PHILIPPINE RICE R&D HIGHLIGHTS 2012

Information Systems Division

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Information Systems Division

Division Head: Jovino L. de Dios

The inflow of data and information within PhilRice fuels the generation of new ideas, data, information, technologies, models, materials and practices to attain its goals and objectives. The methods used by PhilRice on how it manages its own data and information resources inspire people to generate more scientific and practical outputs. Policies, strategies and infrastructures make up the Information Systems (IS) which helps manage data, information and processes.

Several specific ISs are being developed in PhilRice internally and in collaboration with other agencies. These are generally classified as the Management Information Systems (MIS) and the Agricultural Information Systems (AIS) that assists PhilRice clients, administration, research and development, technology demonstration, technology deployment and even sales and production of rice seeds.

I. Site Characterization, Mapping and Information Systems for Irrigated, Rainfed, Upland and other Adverse Rice Environments

Wilfredo B. Collado

The irrigated rice ecosystem has the most favorable environment where the yield potential is achieved, while rainfed and other adverse ecosystems have more complex conditions. Most importantly, understanding the local biophysical conditions (e.g. soil, plant, climate, biotic and abiotic stresses) through site characterization including socioeconomic parameters (e.g. land holdings, cropping calendars, varieties, seed systems, and marketing systems indigenous knowledge and practices, coping mechanisms, cultural, absorbing capacity and economic status) of the target clientele are required to identify research strategies and facilitate development of appropriate and site-specific technologies.

The above properties should be analyzed and mapped for evaluation. These are necessary in providing several information options that will serve the rice sector. Thus, the project was conceived to carry out a system of documentation, identification, characterization, quantification, categorization and mapping of the target areas.

Identification, biophysical characterization and mapping of rice areas of the Philippines
WB Collado, RM Monteza, RV Bermudez, Jr. and JL de Dios

This study aimed to reassess the validated soil series for changes in climatic profile as an effect of climate change; characterize the current rice areas as irrigated, rainfed lowland, upland, saline, drought/submergence-prone areas based on Soil Taxonomy Framework; establish the productivity rating and provide suitability classifications for each soil unit for rice at defined levels of inputs and management circumstances; assess the fertility, suitability of the area for other crops and provide management requirements needed for crop production; develop a simple guidebook for easy identification of the soil based on color, texture, soil pH and other distinguishing characteristics; and improve the database of the soil series including management recommendations for online access.

Highlights:

- Revalidated and characterized soil series profiles of Barcelona, Carig, Toran, Buguey in Cagayan, Moncada and Ramos in Tarlac, Brooke's, Sta. Felomena and Sevila in Nueva Vizcaya, and Tagkawayan in Quezon;

- Developed the intermediate soil database for encoding and consolidating of validated and secondary data (physical and fertility properties; profile descriptions, crop suitability, profile pictures, productivity index, soil limitations to crop production, soil management recommendations and results of laboratory chemical analysis) needed in preparing web application of the guidebook.

- Conducted pre-testing and evaluation of the key soil series guidebook of Region 6 to different end-users from Regional to Municipal Agricultural Technicians/Officers and farmers.

- The Soil Management Subsystem was modified for better presentation and more responsive. The modified subsystem includes maps, graphics, spreadsheets, tables, guide to soil sampling, soil color determination; texture and pH determinations.

- Guidebooks for Antique, Bataan, Bulacan, and Pangasinan.

Characterization of the socioeconomic needs and constraints, and documentation of indigenous practices in rainfed, upland and adverse environments
AB Mataia

This study characterizes rice farmers in the rainfed, upland and adverse rice environments in terms of socioeconomic needs and constraints. To achieve this, three sub-studies were implemented namely: 1) characterization of socioeconomic needs and constraints of rice farmers in upland and drought-prone rice environments; 2) characterization of socioeconomic needs and constraints of rice farmers in saline and submergence prone rice environments; and 3) farmers' coping mechanisms to unfavorable rice farming environments in the Philippines. Secondary data and information on basic agricultural information on specific provinces were gathered. Data were presented up to barangay level.

Sub-Study 1: Characterization of socioeconomic needs and constrains, and indigenous practices in drought-prone and upland rice environments
RG Manalili, AB Mataia, RB Malasa and CP Austria

Rice-based farmers in the upland and drought-prone environments were characterized according to their socioeconomic and technological status. Constraints and opportunities in farming and coping mechanisms and their indigenous farming practices were documented and assessed. A total of 131 farmers in the upland and 155 farmers in the drought-prone environment were interviewed using a structured questionnaire covering 2011 wet season (WS) or July-December 2011 harvest and 2012 dry season (DS) or January-June 2012 harvest. Descriptive statistics such as means and frequencies were used in the preliminary data analysis.

Highlights:

- Table 1 shows that based on the farm and farmers profiles in the upland and drought-prone environments, on the average, upland and drought-prone environments farmers were farming for more than 2 decades. Upland farmers were more experienced in vegetable farming than in the drought-prone areas. Less than 50% of them are members of a farmers' organization and have attended rice related trainings/seminars for the past three years. Among the trainings/seminars attended include Farmers Field School (23-41%), PalayCheck (16-20%), Inbred Rice Production (7-14%) and Hybrid Rice Production (2-8%). More than half of the farmers (54-57%) received assistance from the government in the form of seed subsidy.

- The total land area is higher for farmers in the upland at 2.15ha compared to the drought-prone areas at 1.64 ha. Average rice area is 0.85 hectares (ha) for upland and 1.31ha for drought prone area. Area devoted to other crops by farmers is larger in the upland areas at 0.94ha compared to only 0.20ha in the drought-prone farms. Sixty-six percent are owner-cultivators of upland farms, while only 46% are owners of drought-prone farms.

Table 1. Farmer and farm profile by type of environment, 2011 WS & 2012 DS.

Item	Upland	Drought-prone
Farming Experience (no. of years)		
Rice Farming	23	24
Vegetable Farming	11	7
Membership in Organization (%)	49	39
Attendance to rice-related training (%)	43	47
Trainings/Seminars attended (%)		
PalayCheck	20	16
Farmer Field School (FFS)	41	23
Inbred Rice Production	7	14
Hybrid Rice Production	2	8
Received assistance from the government (%)	54	57
Assistance from the government (%)		
Free seeds	24	23
Free Fertilizer	1	10
Seed Subsidy	58	66
Fertilizer Subsidy	4	9
Farm Area		
Total farm area (ha)	2.15	1.64
Total rice-based area (ha)	0.85	1.31
Total area for other crops (ha)	0.94	0.20
Idle land (ha)	0.28	0.12
Number of rice parcel	1	1
Rice-based land ownership (%)	66	46
Cropping Pattern (%)		
Double cropping	6	52
Single Cropping	32	30
Rice-Corn	43	4
Rice-Other Crops	15	12
Others	2	3

- Rice-corn (43%) ranked as the most practiced cropping pattern in the uplands, followed by rice single cropping (32%) and double rice cropping (6%). This is an opposite of the cropping patterns in the drought-prone farms where more than half of the farmers (52%) can plant rice twice in a year, 30% plant rice for only one season and 19% plant other crops during the second season.

- Table 2 shows that the use of high quality seeds (hybrid, registered and certified) is very low in both environments (ranged from 12-45%). Farmer's seed was used by 80% of the farmers in the upland during the WS and 52% of the farmers in the drought-prone areas during the DS.

- More upland farmers (51-64%) practice direct seeding in both seasons, while 35% practice dibbling only during the WS. In the drought-prone farms, transplanting and direct seeding has almost equal share of farmers' adoption for both seasons.

- The use of Leaf Color Chart is more popular in the upland (5-18%) compared to drought-prone areas (1-3%) which its adoption is still very low. In addition, many farmers (64-90%) do not have soil analysis in their rice farms. Laboratory soil analysis method was used by the farmers whose soils were analyzed. Likewise, very few farmers (12-18%) used organic fertilizer in rice.

- Almost all of the farmers relied entirely on rainfall as water source, though some farmers in drought-prone areas utilize irrigation water from pumps (10-13%) and small water impoundments (SWI)/small farm reservoir (SFR) (1-4%).

- Average area planted during the WS was 0.72ha for upland and 1.04 ha for drought-prone. Rice yield obtained was low in both environments. Farmers in the upland obtained yield of 2.15 t/ha-1 during the WS and 2.62 t/ha-1 during the DS. The average yield in the drought-prone was 2.94 ton ha-1 and 2.16 t/ha-1 during WS and DS, respectively.

Table 2. Farm practices and yield by environment, 2011 WS and 2012 DS.

	Upland (%)		Drought-prone (%)	
	2011 WS	2012 DS	2011 WS	2012 DS
Seed Class				
Hybrid	0	0	1	0
Registered Seed	0	0	1	4
Certified Seed	12	45	42	16
Good Seed	7	18	20	25
Farmer's Seed	80	27	36	52
No Response	1	9	1	3
Crop Establishment				
Transplanting	14	36	58	51
Direct Seeding	51	64	42	49
Dibbling	35	0	0	0
Use of LCC	5	18	3	1
Soil Analysis				
None	90	64	84	88
Lab Soil Analysis	7	36	14	8
Minus One Element Techniqu	0	0	1	0
STK	0	0	0	0
Nutrient Omission Plot Test	1	0	0	0
Others	2	0	1	0
No Response	0	0	1	1
Use of Organic Fertilizer	18	9	16	12
Source of Irrigation				
NIS	0	0	1	1
CIS	0	0	0	0
Pump	4	0	10	13
SWIP/SFR	0	0	1	4
Rainfall	99	100	92	83
Others	1	9	3	1
Area Planted (ha)	0.72	0.07	1.04	0.44
Area Harvested (ha)	0.69	0.07	1.00	0.43
Yield (t/ha)	2.15	2.62	2.94	2.16
Yield distribution (%)				
< 3 t/ha	73	73	55	79
? 3 t/ha	27	27	45	21

Sub-Study 2:Characterization of socioeconomic needs and constrains, and indigenous practices in submergence-prone and saline environments
RB Malasa, AB Mataia, RG Manalili, CN Austria, and MRV Lopez

In support to the Food Staple Rice-Self-Sufficiency Road Map, PhilRice develops specific technologies that will break the low yield barrier in adverse environments. This study is focused on characterizing the socioeconomic and farming practices of submergence-prone and saline environments. The study works on the inventory of existing socioeconomic data and information on submergence-prone and saline environments; identify socioeconomic needs, constraints and opportunities of farming households; document the indigenous production and post-production practices of the farming households; document and understand the roles and motivations of various stakeholders involved in technology transfer; and identify policy recommendations to improve productivity and sustained development.

There were 58 respondents from submergence-prone and 66 respondents from saline environments.

Highlights:

- Table 3 shows that the rice farming experience of the respondents in both adverse environments is around three decades. Farmers in submergence-prone areas is almost a decade (8.71 years) in vegetable farming as opposed to those in saline areas are have relatively new (3.52 years).

- Almost all of the farm area of the respondents is allotted for rice. Regardless of type of environment, the rice area is greater than 2 (ha).

Table 3. Farming characteristics by type of environment.

Items	**Environment**	
	Submergence-prone	**Saline**
Farming experince (years)		
Rice farming experience	27.86	30.15
Vegetable farming experience	8.71	3.52
Area (ha)		
Total area	2.54	2.50
Rice area	2.35	2.38
Other area	0.19	0.15
Idle area	0.01	0.01
No. of rice parcels	1.50	1.56
Yield (t/ha)		
Yield (2011 WS)	2.98	2.66
Yield (2012 DS)	2.99	2.92

- The yield level of farmers in saline areas is less than 0.26t/ha in July to December 2011 as opposed to January to June 2012. Low yield level (less than 3t/ha) was common for both environments.

- Table 4 reveals that 60% of farmers in submergence-prone environment and 59% in saline environment have training in rice vegetable production from 2009 to 2011. In the submergence-prone area, 33% of the farmers had attended a PalayCheck training followed by FFS (21%). In saline areas, 20% of the farmers attended PalayCheck training followed by hybrid rice production (14%) and inbred rice production (11%).

Table 4. Training/seminar participation by type of environment (%).

Training/seminar	**Environment**	
	Submergence-prone (%)	**Saline (%)**
PalayCheck	33	20
Farmers' field school	21	9
Inbred rice production	3	11
Hybrid rice production	3	14
Others	0	6
None	40	41

- Around 76% of farmers in submergence-prone areas can plant rice for two seasons and around 50% of the farmers in saline areas. While 45% can only engage in one cropping in saline areas.

- An in-depth scrutiny of the yield levels of the farmers show that regardless of environment and season, more than 50% of the farmers who planted rice were not able to reach 3t/ha. However, there are more farmers who experienced low yield in the saline areas and this is consistent regardless of season.

- Table 5 reveals that in terms of the use of high quality seeds, more farmers in saline areas, use hybrid, and certified seeds. On the other hand, more farmers use low quality seeds (good seeds and farmer's seeds) in submergence-prone areas.

- More than 80% of the farmers, are non-users of LCC. Many of them do not analyze their soil and do not use organic fertilizer.

Table 5. Cropping pattern by type of environment (%).

Cropping pattern	Environment	
	Submergence-prone (%)	Saline (%)
double cropping	76	50
single cropping	14	45
rice-corn	3	5
rice-other crops	7	0

Sub-Study 3: Farmers' coping mechanisms to unfavorable rice farming environments in the Philippines
ABMataia, RGManalili, RBMalasa and MRVLopez

With the increases in changing climate patterns and the incidence of notable climate episodes, these unfavorable rice environments are expected to be more vulnerable to different risks in the future and further exposing farmers in these environments to production and consumption risks and poverty. This study aimed to determine coping mechanisms of rice-based farming households in different unfavorable environments for better planning of adaptation strategies, and to assess the impacts of adverse conditions on rice yield and productivity. The study was conducted in 15 major rice producing provinces with large rice areas of unfavorable conditions. The provinces are: Ilocos Norte, Pangasinan, Isabela, Cagayan, Pampanga, Zambales, Camarines Sur, Iloilo, Capiz, Bohol, Leyte, Northern Samar, North Cotabato, Agusan del Sur, and Zamboanga del Sur with a total samples of 657.

Highlights:

- The sample farmer's average cultivated rice areas are 1.52 hectares with landholding range of 0.10 to 18 hectares. Farmers with small rice areas are more vulnerable to increasing climate variability if rice farming is the only source of livelihood. Across environments, average rice landholdings are smaller in the uplands (0.85ha) while farmers in the submergence prone areas have relatively bigger average rice area (1.61ha) (Table 6a and 6b).

Table 6a. Yield levels by type of environment, 2011 WS and 2012 DS (%).

Yield level/season	Environment	
	Submergence-prone (%)	Saline (%)
Yield level (2011 WS)		
< 3 t/ha	52	58
? 3 t/ha	48	42
Yield level (2012 DS)		
< 3 t/ha	51	55
? 3 t/ha	49	45

Table 6b. Farm practices by environment, 2011 WS and 2012 DS.

Farm Practices/Season	Submergence-prone (%)		Saline (%)	
	2011 WS	2012 DS	2011 WS	2012 DS
Seed Class				
Hybrid	4	2	24	8
Registered Seed	2	0	2	3
Certified Seed	36	26	42	39
Good Seed	22	28	6	19
Farmer's Seed	36	37	24	31
No Response	0	7	2	0
Use of LCC				
Yes	15	11	8	14
No	84	89	89	81
No Response	2	0	3	6
Was the soil of the parcel analyzed?				
Yes	20	13	29	22
No	80	85	71	78
No Response	0	2	0	0
Method of Soil Analysis				
Lab Soil Analysis	13	9	26	22
Minus One Element Technique	5	2	0	0
STK	0	0	0	0
Nutrient Omission Plot Test	0	0	0	0
Others	2	2	0	0
No Response	0	0	3	0
Use of Organic Fartilizer				
Yes	20	15	16	14
No	78	80	84	83
No Response	2	4	0	3

- Majority of the sample farmers experienced a range of abiotic stresses such as: drought, flood and soil salinity in the last three years, which have great impacts on their rice yield and production.

- The impacts of the abiotic stresses (Table 7) are assessed on the size of affected areas, particular on rice yield and total production during the latest cases of stresses. On drought, there was a 20% reduction in cultivated rice areas, while a reduction of around 53% and 43% in total production and yield, respectively. The flood decreased rice areas by around 20%, which translated to a declined in yield by 48% and total production by 61%. The drought-flood was recorded a reduction of 27% in rice areas, while a plunged of 44% in total production and 42% in yield. Soil salinity has also great impacts, which decreased rice areas by 27% with a reduction of 42% in total production and 25% in yield. In upland related stresses decreased rice areas by 11%, total production by 45% and yield by 40%. Overall, flood has the biggest negative impacts in rice production as this occurred frequently than the other stresses.

- Many sample farmers deployed different adaptation strategies before (ex-ante) and after (ex-post) stress occurred to cope with its impacts. The ex-ante strategies are proactive measures that are employed before stress occurs while coping mechanisms or ex-post strategies employed after a stress occurs. Specifically, ex-ante strategies are adapted to reduce production shortfall to help lessen the fluctuations in rice farm income, while ex-post strategies are employed to smoothen consumption.

- Most common ex-ante strategies adapted by farmers across unfavorable environments include: investment in backyard livestock; make temporal adjustments in cropping patterns based on timing of drought/flood/salinity occurrence; maintain financial reserves; engagement on off-farm employment; accumulation of stocks in good years, practice crop diversification and avoiding expensive investments. Additionally, farmers employed ex-ante coping strategies such as careful choice of rice variety tolerant to specific stress; adjustment in cropping calendar to synchronize with crop planting and growing period; and adoption of new technologies. Other farmers did not do any coping strategies because they lack the knowledge or information about it.

- The most ex-post coping strategies adapted by farmers are: avail loan to finance capital requirements of the crop; engage on off-farm employment of other household members; drawing from savings; selling of livestock; reducing food budget and children school allowance.

Table 7. Impacts of stress or adverse condition to rice production, 2012.

Items	Unfavorable Conditions				
	Drought	Submergence	Drought-Submergence	Salinity	Upland
Normal Area (ha)	1.13	1.62	0.75	1.42	0.79
Damaged Area (ha)	0.92	1.03	0.59	1.04	0.71
% Damaged	18%	20%	21%	27%	11%
Normal Palay Production (kg)	3,425	5,694	2,222	5,155	1,628
Damaged Production (kg)	1,615	2,221	1,253	2,967	890
% Damaged	53%	61%	44%	42%	45%
Normal Yield (kg)	3,089	3,504	2,962	3,513	2,058
Damaged Yield (kg)	1,317	1,831	1,728	2,626	1,241
% Damaged	43%	48%	42%	25%	40%

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Decision support system for intensive rice-based farming system

RC Castro, JM Maloom, MJC Vives, HJP Agngarayngay, EP Agres, BM Catudan, ND Ganotisi, AC Aguinaldo, AY Alibuyog, NQ Abrogena, NR Alibuyog and CO Iglesia

The vulnerability of rice-based cropping system in Ilocos to climate forces which include pests and diseases were assessed and done in six activities namely, (1) Delineation of flood, drought and saline prone areas in Ilocos Norte using GIS-based mapping technique coupled with community interviews and instrumentation; (2) Simulating the growth and yield performance of selected rice-based cropping system using DSSAT under different climate change scenario; (3) Groundwater monitoring, characterization and supply forecasting; (4) Local weather monitoring and forecasting; (5) Development of webGIS-based Integrated Climate Change Information System and (6) Defining pest management strategies in stress-prone environments of Northwest Luzon

The main objective of this project is to create a decision support group. The group provides advisories to prevent losses due to adverse weather conditions, pest and diseases, and price fluctuations; apply the correct residual measures or amounts of inputs to the crops, livestock, poultry and fishes at the right time, consequently increase the income of the farmers, provide more and better quality farm products, and sustain ecological balance.

Highlights:

Delineation of drought, flood and saline-prone areas in Ilocos Norte

Field surveys were conducted in the drought, flood- and saline-prone areas of Ilocos Norte with 69 barangays classified as flooded, 19 as saline and 62 as drought-prone. The list of barangays affected by the different adverse environments were provided by the Municipal Agriculture Officers from different municipalities of Ilocos Norte and an electronic map on flood-prone areas was requested thru NEDA-I. These served as the basis for the conduct of actual survey and interview of farmer respondents.

- Downloaded satellite images of the different municipalities of Ilocos Norte from Google Earth; printed poster size maps of 30% of the municipalities covered for delineation of the three adverse environments;

- Prepared the flood hazard map of Ilocos Norte.

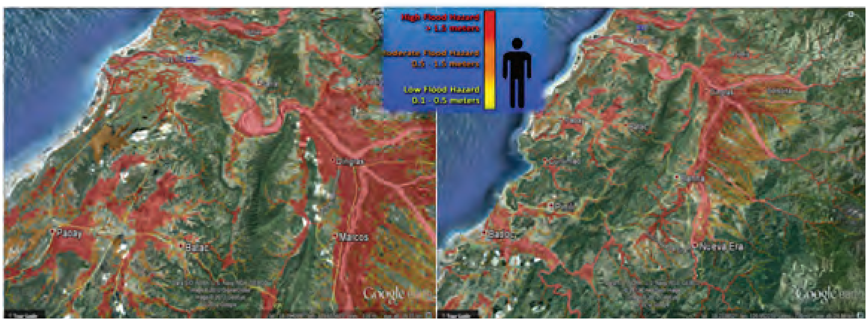

Figure 1. Simulating the growth and yield performance of selected rice-based cropping system using DSSAT under different climate change scenarios

- Established experimentation for rice (PSB Rc82 and IR64) and corn (Pioneer 280 (hybrid) and OPV (glutinous) for the identification of their genetic coefficients

- Gathered, recorded and organized agronomic and yield data for both rice and corn for inputting of data sets in the DSSAT software; A comparison of the result will be made from that of the observed and generated data from the DSSAT model.

Figure 2. Experimental set-up for the localization of the DSSAT model for rice in PhilRice-Batac, Ilocos Norte. 2012 Dry Season.

- Established experiments for rice and corn for the identification of their genetic coefficients using the widely used varieties in Ilocos Norte, rice: PSB Rc82 and IR64; corn: Pioneer 280 (hybrid) and OPV (glutinous) and gathered, recorded and organized the agronomic and yield data for inputting of data sets in the DSSAT software;

Ground water monitoring, characterization and supply forecasting

- Identified and established a network of shallow tube wells (STWs) in the province of Ilocos Norte and 1st District of Ilocos Sur that served as the monitoring sites for gathering data on groundwater level; initially, each municipality had 5 observation wells to represent the agricultural areas using pump for irrigation. A total of 85 wells were identified, measured and mapped;

- Out of 23 municipalities of Ilocos Norte, there were seven identified municipalities that are not using STW (Pagudpud, Dumalneg, Adams, Carasi, Solsona, Banna and Nueva Era); surface water was used to water their farm instead of STWs.

- Eighty five wells were identified in Ilocos Norte (were 41 for the 1st District and 30 for the 2nd district, while 14 for 1st district of Ilocos Sur).

- Installed four (4) units of Automatic Weather Stations in the eastern municipalities of Ilocos Norte such as Solsona, Marcos, Banna, and Nueva Era; these sites were prioritized because rainfall in these areas is much earlier and abundant as compared to northern and southwestern part of the province.

- Agri-weather data such as rainfall, temperature, relative humidity and barometric pressure from these municipalities and existing rainfall/weather station thru PAGASA, Laoag City were downloaded regularly for consolidation needed for the localized weather advisories for the farmers;

Development of webGIS-based climate change information system

- Gathered and consolidated data on yield, soil, water and climate, vulnerability maps as well as adaptation and mitigation measures developed, and best farming practices in mitigating climate change impacts in Ilocos Norte;

- Coordinated with MMSU for the development of the webGIS facility that will be accessed by PhilRice stations in the future

- Started the development of the PhilRice Integrated Climate Change Information Center.

II. Development and Innovation of Rice Database and On-Line Information Systems
Jovino L de Dios

Digital technology gives way to the inter-linking of several information and communications components and systems into one for economy and efficiency. Examples are the internet, short messaging service (SMS), Camera-phone, Global Positioning System (GPS)-cameras, wireless local area network (WLAN), Remote Sensing Systems, and online database systems. These are used to collect, transmit, store, and present data and information real-time or near-real-time to a wide range of stakeholders, from farmers to decision-makers regardless of geographical location and time.
In terms of application, this is almost more than the boundary of a unified communication platform which is "communications integrated to optimize business processes," (http://en.wikipedia.org/wiki/Unified_communications).

Digital data content are important when developing agricultural information systems. Site-specific field data are necessary when farmers require site-specific decision support. For example, a growth model may require soil and fertilization information from the target area for better recommendation.

Common and frequently used gadgets, like smartphones, are also used to create tools to help in rice production, seed distribution, field assessments, information dissemination, etc.

Use of information systems in collection, transmission, organization, storage, and retrieval of field data and information from multiple sites
AC Arocena Jr., LdR Abaoag, SR Brena, and EB Sibayan

Highlights:

PhilRice Vehicle Information Systems

- Enhanced the PhilRice Vehicle Information System to comply with the new requirements of the vehicle dispatch unit.
- Transformed the stand-alone database system to an online Information System.
- Restructured the database, presentation and printing modules of the IS.
- Established a working model for public users of the dispatch system.
- Perform initial inventory of the sales and warehouse operational process, equipment requirement and reports generated.
- Recommended equipment requirements.
- Improved the process flow to validate conformity of suggested check points with existing process.
- Restructured the database systems to incorporate barcoding.
- Gathering useful toolkits to better implement modification to the system.
- Conducted orientation and immediate response to queries from different stations.
- Enhanced the barcode layout of rice wine barcode.
- Redesigned the PBDO Point Of Sale and Warehouse Database Systems including Seed Ordering sub-systems module, Purchase order releasing sub-systems module, and Payment sub-systems module.

Mobile-phone Applications Development (Apps Dev)

- Developed a prototype for gathering GPS coordinates using SMS as mode of transmitting data into a database.

- Concept proof the developed application in Bulacan, Pampanga, Nueva Ecija and Tarlac provinces.

Development of Online Rice Research and Development Abstract Information System
MA Gacutan, T L Briones, and RZ Relado

The online rice research and development abstract information system is a web-based management information systems that monitors reports and protocols of programs, projects and studies. It is an interactive portal where reports can be submitted and status can be tracked. It has different access privileges and customized user interface based on log-in credentials. Project and Program Leaders can monitor submitted reports and has the privilege to check, put remarks or accept submitted reports. The Planning and Collaborative Projects Office can monitor status, track history, view profile (study, project, program), update and manage the reports and protocols submitted.

Highlights:

- Graphical user interface for study or project or program leader for uploading and monitoring reports and protocols were made.

- Planning and Collaborative Project Office Interface for Project Monitoring – reports and protocols monitoring page as general view to check and monitor whether if they already submitted protocols or reports were made.

- Project Manager Page Option – page to update/add new list of study/project/program, add remarks, track history, monitors status, view profile and delete projects profile were made.
- SED Databank. Web-based repository of SED papers and articles, published and unpublished. Uploaded documents are searchable and can be downloaded. Documents are also categorized in different accessibility. Initial data were uploaded and at present it was being evaluated and tested for improvement.
- Established a stand-alone version of the Document Management and PhilRice Document Tracking Subsystem and deployed these subsystems to PhilRice-Isabela, the version serves as back-up in case internet connectivity is not available.
- Updated the Farmer’s Q and A database.

- Created a database build-up of 15th to 25th R&D conference participants.

Gene Bank Management Information System (GEMS)

Report Monitoring System was added in GEMS. It monitors the monthly movement of accessions and collections Gene Bank. Reports are in tabular and graphical formats that can be printed or downloaded.

Computer-aided Farm Operations Management and Maintenance System
AC Arocena Jr.

Farm operations performed in research and seed production farms are tedious tasks. Manual monitoring and scheduling of farm activity requests, progress and accomplishments takes a lot of time and effort. Similarly, farm equipment maintenance and status checks needs equal importance for smooth field operations. The implementation of a computer-aided farm operations management and maintenance system can facilitate feedback and monitoring processes.

The efficiency offered by database driven inputting module systematically organizes and stores data and processes. The equipment inventory subsystem provides equipment monitoring and maintenance scheduling to maintain the top conditions of farm equipment. These can maximize the use of resources and systematically document the processes for improvement.

This console can also be used to post activity requests, accomplishments, problems observed, and can also serve as internal communication channel by the FOM unit with concerned staff.

The FOM task manager can be accessed online for remote monitoring of the progress of field operations and can possibly integrate a cellphone-based requests form to increase its functionality.

Highlights:

- Performed modification on the systems request inputting form to simplify farm activity request for researcher.

- Established a more stable user management system to accommodate all PhilRice staff and researchers.

- Started concept design on the development of a farm machinery inventory and management sub-system, the component which will complete the transformation of the FOM Task Manager into FOM Information Systems.

- Gathered data and information required for the development of the machine inventory system.

- Established a prototype for the machine inventory system.

Electronic map creation and conversion for interactive GIS-aided presentation
AC Arocena Jr., WB Collado, MA Gacutan, and JL de Dios

Maps visualize the spatial distribution of any data throughout an area. It is mostly used for land evaluation, spatial planning and agricultural research, development and extension activities. Through information technology, interactive electronic maps are now becoming commonly available online which are free and easy-to-use. Maps clearly present, summarized or detailed geo-related information from specific location anywhere in the world. It is generally being developed using geographic information system (GIS) and/or Geographic positioning system (GPS) technologies which allows more interactivity among users and developers. The study aims to establish an interactive GIS mashup as geo-referenced data presentation through the internet.

Highlights:

- Established a web-link for easy accessibility of the converted maps

- Established partial map for PhilRice projects sites map in kml format.

- Provide PhilRice projects site map to Devcomm and ODEDD.

- Created the Index of maps, KML file of PhilRice field map overlaid in Google Earth, and Rice project sites map overlaid in Google Earth application

Improving the security, viability and connectivity of the PhilRice e-Data
JL de Dios, LA Tamani, and AC Arocena Jr.

Information Systems (IS) is an essential tool to properly administer processes and manage data within an organization. This project maintained and secured the PhilRice information systems and its components like servers, network equipment and internet connections to be viable all the time to effectively share data and information online. This ensured the PhilRice web presence to enable clients to access valuable information 24/7. The study also established a system of data security against man-made natural causes of data losses.

Highlights:

- Redesigned the ICT operations policy, and strategy to optimize the local area network performance. Prioritized the internet connections and bandwidth utilization among servers, browsers and wireless local area network. Established several Wifi hotspots in strategic places within PhilRice CES for wireless access.

- Upgraded the internet connections of PhilRice Branches and PhilRice CES by 30%.

- Performed data and system back-up regularly and implemented a more complex user access management.

- Deployed several Network Attached Storage System for data backup and redundancy on storage.

- Developed a system of bandwidth usage monitoring and analysis to decongest the system.

Corporate Website Technical Maintenance

- Configured additional features and enhancement of PhilRice website backend and content administrator functionalities. Inserted the thumbnail label/field for the homepage articles. Created the staff profile database and form for managing staff profiles. Developed the rice science database and form for managing rice science page. Provided technical assistance to PhilRice corporate website for upgrade and enhancement concerns. Evaluated and configured a news mailer for sending electronic articles to PhilRice partners and stakeholders.

- Developed a system of performance monitoring of the corporate servers using Google analytics starting August 2012. Datta shows that there were 80,834 visits to the website by 27,527 unique people. There were also 32.61% new visitors and 67.39% as returning with an average visit duration of 4:14 minutes.

Lakbay Palay Web based Evaluation

A web-based evaluation form was developed based on the survey used during field days and Lakbay Palay and was tested in October 2012 field day with 30 respondents. This prototype system can also be used to other processes with the same purpose.

PhilRice Hybrid Library Science and Services
E Joshi and V Salvador

Online library. Continuous improvement of the library web page is being undertaken. Several additions to the original are being done to upgrade and further improve its contents. It now includes the Rice Centennial Bibliography as well as other useful sites for researchers. Currently developing the library website and management system for backup and transfer of some data to web-based applications for accessibility and availability of information.

Highlights:

- Proquest usage and literature search. There were 1,469 recorded searches with 481 downloaded citations/ abstracts and 4,146 full-text articles. A total of 4,649 articles/citations were downloaded. Average unique searches is 147 per month. Recorded searches in OPAC within the Library is 207 with the increase of virtual usage by staff.

- Clippings database. Newspaper clippings of around 725 pertaining to rice and PhilRice were scanned and uploaded to the database.

- Organization of library materials and database management. Cataloged publications total of 1,165 comprising of 505 books, 656 reprints and 4 journal titles. Barcoded publications entered in the Destiny software is: 6,157 volumes (4,982 titles) and the software was upgraded to 10.1 version.

- Current Awareness Service. Daily News Monitor was serviced to top management. Requests were also made to complete articles to DA-AFIS upon request. These news items were also posted in the Library Bulletin Board. Ninety-seven PhilRice articles, 1,437 rice articles were collected and posted, and circulated 46 content pages with rice articles via email.

- Reports and PhilRice Milestones 2011. Contributed for the annual report (Milestones) the citation study indicating the top 10 most cited PhilRice staff. This is important in evaluating significance of research work of scientists to others are well as providing information to our staff with CSC and Magna Carta concerns. Two new requests for citation reports of N Manigbas and C Asis were made for the CSC-Magna Carta.

- Library Networking. Enrolled as a member of the Philippine Association of Academic and Research Libraries Network (PAARLNET). This network enables PhilRie to avail of interlibrary loan service and address journal article requests. .

- Indexed Articles. A total of 434 articles were indexed and content pages emailed to staff (517 pdf files were downloaded, 80 were uploaded in the Greenstone database).

- Collection Development. Acquired a total of 4,636 materials consisting of 1,527 books; 751 journal issues; 525 reprints/pamphlets; 12 special materials; and 1821 newspapers. More than 300 books on economics and 28 children's books for the PhilRice Daycare Center were solicited from Yale University..

- Circulation. Loaned 1,424 books, 2,098 journals, and 198 mixed materials for room reading to outsiders, with a total of 3526 circulated materials.

- PhilRice Magazine. Contributed article on energy for inclusion as Global Update and also provided materials to writers as well as staff from ODED R & D used for proposals on energy. The issue devoted on communication and IT did not include Global Update.

Near-Real Time Rice Seed Information Support System for Region III
AC Arocena Jr., JL de Dios, DA-RFU III, NIA-PIO III, and NSQCS

A strong multi-agency collaboration to deliver near-real-time information can be established using the state-of-the-art and existing communication systems like short messaging services (SMS), multimedia services (MMS)and the internet or "cloud" in capturing, transmitting, organizing, database building and presenting field data and observations to intended users. The project aims to establish an effective electronic information system tools using the commonly available information infrastructures to facilitate data collection, data transfer, project feedback mechanisms and monitoring

Highlights:

- Conceptual Process Flow was formulated. Data coming from multi-mode collection platforms (cellphone forms and web-forms) transmit through GSM and the internet will ensure that it will be received by the server. These data will pass through processing interface for data organization before being stored into the database. Stored data are processed into information with different level of access to each user type.

- Inventories and equipment needed were prepared, which include: 25 units smartphones with Symbian OS', 1 unit smartphone with Android OS and 125 units 4Gb microSD memory card.

- Secondary data of Inventory of Irrigators Association and water sources by irrigation systems from NIA-PIO and Updated list of seed growers in region III from NSQCS were acquired.

- In application development aspect, the following were done:
  1. Established systems and data collection process flow
  2. Installed and configured the receiving module for the cellphone-based data capture infrastructure.
  3. Developed database and table structure for organization and storage of received data.
  4. Developed 2 cell-phone based apps for GPS data collection.
  5. Developed the preliminary (Stage 1) and final (Stage 2) data gathering form.
  6. Developed a process to automatically organize and store received data into the structured database.
  7. Concept proofed the developed apps in some seed growers from Pampanga, Bulacan, Nueva Ecija and Tarlac.
  8. Started GPS data gathering of seed growers household, trading post and seed production lots
  9. The project proponents meet with Mr. Nelson Bautista (Region III Seed Coordinator) together with Region III Provincial Seed Coordinators.
  10. Developed the Geographical Position System and field data gathering e-forms.

Strategic Assessment of Yield-Limiting and Reducing Factors in the Philippines
RO Mabalay and EJP Quilang

GIS and Remote Sensing related activities

- Mapped the rice areas of the Philippines at high spatial resolution using SAR imagery. IRRI and PhilRice, and Sarmap developed a rice extent map of the Philippines at approximately 1ha resolution. An accuracy assessment covering 17 provinces was conducted by PhilRice and IRRI staff from 15 Oct to 7 Dec 2012. The validation sites are shown in figure 4. The final accuracy assessment and map will be made available to the DA in mid 2013.

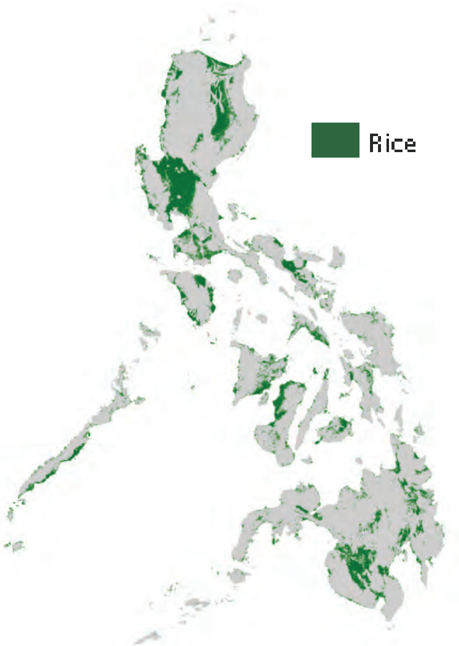

Figure 3. The rice extent map for the Philippines

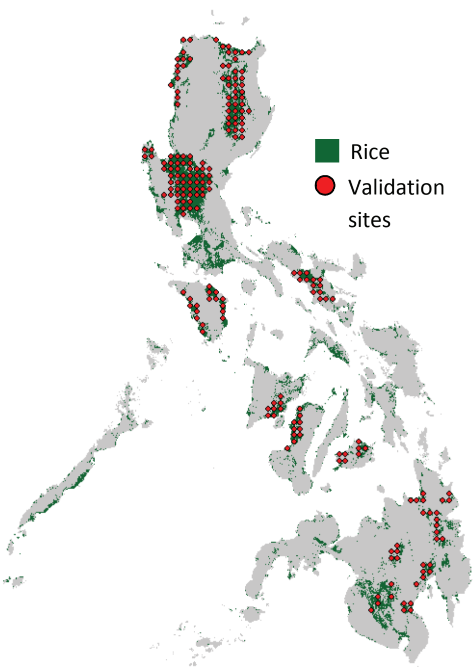

Figure 4. Validation sites Build capacity in PhilRice/IRRI for rice mapping

Build capacity in PhilRice/IRRI for rice mapping

The 3rd training course on RICEscape version 5.0 to include the: 1) the temporal and spatial based criteria for the automatic selection of the acquisitions of interest from an existing database, for all supported sensors and acquisition modes; 2) the time series method of data processing approach to get the best results from large ENVISAT ASAR acquisition series; and 3) simplified and better performing classification procedure with respect to the previous versions. The 4th training (for one IRRI and one PhilRice staff) was conducted on August 27-Septermber 7 at Sarmap headquarters in Purasca, Switzerland to provide the new updates on the software particularly the integration of MODIS data with SAR data for the determination of the phenological characteristics of rice per cropping season.

Yield and yield gap assessments using simulation modeling won the 1st prize in the CSSP 2012 conference in the downstream research poster category. I t was tested whether the spatial and seasonal variability in yield and yield gaps from 2006 to 2010 can be modelled using three independent but complementary sources of information: official statistics, household survey data, and a crop growth simulation model. The study aimed to demonstrate how these data can be used to map yield gaps and to target appropriate interventions. There were minimal differences between BAS yield statistics and average farm level yields (Table 8). ANOVA results (Table 9) suggested that actual yields from BAS and the surveys were comparable, thus confirming that BAS estimates are representative of farmers' reported yields and could be used in the subsequent experiments.

Table 8. Comparison between farm household survey data and BAS provincial yields.

Province	Year	Season	Water source	Household yield ($t\ ha^{-1}$)		BAS yield ($t\ ha^{-1}$)	Yield difference ($t\ ha^{-1}$)
				Average	Standard deviation		
Bulacan	2008	Wet	Rainfed	3.78	1.56	4.00	0.22
Laguna	2006	Dry	Irrigated	4.49	1.59	4.63	0.14
Nueva Ecija	2008	Wet	Irrigated	4.57	0.87	4.61	0.04
Pangasinan	2007	Dry	Irrigated	3.71	1.96	4.01	0.30

Table 9. ANOVA between farm household survey

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Yield group	1	0.569	0.569	1.989	0.167
Residuals	38	10.873	0.286		

- The ORYZA2000 could also simulate actual yields with acceptable accuracy using information from available survey data to parameterize the simulation with observed management situations. The positive difference between simulated actual yields and BAS reported yields (Table 10) were attributed to socioeconomic and biophysical constraints not accounted for in the model such as nutrient deficiencies (other than that of nitrogen), lodging, salinity, submergence, pests, diseases, and weeds. The higher simulated yields during dry seasons are due to overestimated solar radiation.

Table 10. Differences between actual yield simulation and BAS yield statistics (t ha^{-1}). [a]

Water source/ Season		Year				
	Average	2006	2007	2008	2009	2010
Rainfed	0.37±0.03					
Wet season	0.22±0.04	0.21±0.09	0.00±0.08	0.28±0.09	0.43±0.09	0.19±0.09
Dry season	0.56±0.06	0.29±0.11	0.70±0.12	0.73±0.13	0.20±0.11	0.88±0.12
Irrigated	1.48±0.04					
Wet season	1.15±0.04	0.99±0.09	0.95±0.10	1.20±0.10	1.38±0.09	1.22±0.09
Dry season	1.82±0.05	1.76±0.12	1.72±0.11	1.79±0.11	1.95±0.11	1.89±0.12

- Yield gaps varied in magnitude from 2.5 to 8.8 t ha^{-1}. Figure 3 shows this variation by province, by water source, and by season as maps of the average yield gap (2006-10) and box plots of the yield gap by year. The provincial maps were distorted relative to their rice production to emphasize high-production provinces that still suffer from high yield gaps.

- Rainfed yield gaps were higher than irrigated yield gaps in the top rainfed provinces in the Visayas (Iloilo, Capiz, Leyte) and Mindanao (Maguindanao) – varying from 4 to 8 t ha^{-1} across wet and dry seasons. Central Luzon and other provinces in Luzon, which are major producers of irrigated rice, had relatively lower yield gaps that ranged between 3 and 5 t ha^{-1} (except for Cagayan and Isabela with yield gaps between 5 and 7 t ha^{-1}).

Figure. 6. Maps and corresponding box plots, by water source and by season.

Crop health related activities

The assessment of crop health in the Philippines involved three main elements: The training and rebuilding of a national capacity to diagnose crop health in a holistic manner; (2) Conduct of RICE-PRE trials in IRRI and PhilRice stations aimed at testing this strategic decision tool for crop health management, and (3) The conduct of surveys in farmers' fields to assess yield-limiting and yield-reducing factors and yield.

Training

There were five local workshops and one foreign held in Vietnam. The general objectives of these trainings/workshops were to: 1) share basic knowledge on rice diseases, animal pests, and weeds, 2) demonstrate the identification of rice diseases, animal pests, and weeds, 3) demonstrate procedure for collecting data on crop health and production situation in farmers' fields using the IRRI Crop Health Characterization Portfolio, 4) share information on crop health management, 5) train participants in data processing, and 6) share methods in data analysis and modeling.

RICE-PRE trials

Yield loss that is often experienced by rice farmers in developing countries can be prevented with proper diagnosis of crop health. Availability of crop health specialist is usually lacking in most areas and often farmers would get advice from pesticide and fertilizer agent or distributor. To help, RICE-PRE (Rice Epidemic Prevention) was developed, a strategic decision tool that prescribes a set of recommendations that contain the list of strategies for crop production and crop protection aimed at decreasing yield losses. Each prescription was created based on the combination of several elements namely: 1) rice agro-ecology; 2) agricultural objectives; 3) major pests; 4) crop management options and; 5) the most appropriate pest management options available.

The RICE-PRE prescriptions were derived from survey results in rice fields in Asia that showed a very strong statistical link between pest syndromes and the production situations in spite of a broad range of environments and highly diverse injuries caused by harmful agents. The prescriptions recommend the use of resistant varieties whenever available against the major pests that are expected to be production constraints. It is only when resistant varieties are not available and risk of injuries is unacceptably high that judicious pesticide use is recommended.

- Preliminary results of field experiments conducted at IRRI, PhilRice Nueva Ecija, PhilRice Negros and PhilRice Agusanduring 2012 dry season showed a 10.5% yield advantage of RICE-PRE treatment over conventional farmers' practice. This indicated the promising potential of the use of RICE-PRE system in farmers' fields. The results of this trial were presented at two conferences in 2012, in the American Phytopathological Society meeting and in IRRI Young Scientist Conference. The experiment is currently in its third season.

Surveys of Farmers' Fields

IRRI and PhilRice surveyed a total of 391 farmers' fields were surveyed from 2009 to 2012 covering at least six cropping seasons. Surveys were conducted in Agusan del Norte (ADN), Iloilo (ILO), Isabela and Cagayan (ISC), Nueva Ecija (NUE), Negros Occidental (NOC), North Cotabato and South Cotabato (COT). Data on crop health and production situation were collected according to the procedure described in the IRRI Crop Health Characterization Portfolio.

- The survey results from 2009 to 2011 showed that yield differed between seasons (X2= 46.86, p = 1.69e-07). Yield varied across seasons: 3.4, 4.7 and 5.1ha^{-1}. Yield also differed between provinces (X2= 69.53, p = 2.17e-07). The highest yield was obtained in ISC at 6.9 t/ha^{-1} and the lowest was obtained in NOC at 4.0 t/ha^{-1}. Yield in ISC, NOC and NUE was higher in the dry season than in the rainy season. However, in ILO, the yield was almost two times higher in the rainy season than in the dry season.

- Four clusters each of injury profiles and production situations (represented by a set of cropping practices) were identified using cluster analysis. These clusters correspond to different levels and nature of injuries and production situations. Results show that clusters of injury profiles were significantly associated with clusters of production situations (X2 = 25.16, P = 0.003). Province was associated with clusters of injury profiles (X2 = 149.24, P < 2.2e-16) and with clusters of production situations (X2 = 64.99, P = 1.449e-10). The association between these clusters and province are further analyzed using correspondence analysis.

- Correspondence analysis was performed to visualize and analyze the statistical association between the clusters of injury profiles, clusters of production situations, and provinces. NUE is closely associated with CLUSPS1 and CLUSPS3 (maximum P, maximum K, below average N, below average HU) and with CLUSIP2 and CLUSIP3. CLUSPS2 and CLUSPS4 are location-specific because these clusters are strongly associated only with ADN and ILO, respectively, whereas CLUSPS3 is not location-specific because it is associated with both ADN and NUE. Fields in ILO and COT have distinct injury profiles and production situations, whereas fields in NUE have characteristics that are similar to those in other provinces. The close association with clusters of injury profiles with clusters of production situation further supports that pest management strategies should be based of crop management.

Development of Information System Strategic Plan (ISSP)
The ISSP Technical Working Group Headed by JL de Dios

To support PhilRice mandates, the power and potentials of Information and Communications Technologies (ICT) in creating its information systems (IS) projects should be tapped. This makes PhilRice's services accessible anytime and anywhere in the world to all its users, clients, stakeholders, partners, users, employees, citizens, and the general public.

The ISSP started its development in the third quarter of 2012 and at around 75% completion as of December 2012. Applications Development (Apps Dev) comprises 50 to 70 % of the plan of work while the rest is for infrastructure development that focuses on inter-branch connectivity and system redundancy and security development.

Highlights:

- Formulation and creation of Mission Critical Information Systems (IS) that empower the clients to transact with PhilRice electronically regardless of place and time. These IS comprise of front-end and back-end systems with integrating databases and interfaces for scalability. Central to this is the PhilRice Web Portal that conforms to e-Government Stage 3 metric which is highly transactional and citizen-centric. The front-end revolves around clients like farmers, allied workers, trainees, business partners and so forth, while the backend revolves around PhilRice staffers from all branches and collaborators for internal operations and usage. The IS shall take advantage of the internet protocol (IP) and wireless or mobile technologies.

- Conceptualization and/or revision of Policies, Standards and & Procedures based on well known and acceptable standards to govern the access, use, maintenance and overall security of the agency's IS. The policy establishes the protocols for transacting with the agency for PhilRice employees and its clients.

- Database restructuring, data cleansing, migration, and buildup to create a "renewed" database while the previous databases are being cleansed for migration and later integration with the "new" database. This guarantee that both databases are thoroughly "sanitized" before being used by the IS to be developed while no existing data being lost.

- Revisiting the ICT infrastructure to establishment the basic and necessary physical and system's infrastructure in preparation for the deployment of the agency's mission critical IS. This will provide facilities for PhilRice clients, trainees, business partners, employees and other users and stakeholders to avail of PhilRice's services on a 24x7 basis. Information system networks for development should be in compliance with the internet protocol version 6 for future development and technical turn over.

- The Disaster Recovery Facility (DRF) to guarantee the continuity of service to all stakeholders. Besides, security of information ensures the confidentiality, availability and integrity of the clients' supplied information. System backup management plan and Security assessment and vulnerability testing are important part of the general plan in consideration. Secured PhilRice Information Systems shall conform to ISO 27001 Security Framework.

Abbreviations and acronymns

ABA – Abscicic acid
Ac – anther culture
AC – amylose content
AESA – Agro-ecosystems Analysis
AEW – agricultural extension workers
AG – anaerobic germination
AIS – Agricultural Information System
ANOVA – analysis of variance
AON – advance observation nursery
AT – agricultural technologist
AYT – advanced yield trial
BCA – biological control agent
BLB – bacterial leaf blight
BLS – bacterial leaf streak
BPH – brown planthopper
Bo - boron
BR – brown rice
BSWM – Bureau of Soils and Water Management
Ca - Calcium
CARP – Comprehensive Agrarian Reform Program
cav – cavan, usually 50 kg
CBFM – community-based forestry management
CLSU – Central Luzon State University
cm – centimeter
CMS – cystoplasmic male sterile
CP – protein content
CRH – carbonized rice hull
CTRHC – continuous-type rice hull carbonizer
CT – conventional tillage
Cu – copper
DA – Department of Agriculture
DA-RFU – Department of Agriculture-Regional Field Units
DAE – days after emergence
DAS – days after seeding
DAT – days after transplanting
DBMS – database management system
DDTK – disease diagnostic tool kit
DENR – Department of Environment and Natural Resources
DH L– double haploid lines
DRR – drought recovery rate
DS – dry season
DSA - diversity and stress adaptation
DSR – direct seeded rice
DUST – distinctness, uniformity and stability trial
DWSR – direct wet-seeded rice
EGS – early generation screening
EH – early heading
EMBI – effective microorganism-based inoculant
EPI – early panicle initiation
ET – early tillering
FAO – Food and Agriculture Organization
Fe – Iron
FFA – free fatty acid
FFP – farmer's fertilizer practice
FFS – farmers' field school
FGD – focus group discussion
FI – farmer innovator
FSSP – Food Staples Self-sufficiency Plan
g – gram
GAS – golden apple snail
GC – gel consistency
GIS – geographic information system
GHG – greenhouse gas
GLH – green leafhopper
GPS – global positioning system
GQ – grain quality
GUI – graphical user interface
GWS – genomwide selection
GYT – general yield trial
h – hour
ha – hectare
HIP - high inorganic phosphate
HPL – hybrid parental line
I - intermediate
ICIS – International Crop Information System
ICT – information and communication technology
IMO – indigenous microorganism
IF – inorganic fertilizer
INGER - International Network for Genetic Evaluation of Rice
IP – insect pest
IPDTK – insect pest diagnostic tool kit
IPM – Integrated Pest Management
IRRI – International Rice Research Institute
IVC – in vitro culture
IVM – in vitro mutagenesis
IWM – integrated weed management
JICA – Japan International Cooperation Agency
K – potassium
kg – kilogram
KP – knowledge product
KSL – knowledge sharing and learning
LCC – leaf color chart
LDIS – low-cost drip irrigation system
LeD – leaf drying
LeR – leaf rolling
lpa – low phytic acid
LGU – local government unit

LSTD – location specific technology development
m – meter
MAS – marker-assisted selection
MAT – Multi-Adaption Trial
MC – moisture content
MDDST – modified dry direct seeding technique
MET – multi-environment trial
MFE – male fertile environment
MLM – mixed-effects linear model
Mg – magnesium
Mn – Manganese
MDDST – Modified Dry Direct Seeding Technique
MOET – minus one element technique
MR – moderately resistant
MRT – Mobile Rice TeknoKlinik
MSE – male-sterile environment
MT – minimum tillage
mtha^{-1} - metric ton per hectare
MYT – multi-location yield trials
N – nitrogen
NAFC – National Agricultural and Fishery Council
NBS – narrow brown spot
NCT – National Cooperative Testing
NFA – National Food Authority
NGO – non-government organization
NE – natural enemies
NIL – near isogenic line
NM – Nutrient Manager
NOPT – Nutrient Omission Plot Technique
NR – new reagent
NSIC – National Seed Industry Council
NSQCS – National Seed Quality Control Services
OF – organic fertilizer
OFT – on-farm trial
OM – organic matter
ON – observational nursery
OPAg – Office of Provincial Agriculturist
OpAPA – Open Academy for Philippine Agriculture
P – phosphorus
PA – phytic acid
PCR – Polymerase chain reaction
PDW – plant dry weight
PF – participating farmer
PFS – PalayCheck field school
PhilRice – Philippine Rice Research Institute
PhilSCAT – Philippine-Sino Center for Agricultural Technology
PHilMech – Philippine Center for Postharvest Development and Mechanization
PCA – principal component analysis
PI – panicle initiation
PN – pedigree nursery
PRKB – Pinoy Rice Knowledge Bank
PTD – participatory technology development
PYT – preliminary yield trial
QTL – quantitative trait loci
R - resistant
RBB – rice black bug
RCBD – randomized complete block design
RDI – regulated deficit irrigation
RF – rainfed
RP – resource person
RPM – revolution per minute
RQCS – Rice Quality Classification Software
RS4D – Rice Science for Development
RSO – rice sufficiency officer
RFL – Rainfed lowland
RTV – rice tungro virus
RTWG – Rice Technical Working Group
S – sulfur
SACLOB – Sealed Storage Enclosure for Rice Seeds
SALT – Sloping Agricultural Land Technology
SB – sheath blight
SFR – small farm reservoir
SME – small-medium enterprise
SMS – short message service
SN – source nursery
SSNM – site-specific nutrient management
SSR – simple sequence repeat
STK – soil test kit
STR – sequence tandem repeat
SV – seedling vigor
t – ton
TCN – testcross nursery
TCP – technical cooperation project
TGMS – thermo-sensitive genetic male sterile
TN – testcross nursery
TOT – training of trainers
TPR – transplanted rice
TRV – traditional variety
TSS – total soluble solid
UEM – ultra-early maturing
UPLB – University of the Philippines Los Baños
VSU – Visayas State University
WBPH – white-backed planthopper
WEPP – water erosion prediction project
WHC – water holding capacity
WHO – World Health Organization
WS – wet season
WT – weed tolerance
YA – yield advantage
Zn – zinc
ZT – zero tillage

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Department of Agriculture

PHILRICE

PHILIPPINE RICE RESEARCH INSTITUTE

We are a chartered government corporate entity under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding, cost-reducing, and environment-friendly technologies so farmers can produce enough rice for all Filipinos.

We accomplish this mission through research and development work in our central and seven branch stations, coordinating with a network that comprises 58 agencies and 70 seed centers strategically located nationwide. To help farmers achieve holistic development, we will pursue the following goals in 2010-2020: attaining and sustaining rice self-sufficiency; reducing poverty and malnutrition; and achieving competitiveness through agricultural science and technology.

We have the following certifications: ISO 9001:2008 (Quality Management), ISO 14001:2004 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series).

Central Experiment Station
Maligaya, Science City of Muñoz, 3119 Nueva Ecija
Trunklines: (44) 456-0277, -0285 • Telefax: (044) 456-0441
Email: prri@email.philrice.gov.ph

PhilRice Agusan
Basilisa, RTRomualdez, 8611 Agusan del Norte
Tel/Fax: 343-0768; 343-0778
Email: agusan@email.philrice.gov.ph

PhilRice Batac
MMSU Campus, Batac City, 2906 Ilocos Norte
Tel/Fax: (77) 792-4702; 670-1867
Email: batac@email.philrice.gov.ph

PhilRice Bicol
Batang, Ligao City, 4504 Albay
Cell: 0908-884-0724

PhilRice Isabela
San Mateo, 3318 Isabela
Tel: (78) 664-2954 • Fax 664-2953
Email: san_mateo@email.philrice.gov.ph

PhilRice Los Baños
UPLB Campus, Los Baños, 4030 Laguna
Tel: (49) 536-1917
Email: los_banos@email.philrice.gov.ph

PhilRice Midsayap
Bual Norte, Midsayap, 9410 North Cotabato
Tel: (64) 229-8178 • Fax 229-7242
Email: midsayap@email.philrice.gov.ph

PhilRice Negros
Cansilayan, Murcia, 6129 Negros Occidental
Cell: 0928-506-0515
Email: negros@email.philrice.gov.ph

PhilRice Field Office
CMU Campus, Maramag, 8714 Bukidnon
Tel/Fax: (88) 222-5744

PhilRice Liaison Office
3rd Flr, ATI Bldg., Elliptical Road,
Diliman, Quezon City
Tel/Fax: (02) 920-5129
Cell: 0920-906-9052

CERTIFICATION INTERNATIONAL
ISO 9001:2008 CIP/4360/Q/09/10/668
ISO 14001:2004 CIP/4360/E/09/10/668
OHSAS 18001:2007 CIP/4360/HS/09/10/668

PhilRice Farmers' Text Center
0920-911-1398

PinoyRice Knowledge Bank
www.pinoyrkb.com

PhilRice Website
www.philrice.gov.ph