2019

PHILRICE R&D HIGHLIGHTS

CROP PROTECTION DIVISION

Contents

DIVISION

Crop Protection

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Executive Summary

The Crop Protection Division (CPD) aims to generate, develop, and promote sustainable pest management strategies that will help farmers judiciously decide on pest management strategies. Pest management strategies should be ecosystem-based, environment-friendly, safe, economical, sustainable, and compatible with other management options. Hence, CPD contributes to the achievement of PhilRice strategic outcomes: (1) increased productivity, cost effectiveness, and profitability of rice farming in a sustainable manner; (2) enhanced value, availability, and utilization of rice, diversified rice-based farming products for better quality, safety, health, nutrition, and income; and (3) advanced rice science and technology as continuing sources of growth.

In 2019, the division implemented four interrelated projects. The first project evaluated rice materials for insect pest and disease resistance. Rice lines totaling 996 were screened to determine their reactions to major pests. In addition, 43 rice varieties were re-evaluated against the major pests under field and screenhouse conditions. For fast and efficient method of screening resistance of rice to sheath blight, the micro-chamber method was used under greenhouse condition.

To help ensure pest resistance in released varieties, the second project focused on characterizing PhilRice breeding lines under development and other rice germplasm as potential source of genes against two distinct major rice diseases (rice blast and bacterial leaf blight). Using the differential system for disease resistance, reaction of selected PhilRice elite/ advanced lines for irrigated lowland and adverse environment against differential rice blast and bacterial blight isolates was evaluated while the resistance genes harboring in these rice genotypes were estimated. The breeding lines were also genotyped for the presence of resistance genes using R-gene specific DNA markers of known bacterial blight and rice blast major resistance genes.

To complement host plant resistance in managing pests, the third project focused on other alternative control techniques and maximized the use of biological control agents and other potential organisms that have been suggested to minimize injudicious use of pesticides to ultimately create more options for pest management in rice production.

The fourth project maintained the research and analytical laboratory system and three laboratories: entomology, plant pathology, and weed science to ensure that outputs are of good quality and accurate.

PROJECT 1

Evaluation of Rice Lines for Disease and Insect Pest Resistance

JP Rillon

The role of pest evaluation is very important in identifying rice lines that will show resistance to major rice diseases and insect pests and this complements rice varietal development to produce rice varieties with resistance to pest. There are four studies under the project: evaluation against rice disease, insect pest, resistant stability of rice varieties; and development of a rapid screening protocol for sheath blight. Promising rice lines and varieties were evaluated for resistance to blast, bacterial leaf blight (BLB), sheath blight (ShB), tungro, green leafhopper (GLH), brown planthopper (BPH), and yellow stem borer (SB). A field study was also established to determine the resistance stability of high popular varieties to the major diseases and insect pests. Under screenhouse condition, a rapid screening protocol for ShB was implemented to identify rice varieties that will exhibit disease resistance. In 2019, 996 rice lines were evaluated to determine the reactions against major rice diseases and insect pests. For fast and efficient method of resistance screening to ShB, the micro-chamber method was evaluated under greenhouse condition.

Centralized Screening for Resistance to Rice Diseases

KMB Guarin, JP Rillon, SE Santiago, and MAV Duca

For blast resistance screening, 996 rice lines were evaluated while 681 rice lines were evaluated for BLB, ShB, and tungro resistance. Blast resistance was conducted 30 days after sowing by examining the dominant lesion type. BLB's length of lesion and ShB's relative lesion height were examined 14 days after inoculating the test plant. Tungro resistance under induced method was evaluated 3-4 weeks after inoculation. For tungro resistance under modified field method, evaluation was done at 45 and 60 days after transplanting by assessing the degree of discoloration and height reduction. Results showed that among the lines tested, 630 lines had resistant reactions to blast while 187 lines had intermediate reactions to the disease. Two hundred forty-nine (249) rice lines had intermediate reactions to BLB while 33 lines had intermediate reactions to ShB. All rice lines were susceptible to tungro under induced method of evaluation. Low disease pressure was observed for tungro resistance under modified field.

Centralized screening for resistance to major insect pests of rice

GD Santiago

This study characterized and compared the reactions of different entries/ selections to major insect pests to ensure that varieties recommended for commercial release are highly resistant. There were 292 rice entries evaluated against SB under natural field condition. A low SB pressure was observed during the vegetative and reproductive stage of the entries; hence, data were invalid. The susceptible check was infested by BPH that caused hopperburn. Whitehead evaluation showed that majority of the entries had intermediate reaction. Majority of the entries were Intermediate to BPH and GLH under the screenhouse condition. During 2019 WS, 398 entries were planted late on August 16, 2019. The entries were also evaluated against SB, BPH, and GLH, under field and screenhouse condition. Evaluation at vegetative stage showed a very low insect pressure. Evaluation under screenhouse condition showed that majority of the entries were intermediate to BPH and GLH.

Resistance stability of high-yielding varieties to major insect pest and diseases of rice

GD Santiago, EM Valdez, and MSV Duca

The recommended popular PSB and NSIC rice varieties recommended to farmers 5 to 10 years ago and older were chosen and planted starting 2019 DS. Their reactions to biotic stresses at the time of release served as the benchmark data. These varieties were laid out following the RCBD and re-evaluated against the major insect pests and diseases under field and screenhouse conditions following the National Cooperative Test protocol.

Field evaluation for 2019 DS and WS was not valid due to low SB population. The susceptible check (TN1) did not reach the minimum required percent damage for the data to be valid. However, some of the varieties including the susceptible check were heavily infested by the BPH that caused hopperburn and bugburn during WS. Disease pressure was also low during both seasons.

For the screenhouse evaluation in 2019 DS and WS, majority of the different varieties showed an inconsistent reaction to 1 or more pest compared at the time of their release. NSIC Rc 294, Rc 304 SR, and Rc 27 showed consistent reactions.

Optimization of a Rapid Screening Method for Sheath Blight under Screenhouse Conditions

ES Avellanoza, RT Miranda, and JP Rillon

Two trials were conducted to optimize the micro-chamber method as tool for screening resistance of rice to sheath blight under greenhouse condition. This method is optimized as fast and efficient tools for screening resistance against ShB contribute to improved rice varieties.

Five varieties with known reactions to ShB were evaluated for lesion, sheath height, and plant height. Factors involved in the experiment were the kind of substrates (mycelial discs, rice straw strips, and rice hull plus rice bran), conditions during the inoculation (within and out of chamber), and seedling age at 14 and 21 days after sowing (DAS). The experiment was arranged in RCBD with three replications. Data gathered were analyzed through three-way ANOVA using STAR 201. Statistical analysis showed no significant differences in % lesion among varieties under three substrates when inoculation was done outside the chamber. Rice plants inoculated within the chamber significantly had higher % lesions at 14 and 21 DAS regardless of substrates. In terms of seedling age, the 21-day-old seedlings inoculated within the chamber significantly had higher % lesions under rice hull plus rice bran substrate. Rice plants at 14 and 21 DAS had significantly lower % lesions under three substrates when inoculation was done outside the chamber. Mist chamber method materials were inoculated in two ways: 1) substrate was evenly spread in the soil, and 2) substrate was placed at the basal sheath of the plants. Rice hull plus rice bran (3:1 ratio) was used as inoculum carrier as it was identified as best substrate during the previous screening using the micro-chamber method. Based on the preliminary result at 10 days (PDI), plants of TN1-susceptible check variety, were all rated susceptible. Plants inoculated at the base had rating score of 7.8. Test plants recorded 8.88 rating score when substrate inoculated evenly in the soil.

Characterization of PhilRice Elite Germplasm for Functional Disease Resistance Genes

JT Niones

Host resistance is considered the most effective, economical, and environment-friendly way of rice disease management. In-depth characterization of disease resistance among PhilRice breeding parentals, elite rice genotypes, and other germplasm as potential sources of novel disease resistance genes is needed to ensure the variation of resistance genes (R genes) in the breeding program. Characterizing and identifying the mechanisms of host resistance to diseases facilitate the manipulation and effective transfer of genes to popular varieties and eventual deployment of disease-resistant cultivars.

This project generally aimed to characterize the resistance of PhilRice breeding lines under development and other rice germplasm as potential source of resistance genes against two distinct major rice diseases, the rice blast (*Pyricularia oryzae*) and the BLB (*Xanthomonas oryzae pv. oryzae*). The project is composed of two studies. CPD 102-001 focused on rice blast resistance while CPD 102-002 on bacterial blight resistance.

Identification of major blast resistance genes in PhilRice elite rice germplasm and other rice materials as potential source of blast resistance genes

JT Niones, J Manangkil, and RM Macababat

Rice blast disease imposes a constant constraint to the stable rice production worldwide. In the Philippines, rice blast disease has been frequently reported in upland rice growing areas and rainfed lowland environments that are prone to drought, which caused yield losses ranging 50-85% in some epidemic years. The study aimed to systematically determine and analyze the range/spectrum of disease resistance of PhilRice elite rice accessions against differential blast (*Pyricularia oryzae*) isolates and to determine the rice blast resistance genes possibly harboring in breeding lines based on the disease reaction patterns against differential pathogen isolates and DNA markers. For 2019, the resistance reaction of 48 PhilRice elite/advanced lines for irrigated lowland and adverse environment against differential rice blast isolates were evaluated. Moreover, the rice blast (*Pi* gene) harboring in these rice genotypes was estimated. These breeding lines were also genotyped for the presence of resistance genes using disease resistance gene (R gene) - specific DNA markers. Seven breeding lines have shown resistant reaction to all of the 20 differential blast isolates. Two of these lines are for adverse environment with tolerance to drought and submergence-salinity, two hybrid parentals, one mutant line, and one advanced line for high yield. These breeding lines showed disease reaction pattern different from that of the major R-genes included in the differential system. It is possible that R-genes (not considered in the differential system) or novel R genes are controlling the resistance in these breeding lines. Most of the breeding lines exhibited broad spectrum of blast resistance against differential blast isolates. Primary estimation of R genes present in these breeding lines using three distinct blast differential isolates showed 18 breeding lines estimated to harbor a combined *Pi20*(t), Pita and *Pik* genes. *Pi20*(t) is the most frequently estimated gene among the breeding lines, either as single gene or in combination with *Pita* and *Pik* genes. Using R-gene DNA primers, breeding lines were predicted to carry *Pi2/Pi9, Pii, Pia,Pik, Pish*, and *Pib* genes, either singly or combination of 2 to 4 R genes. *Pib, Pish,* and *Pia* genes were the most frequently detected R genes. The presence of Pi9 gene, a known broad-spectrum resistance gene, was only detected in 18DS-Sub18, which is a submergence- drought tolerant line.

Identification of Bacterial Blight Resistance Genes in PhilRice germplasm and Potential Source of Bacterial Blight Resistance Genes

ES Avellanoza, LC Jain, AM Irang, and JT Niones

The study aimed to determine the bacterial blight resistance genes (*Xa* genes) in PhilRice elite breeding lines. In 2019 DS, 63 elite lines bred for different abiotic stresses and in different purposes such as hybrid parentals, mutant lines, irrigated lowland, specialty rice, and heat tolerance were subjected to genotyping to detect presence of *Xa* genes and phenotype and determine their broad resistance spectrum based on their reaction to each of the *Xoo* differential isolates. The *Xa* genes presence in the 63 elites lines ranging 0–0.8 indicated broad-spectrum resistance against *Xoo* differential isolates. Moreover, the presence of *Xa21* gene in 36 of the elite lines can contribute resistance against *Xoo* differential isolates. In 2019 WS, phenotyping results showed that 56 of the 63 elite lines from different ecosystems exhibited complete reactions to nine Xoo differential races. The obtained values for Broad Spectrum Resistance Index (BSRI) of valuated elite lines ranged 0-1.0. Most of the elite lines were frequently observed to have a presence of both *Xa4* and *Xa21* genes and with highest values of BSRI, as well. Two elite lines developed for adverse ecosystem, PKEL-394 and HTEL-432, harbored the most number of *Xa*-genes detected in their genome. With a resistance spectrum of 0.8 and had highest computed BSRI values of 1.0 and with an estimated known *Xa*-genes based on their resistant patterns on the seven differential lines evaluated against nine differential *Xoo* isolates. Elite lines PR29A (a Hybrid parental), GYT 27 (for irrigated lowland ecosystem-transplanted), HTEL-416 (for adverse environment- with heat tolerance), and 18DS-Sub18 (for adverse environment- with submergence tolerance) had an estimated known *Xa*-gene and with highest values of BSRI. Five elite lines including 18DS-Sub84, GYT 10, PKEL-424, RL18WS_SI-4, and RL18WS_SI-40 had broad spectrum resistance index of 0.6-0.9. Resistance patterns exhibited by these elite lines were unique or governed by unknown resistance genes present in their genome, especially those with high BSRI values; thus further studies will be conducted. These genes can be exploited for breeding rice varieties with pyramided genes for resistance against BLB.

PROJECT 3

Ecology and Management of Key Pests of Rice and Conservation of Beneficial Organisms

DKM Donayre

Knowledge on biology and ecology of pests is pre-requisite to effective and economical pest management. Preserving beneficial organisms for pest management is also important in conserving genetic and physiological characteristics for long periods and make them easily available. This project aimed to: (1) determine the ecology of yellow SB, plant hoppers, and other arthropods; (2) determine the competitive ability of *Cyperus rotundus* against irrigated rice; (3) test the efficacy of fungal endophytes, fungal epiphytes, and selected weed species against rice blast and ShB pathogens; (4) test the efficacy of golden apple snail and *Lantana camara* as attractants to rice bug; and (5) develop preservation methods that can maintain the viability and genetic integrities of beneficial microorganisms.

Seasonal Fluctuation of Stem borer and Other Arthropods at PhilRice CES

GD Santiago and EM Valdez

Yellow stem borer (YSB) is one of the widely distributed, dominant, and monophagous pests of rice in the country. Regular monitoring in the field is very vital to understand its population dynamics and select appropriate pest management strategies. Using a light trap, the population of adult YSB and other arthropods were monitored from January to November 2019 in ricefields of PhilRice CES. Light trap catches showed that adult YSB peaked in April (390 adults) and September (64 adults), BPH in March (15,245 adults) and September (3,386 adults), and rice black bug in June (2,762 adults). Same trends were also observed for zigzag leafhopper, GLH, and whitebacked planthopper. Peak populations of predominant natural enemies, mirid bug (*Cyrtorhinus sp.*) and water bug (*Microvelia sp.*), followed the same trends as the rice hoppers. Occurrences of low temperature and high humidity could be the attributable factors for the low population of the YSB and other arthropods.

Development of Management Options for Rice Planthoppers

GS Rillon, and CCB Encarnacion

Information on the population and associated damage of rice planthoppers (RPH), which had been considered lately as potential constraints to rice production in the Philippines, were determined. Based on the light trap catches at PhilRice CES, BPH population was high in March 19 (58,154 individuals) but had low population in the latter part of the year. Population of whitebacked planthopper was consistently lower than BPH. Using sticky traps, population of RPH was also monitored in fields of PhilRice CES and Mabini, Sto. Domingo, Nueva Ecija. Data on trap catches during dry and wet seasons showed low population of RPH at PhilRice CES while high population in Mabini, Sto. Domingo, particularly during flowering to milking stages of rice plants. Few incidences of hopperburn and no incidences of rice virus disease were observed in field sites, which could be due to the low usage of insecticides and application of recommended amount of fertilizers. Information gathered will be useful in updating decision guides for RPH.

Interference of Cyperus rotundus on growth and development of rice under irrigated-lowland condition

DKM Donayre, JJL Jimenez, EC Martin, and AMLS Latonio

Knowledge on a weeds' competitive ability at certain population helps decide when it must be controlled to prevent crop yield loss. A lowland ecotype C. rotundus (LE-CYPRO) had been found infesting lowland ricefields in the Philippines possessing different adaptive mechanisms under flooded condition. Its effects on growth and yield of rice under this type of condition, however, are still unknown. An experiment was conducted from February to May 2019 to determine the effects of LE-CYPRO on growths and yields of transplanted (TPR) and direct-seeded (DSR) rice, and to quantify yield losses of the crop when the weed was allowed to grow at different densities under flooded condition. Twenty-one-day-old seedlings and pre-germinated seeds of rice were planted in separate boxes and allowed to grow with LE-CYPRO at 0, 5, 10, 15, and 20 tuber densities. Each box, replicated 5 times and arranged in RCBD, was flooded with water (5cm) at 7 DAP until maturity. Growth, yield, and yield losses of rice were recorded. Data were subjected to ANOVA while treatment means were compared through LSD at 5% level of significance. Correlation was also done to relate yield losses to three weed parameters. Height, number of leaves and tillers, shoot and root dry weights, and number of panicles were reduced when LE-CYPRO was allowed to compete at 5, 10, 15, and 20 densities. Grain yield losses ranged from 2.34 to 26.7% for TPR while 19.1-26.1% for DSR. Grain yields and yield losses of TPR and DSR had high negative and positive relationships on densities, number of off-shoots, and shoot biomass of LE-CYPRO, respectively. This study proved that LE-CYPRO, at densities between 5-20, is capable of reducing growth and yield of rice even under flooded condition. The weed, therefore, must be controlled whenever found infesting rice under irrigated lowland condition.

Evaluation of Antifungal Potential of Epiphytes against the Rice Blast Pathogen

FA Dela Peńa and HG Pascua

Ten epiphytic bacterial isolates from rice were evaluated for their antagonistic effects against the growth of rice blast fungus (*Magnaporthe grisea*) using a dual culture test. The isolates were also tested for their endoglucanase and proteolytic extracellular activities. All the isolates showed inhibitions greater than 2mm against the mycelial growth of *M. grisea*. Isolates' CLSUM4 and CLSUT13 exhibited the highest rice blast fungal growth inhibition (33.84 and 33.71%). The isolates, except CLSUM6 and CLSUB2, also showed positive proteolytic extracellular activities. Only isolate CLSUM3 showed negative endoglucanase extracellular activity. CLSUM4, CLSUT13, and CLSUT9 will be further tested to fully package the bacteria as potential biological control agents against the rice blast fungus.

Antifungal Effects of Selected Weed Against the Philippine Isolate of Magnaporthe grisea Causing Rice Blast Disease

FA Dela Peña and HG Pascua

An experiment was conducted to determine the effect of weed ethanolic extracts on Magnaporthe grisea via phytotoxicity and slide germination tests. Extracts of *Hydrolea zeylanica, Eichhornia crassipes* and *Pistia stratiotes* 100, 50, 25, and 12.5% concentrations were used as the treatments against the causal fungus of rice blast. Except for *E. crassipes* at 12.5% concentration, all extracts of the weeds were phytotoxic to rice. Spores of *M. grisea*, on the other hand, germinated at 12.5 and 25% concentrations of *H. zeynalica* but not at 50 and 100% concentrations. Results suggest that *H. zeynalica* extract cannot be used as biofungicide against the rice blast fungus.

Evaluation of Golden Apple Snail and Lantana camara as Attractants for Rice Bug

EM Valdez, DKM Donayre, JJL Jimenez, and AMLS Latonio

Golden apple snail and *Lantana camara* have been reported as effective attractants to rice bug (*Leptocorisa spp.*). Despite the discoveries, evaluating these attractants under field conditions are very limited. A field study was conducted in Maria Aurora and Baler, Aurora; and Burgos, Pangasinan to determine the efficacies of golden apple snail (GAS, crushed and uncrushed at 1000g) and *L. camara* (100, 300, and 500g) as attractants to rice bug. These attractants were randomly arranged in the field through CRD. Number of rice bug individuals attracted were counted the next day. Rice bugs were highly attracted to GAS irrespective whether it was crushed or uncrushed in the field. None or very few were attracted to *L. camara*. Based on the observations made by the farmer cooperators in the different sites, more rice bugs were attracted in GAS treatments that emitted stronger odor. On the other hand, some farmers in the nearby fields of Burgos, Pangasinan were observed adopting the evaluated technology by installing GAS trap in their own fields.

Conservation of Organisms with Beneficial Uses to Pest Management

MSV Duca and JJL Jimenez

A study was conducted at the Plant Pathology Laboratory of Crop Protection Division to determine the best method of conserving organisms with beneficial uses to pest management. Four preservation methods [filter paper, PDA, PDA with glycerol (PDAG), and microbank] were evaluated by storing each separately with 12 fungal endophytes, 12 fungal epiphytes, and 4 fungal pathogens of rice at two varying temperatures (5°C and -20°C) and two periods of revival (1 and 2 years). After one year of preserving 28 fungal isolates, 26 and 25 from filter paper, 23 and 20 from PDA, and 7 and 15 from PDAG were revived, respectively. In addition, 21 isolates from microbank were mainly revived at -20°C. Filter paper had the highest percentage of revival at 5°C and -20°C particularly for fungal endophytes and epiphytes. Filter paper is the most effective and economical method of preserving fungal endophytes, ephiphytes, and fungal pathogens. This method is less expensive, easier to prepare, and requires minimal space in the freezer.

PROJECT 4

Crop Protection Division Research and Analytical Laboratory System and Maintenance

EM Valdez

The Crop Protection Division (CPD) is one of the major research divisions of PhilRice wherein three laboratories: plant pathology, entomology, and weed Science are located. Each laboratory is manned by trained researchers and is maintained by a laboratory manager. The operation of these laboratories was implemented in adherence to quality, environment and health and safety standards, and in compliance with all the applicable laboratory legal and other requirements. Continual improvement in the operations is needed and proper care and maintenance of laboratory facilities and equipment should always be done to ensure that outputs generated are of good quality and accurate.

This project aimed to (1) provide assistance in the improvement/upgrade/maintenance of the existing laboratory facilities for better quality research output; (2) capacitate the laboratory workers on proper maintenance of laboratory equipment; and (3) build database and inventory of information on the chemical and other IMS related laboratory management system and eventually migrate or integrate to the laboratory unified information system in collaboration with ISD and other PhilRice laboratories.

To continually improve the services of these laboratories, the following activities were implemented: (1) calibration of 43 laboratory equipment/tools/devices; (2) laboratory workers were sent to three training courses and seminars on good laboratory practices and calibration of laboratory equipment, and (3) inventory of laboratory equipment, chemicals and other laboratory supplies were conducted while data were centralized and an MS Excel format database was initiated.

Abbreviations and acronyms

AYT - Advanced Yield Trial
ABE - Agricultural and Biosystems Engineering
AEW - Agricultural Extension Worker
ATI – Agriculture Training Institute
AESA - Agro-ecosystem Analysis
AC - Amylose Content
BLB - Bacterial Leaf Blight
BLS -Bacterial Leaf Streak
BCA - Biological Control Agent
BS - Breeder Seeds
BPH -Brown Planthopper
BPI - Bureau of Plant Industry
CGMS - Cytoplasmic Genic Male Sterility
COF - Commercial Organic Fertilizer
CDA - Cooperative Development Authority
DAS - Days After Sowing
DAT - Days After Transplanting
DF - Days to Flowering
DM- Days to Maturity
DAR - Department of Agrarian Reform
DA-RFOs - Department of Agriculture-Regional Field Offices
DoF - Department of Finance
DOLE - Department of Labor and Employment
DTI - Department of Trade and Industry
DSR - Direct-seeded Rice
DS - Dry Season
FBS – Farmers' Business School
FC - Farmers' Cooperative
FSM - Farming Systems Models
FAA - Fish Amino Acid
FGD - Focused Group Discussion
FSP - Foundation Seed Production
FRK - Farm Record Keeping
GABA - Gamma-aminobutyric Acid
GT - Gelatinization Temperature
GAD - Gender and Development
GYT - General Yield Trial
GCA - Genetic Combining Ability
GIS - Geographic information system
GEMS - Germplasm Management System
GAS - Golden Apple Snail
GL - Grain Length
GQ - Grain Quality
GW - Grain Weight
GY - Grain Yield
GLH - Green Leafhopper
GOT - Grow Out Test
HR - Head Rice
HRA - Heat Recovery Attachment
HIPS – Highly-intensified Production System
HQS - High-quality Rice Seeds
HON - Hybrid Observational Nursery
HPYT - Hybrid Preliminary Yield Trial
ICT - Information and Communication Technology
IEC - Information Education Communication
IBNM - Inorganic-based Nutrient Management
ICM - Integrated Crop Management
IPM - Integrated Pest Management
JICA - Japan International Cooperation Agency
IRRI - International Rice Research Institute
IA - Irrigators' Association
KP - Knowledge Product
KSL - Knowledge Sharing and Learning
LCC - Leaf Color Chart
LFT - Local Farmer Technicians
LGU - Local Government Units
LPS - Low Pressure Steam-operated
LE-CYPRO - Lowland ecotype Cyperus rotundus
MFE - Male Fertile Environment
MSE - Male Sterile Environment
MAS - Marker-assisted Selection
MRL - Maximum Root Length
MR - Milled Rice
MER - Minimum Enclosing Rectangle
MOET - Minus-one Element Technique
MC - Moisture Content
MAT - Multi-Adaptation Trials

MCRTP - Multi-crop Reduced Till Planter
MET - Multi-environment Trial
MYT - Multi-location Yield Trial
NAAP - National Azolla Action Program
NCT - National Cooperative Test
NFA - National Food Authority
NRAM - National Rice Awareness Month
NSIC - National Seed Industry Council
NSQCS - National Seed Quality Control Services
N - Nitrogen
NBSP - Nucleus and Breeder Seed Production Project
NFGP - Number of Filled Grains Panicle
ON - Observation Nursery
OSIS - One-Stop Information Shop
OBNM - Organic-based Nutrient Management
PL - Panicle Length
PW - Panicle Weight
PVS - Participatory Varietal Selection
PWD - Person with Disabilities
PHilMech - Philippine Center for Postharvest Development and Mechanization
PRISM - Philippine Rice Information System
PhilRice - Philippine Rice Research Institute
PSA - Philippine Statistics Authority
PTC - PhilRice Text Center
P - Phosphorus
PVS - Plant Variety Selection
K - Potassium
QTL - Quantitative Trait Loci
RCBD - Randomized Complete Block Design
RSP - Registered Seed Production
RBB - Rice Black Bug
RCEF - Rice Competitiveness Enhancement Fund
RCEP - Rice Competitiveness Enhancement Program
RCM - Rice Crop Manager
RHGEPS - Rice Hull Gasifier Engine Pump System
RPH - Rice Planthopper
RSTC - Rice Specialists' Training Course
RTV - Rice Tungro Virus
RBFHS - Rice-based Farming Household Survey
KQ - Kernel Quality
SV - Seedling Vigor
ShB - Sheath Blight
ShR - Sheath Rot
SMS - Short Messaging Service
SNP - Single Nucleotide Polymorphism
SWRIP- Small Water Reservoir Irrigation Project
SRB - Stabilized Rice Bran
SUCs - State Universities and Colleges
SB - Stem Borer
TESDA - Technical Education and Skills Development Authority
TDF - Technology Demonstration Farm
TRV - Traditional Rice Varieties
TOT - Training of Trainers
TPR - Transplanted Rice
URBFS - Upland Rice-Based Farming
WS - Wet Season
WCV - Wide Compatibility Variety
YSB - Yellow Stem Borer

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

With a "Rice-Secure Philippines" vision, we want the Filipino rice farmers and the Philippine rice industry to be competitive through research for development in our central and seven branch stations, coordinating with a network that comprises 59 agencies strategically located nationwide.

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).

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