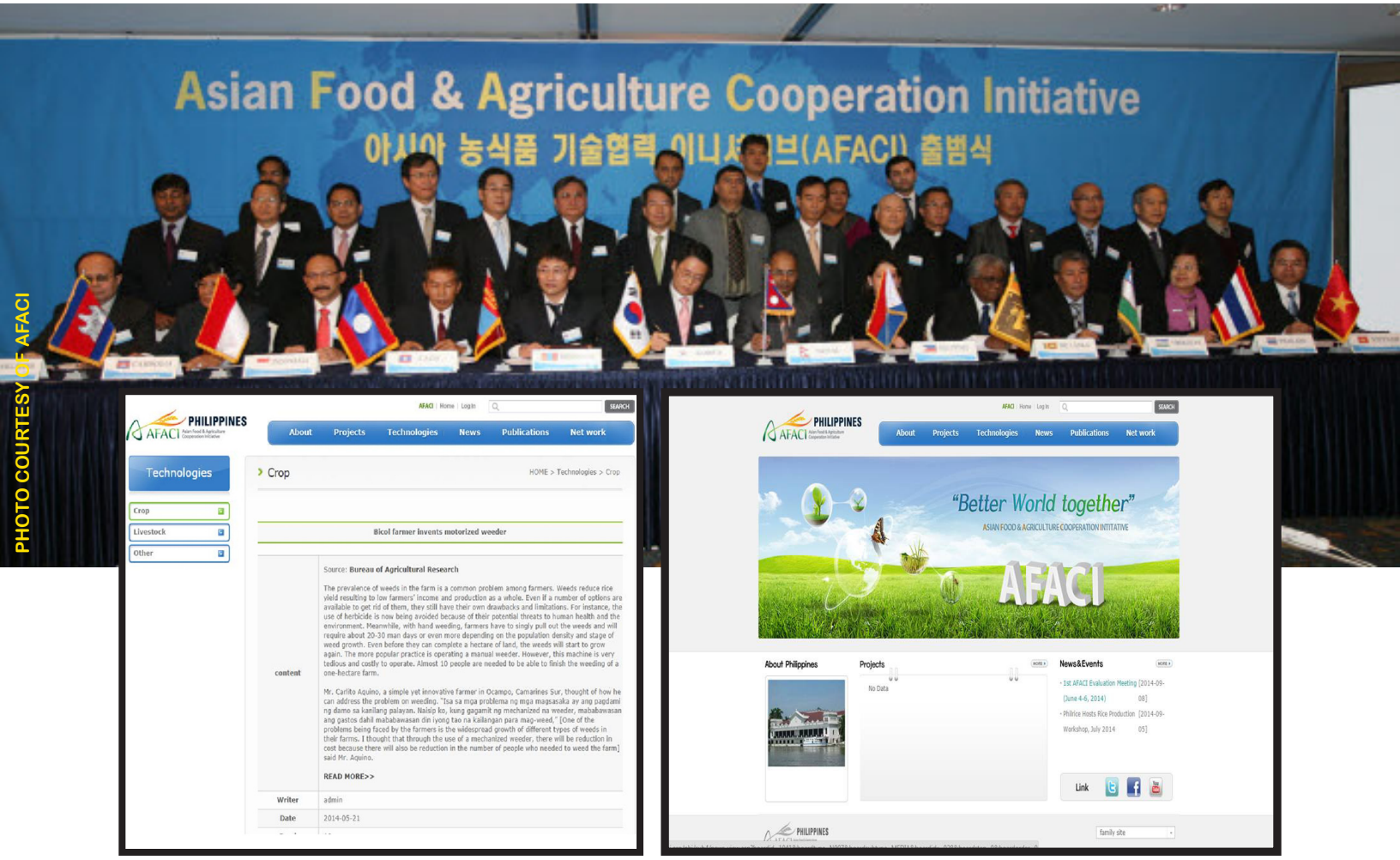


PHOTO COURTESY OF AFACI

e-Learning:

Agricultural learning in a digital age

BY: DIANA ROSE A. DE LEON

Filipinos put a high regard for education as they see it as an answer in finding better job and a relatively high salary. According to Nielsen Global Survey of Education Aspirations in 2013, nine out of 10 Filipinos believed that a good education can pave the way to a better life.

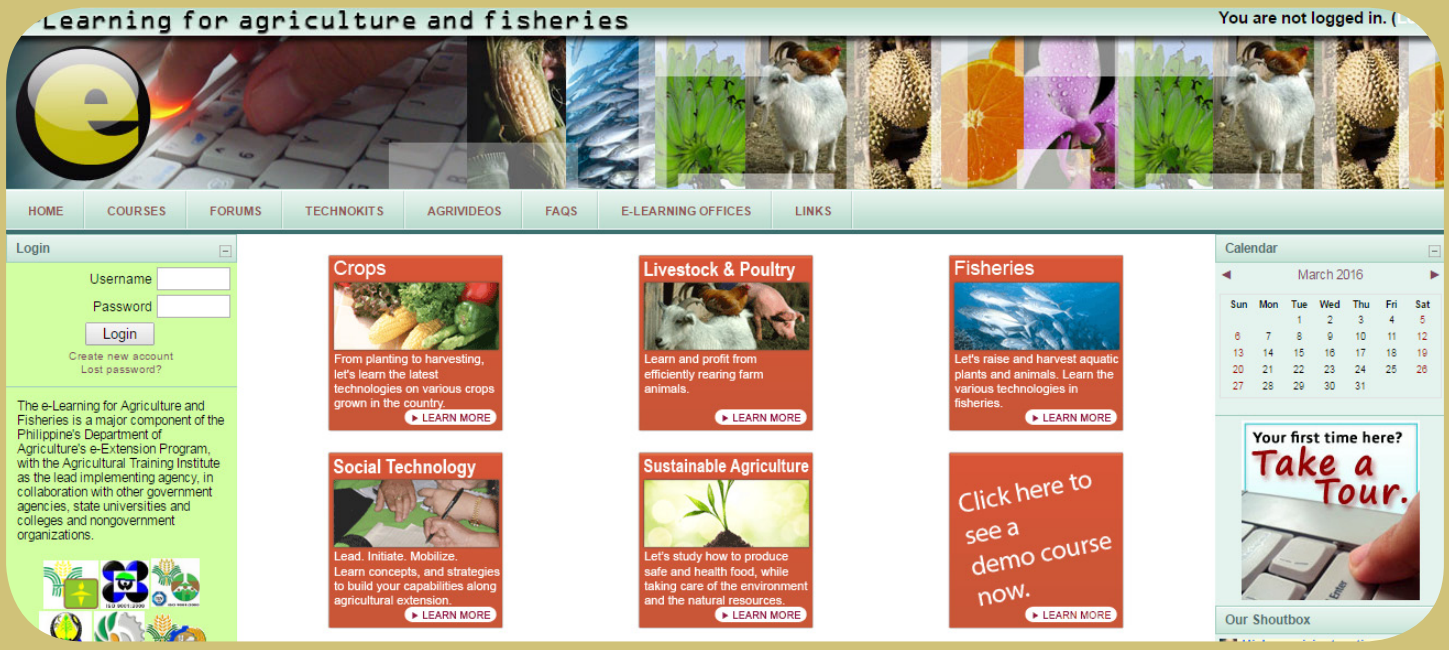
However, not every family can afford formal education. Financial aspect hinders most parents in sending their children to school making low-earning Filipinos cash-strapped. But with the emergence of Information and Communication Technologies (ICTs), access to education not only becomes available but also affordable.

ICT and e-Learning

In its broadest definition, ICT is a combination of hardware, software, and communication devices and applications. It is considered as a game-changer in educational systems. Many educational institutions adapted and integrated ICT in their school curricula, and utilized these technologies to improve the dynamics of teaching and learning. As it is believed that with continuous dominancy of modern technologies in the 21st century, being a technological savvy and digital literate is a must to be able to build on individual's competence and competitiveness.

With this, the ICTs present nowadays gave birth to new platforms of alternative learnings, one of which is through e-Learning.

In its simplest definition, e-Learning is "learning conducted via electronic media, typically on the Internet." Its origin goes way back to the 1980s. However, until today, there are contentions on the definition and scope of e-Learning. There are authors who argued that "e-Learning should not be limited to instructional methods delivered via CD-ROM, the Internet or an Intranet but should also include audio- and videotape, satellite broadcast and interactive TV." e-Learning has also became synonymous to distance learning and online learning, since both transcend the boundaries of time and place to facilitate learning. Yet, there are still reservations



about the interchangeability on the use of terms as they have their own characteristics that make them different from one another.

To give a clearer understanding on e-Learning, Louis Bonder of the University of Amsterdam, highlighted the important characteristics of e-learning, namely: 1) digitization of course materials, 2) delivery of the materials regardless of the learner's location, 3) learner studying at his or her own pace, 4) information must be free-flowing, 5) platforms must be interactive, 6) learning must be collaborative. These features enable e-Learning to suit specific learning needs and styles of the student.

Prospects of e-Learning in agriculture

As various modalities of teaching and learning become available via Internet, different institutions are using these to deliver and share knowledge to the public. One that benefited from all of these, aside from the education sector, is the agriculture and fisheries sector.

In a report released by Ambient Insight, a US-based market research firm, the Philippines ranked seventh on the list of countries with high growth of e-learning revenues. This is attributed to the government efforts of pursuing e-Learning in education and agricultural sectors.

Through the agricultural research and development (R&D) endeavors done by various institutions, many research outputs are produced and need to be disseminated to potential knowledge users including farmers and fisherfolk. Thus, provision of extension service, which now includes electronic means of service delivery, is crucial to facilitate the transfer of knowledge and increase the number of technology adopters.

Another reason to push forward e-Learning initiatives in agriculture is the ASEAN Economic Community (AEC), wherein one of its pillars is transforming the ASEAN region into a single market and production base. One of the key challenges that the Philippine agriculture faces is the stiff global market competition. With this, strengthening the capacities of the stakeholders involved in agricultural value chain through education and training may harness favorable outcomes for building a more competitive agriculture and fisheries sector.

Extending electronic extension

The Agricultural Training Institute (ATI), as the extension and training arm of the Department of Agriculture, has been extending extension modalities to improve productivity, to increase profitability, and to boost global competitiveness of farming and fishing communities.

Seeing the benefits of e-Learning to agriculture, ATI launched in 2007 its e-Extension Program that will complement the existing extension activities done by the agency such as school-on-the-air, farmers' field school, technology demonstration, farmer-led extension, field day, among others. The e-Extension program is an "electronic delivery of extension services by a network of institutions to provide a viable modality to the more traditional extension systems for agriculture, fisheries and natural

resources sectors." One of the major services offered by the program is e-Learning alongside with e-Farming and e-Trading.

Partnering with government agencies, state universities and colleges, and non-government organizations, ATI has developed more than 30 e-Learning courses covering topics on production, postharvest, processing, and marketing practices of various commodities. There are also special topics on social technologies that include proposal writing, community organizing, and training management, among others.

The Bureau of Agricultural Research (BAR), one of the ATI's partner organizations in this endeavor, has led the development of a courseware on seaweed farming. It is a five-module course that provides information on site selection, production and maintenance, various culture methods, and harvest and postharvest handling. Seaweeds is one of the major export commodities of the country, and seaweed farming is one of the viable livelihoods that can be ventured into by those living in coastal areas since it only requires minimal investment but with high profit.

Since it was launched, there have been 399 enrollees on seaweed farming through the e-Learning portal. The ATI has recorded more than 27,000 enrollees. ###

PHOTO COURTESY OF ATI

To access the ATI's e-learning portal, visit: http://e-extension.gov.ph/elearning/

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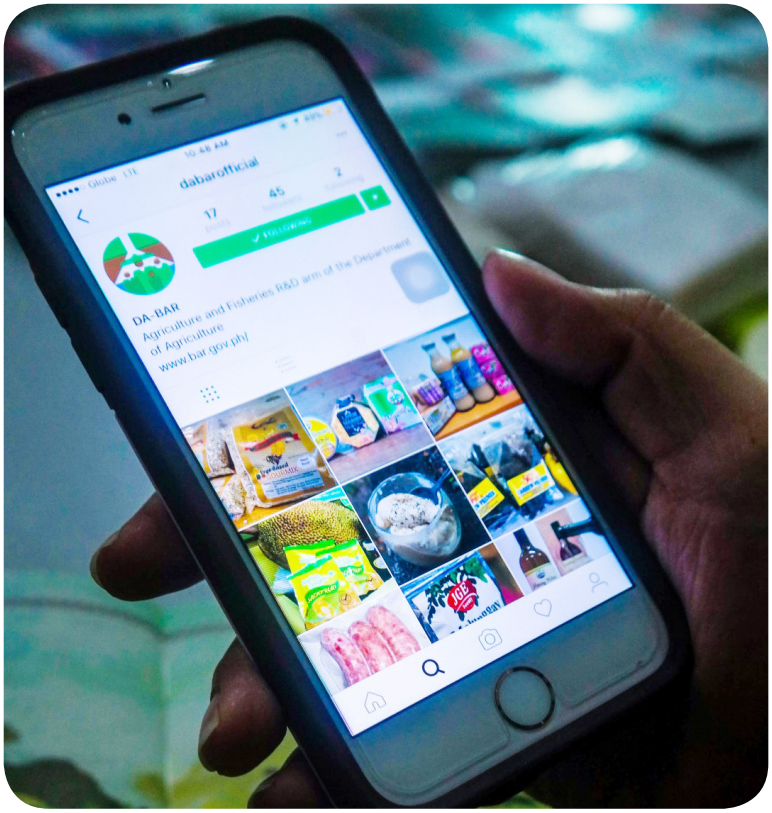
From FarmVille to FB empowerment:

Agriculture's early manifestations on social media may have come in the form of video games that got everybody hooked. Remember the days when you'd curse yourself for forgetting to water your plants in FarmVille? Or that time when you were oddly overjoyed at the fact that you got through the hardest wave of brain-sucking creepers in Plants vs. Zombies? It's not surprising that real farmers would have thought of Facebook as more of a threat to the true essence of their practice than a powerful tool for expanding their knowledge.



Redefining agriculture with social media

BY: EPHRAIM JOHN J. GESTUPA

Fast forward to 2016 when government agencies are migrating to paperless operations and to greater reach via social media. Today, the hand that is mandated to help improve this nation's farmers and fisherfolk is also making their fingers busy within the virtual world. With nearly every Filipino flocking towards Facebook, Twitter, and Instagram, government agencies saw the need to take advantage of the population's persistent social media presence.

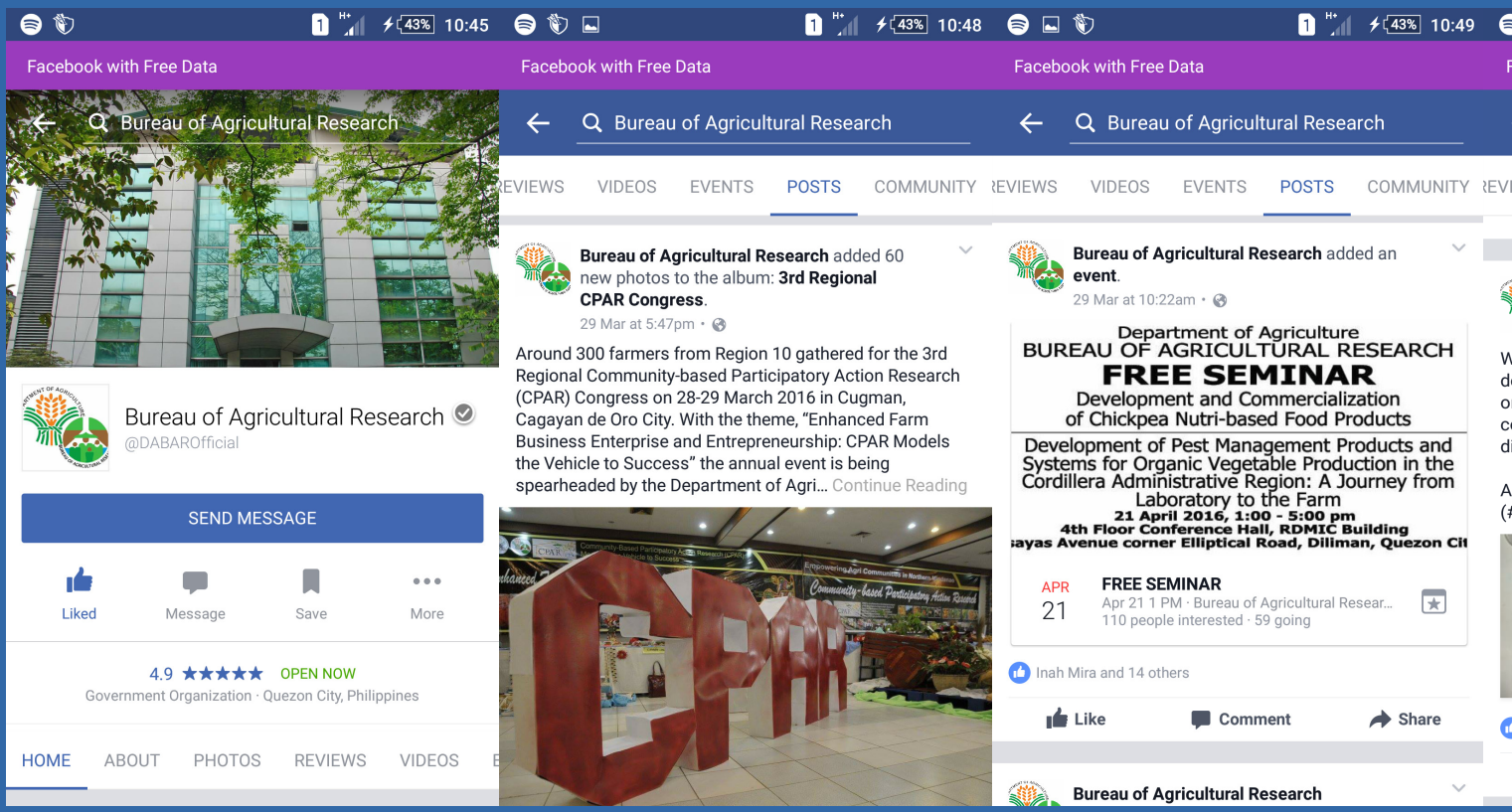
Early beginnings

The Facebook Page of the Bureau of Agricultural Research (BAR) was officially established in June 2015. It started with just posting the links from the bureau's previous newsletters and quarterly magazines, functioning as a mirror to what was being posted on the official website. Given the familiarity and ease in navigating Facebook as a platform, its interface has made it easy for managers to post contents as well as track important statistics of the page's following.

With a Facebook page, an agency can share a wide array of content equally if not, much more accessible to a user compared to that in the agency's website. Using the "share" feature, users can be updated with the latest articles, videos, and powerpoint presentations on one page. Content from research partner agencies and organizations can also be shared for followers to have an idea of what else is going on in the agriculture industry.

The page has proven to be very useful in putting out announcements of the seminars that the bureau regularly conducts. By uploading an "event" announcement on FB, the bureau gets an idea of how many people are planning to attend the seminar. Subscribers are also reminded within the week of the seminar event.

According to Mr. Ryan Abrigo, one of the content managers of the BAR's FB page, ever since they've began announcing the seminars via Facebook, attendees increased



from an average of 30-40 participants to 80-90. One major factor that led to BAR's page getting traction is when they implore seminar attendees to like the page where they can not only learn about future event announcements but also be referred to the links of the powerpoint presentations used during the seminars.

To date, BAR's subscribers on Facebook has grown from 800 to 2000+ followers in the span of five months.

After BAR conducts its events and activities, the agency's Applied Communication Division (ACD) puts out press updates featuring photos and a short description of what transpired in the activity.

Social media platforms, such as Facebook, Instagram, and Twitter continue to be effective tools for information dissemination in a fast paced society where quality information equates to fresh off the bat content, short and sweet, and coupled with stimulating multimedia elements.

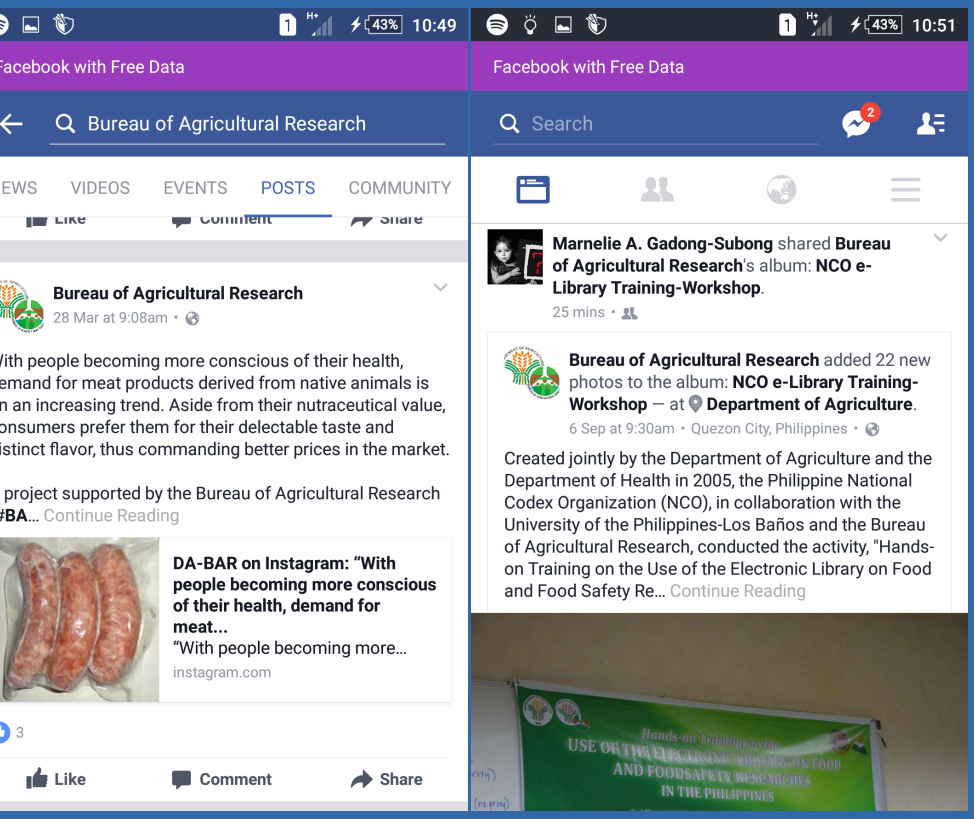
Earlier this year, BAR launched its own Instagram page as a platform to promote the countless technologies that have resulted from the bureau's research programs. Featured technological commercialization products include gourmix from the Cagayan Valley Research Center, bee products developed by the Pampanga Agricultural College, Jackfruit chips by Visayas State University, among other examples.

With over a thousand projects that are either completed or ongoing, social media becomes a way for BAR to put a face on all its efforts. In the process of doing so, it expands its clientele from the farmers and fisherfolk of this country, to the greater public which includes staff from other DA-related agencies, students and faculty from SUCs, private individuals and businessmen and women, as well as overseas Filipino workers.

Empowered public

Early on during the late 1990s, before the internet ever existed, people relied on mass media as a source of information and if ever one has an inquiry about a certain project or product, he or she must visit the organization's building where she may have her concerns addressed. Today, a biologist based, for example in rural Zimbabwe can visit BAR's page and leave a comment pointing out his inquiries and wait for our social media managers to respond.

With the advent of social media, information sharing is no longer one sided. BAR's clients have become more involved via social media as they too can use their own personal profiles to express ideas and share their thoughts on the projects and activities they are passionate about. Facebook is giving every farmer and every other individual the ability to participate



in useful dialogues while agencies are given a better picture of how the public thinks and behave through their interactions. With mainstream media allowing audience members to become active participants, there is pressure for government services to adjust based on the continuous flow of user content.

Reports from the page show a steady flow of users using facebook chat as an avenue to express some inquiries concerning some of the projects of BAR. Inquiries are usually from users who ask for tips on how to plant vegetable crops from the comfort of their own home. Some also send in messages asking about the availability of publications and other Information, Education, Communication materials on certain crops, livestock, or value-added products. People who are interested in purchasing crop seeds also use Facebook chat to find out if such is available at the bureau. While BAR cannot answer to every single inquiry about agriculture practices, concerned users are usually referred to other agencies that can be of better assistance.

Future plans

For an age where new technology induces constantly shifting trends, BAR seeks to find more ways of utilizing social media to fulfill its mandate as a leading agency for agri-fishery research and development. By reaching a greater number of this country's population, BAR hopes to make every Filipino aware that advancements in research and technology not only impacts farmers and fisherfolk but the average consumer as well. The bureau's Facebook page aims to further encourage its followers to take their enthusiasm outside of the virtual world and take action in working with BAR's programs or its partners. ###

Decisions made... from page 15

IPNI demonstrated the ability of the Nutrient Expert® to provide precise recommendations that can increase farmers' yield and income across a variety of climates, soil types, and cropping systems, while promoting balanced crop and soil nutrient management. ###

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Given the high demand for cacao and cacao-based products, various research and development activities have been conducted on production, postharvest handling, processing, and marketing of the said commodity. One of the institutions that engaged in cacao R&D is the Cagayan Valley Cacao Development Center based at Isabela State University, Echague (Main Campus). The insitution has been able to produce various cacao-based products under the brand name, Sikulati. These products are dark chocolate, tablea kisses, polvoron de cacao, pastillas de cacao, moringa-tablea cupcakes, leguvoron decacao, charantia-tablea cookies, and choco-mango tart. *(Photo by Anne Camille Brion)*

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