Corporation: Philippine Rice Research Institute

I. CORPORATE PROFILE

A. Corporate Objectives

PhilRice is a chartered government corporate entity created through Executive Order No. 1061 on Nov. 5, 1985 (amended by EO 60 on Nov. 7, 1986). According to Section 2 of its charter, the purpose of PhilRice is to develop a national rice research program so as to sustain and further improve the gains already made in rice production, improve the income and economic condition of small rice farmers, expand employment opportunities in the rural areas, and ultimately promote the general welfare of the people through self-sufficiency in rice production. Its functions as outlined in Section 3 of the charter include, among others, the following:

1. Serve as the coordinating center of a national network of rice research stations located in the different agro-ecological regions of the country;
2. Plan and carry out research and development activities, specifically in the areas of varietal improvement, planting and fertilizer management, integrated pest management, farm mechanization and post-harvest engineering, farming systems, training and technology transfer, and social science and policy research;
3. Verify, package and transfer economically viable technologies, giving emphasis on the social engineering aspects necessary for group endeavor;
4. Provide the data base or policy formulation that will stimulate and sustain rice production, marketing and consumption;
5. Organize and develop strong training programs for rice scientists, research managers and extension workers; and
6. Publish and disseminate research findings and recommendations

B. Corporate Priorities for Year 2017

Guided by its new vision, "Rice-Secure Philippines" under its new Strategic Plan for 2017-2022, PhilRice and its partners will propose and execute strategies on how to create significant impacts on the lives of all rice stakeholders.

With its mission "To improve the competitiveness of the Filipino rice farmer and the Philippine rice industry and transform it to be more profitable, resilient, and sustainable through responsive, balanced, environmentally sound and partnership-based research, development, and extension." PhilRice will therefore pursue a balanced R4D programs and approach with the following outcomes:

1. Increased productivity, cost-effectiveness, and profitability of rice farming in a sustainable manner
2. Improved rice trade through efficient postproduction, better product quality, and reliable supply and distribution system
3. Enhanced value, availability, and utilization of rice, diversified rice-based farming products, and by-products for better quality, safety, health, nutrition, and income
4. Science-based and supportive rice policy environment
5. Advanced rice science and technology as continuing sources of growth
6. Enhanced partnerships and knowledge management for rice research for development (R4D)
7. Strengthened institutional capability

C. Major Programs and Projects (2017–2022)

C.1. National Rice R4D Programs

Program 1: Coping with Climate Change

Higher risks and greater uncertainty owing to climate change in a highly vulnerable country like ours continue to daunt the Filipino rice farmer. Confronted with spiraling prices and dwindling supply of farm inputs, such as fossil fuel, fertilizers, irrigation water, and even human labor, the future of Philippine rice-based agriculture indeed looks grim. The incessantly rising population and continuing conversion of prime rice lands for other purposes further pose an enormous challenge of producing more food from smaller and less fertile, even marginal lands.

Changes in precipitation, increase in temperature, and sea level rise are among the projected impacts of climate change which will greatly affect agriculture, the prime source of food security in the country. Agriculture is very sensitive to climate change, which will exacerbate the annual damage in the sector. Rice production in the Philippines has been projected to decline starting in 2020 by as much as 75% from the current level unless the resiliency and flexibility of rice farming communities in facing climate change is addressed through effective and efficient mitigation and adaptation measures (ADB, Manila Times 2009).

To cope with climate change, there is a need to transform Philippine rice agriculture into a climate-resilient and energy-efficient system. The resilience and sustainability of our rice production system must be intensified, while making it more efficient in the use of energy, water and nutrients. This can be done by combining rapid advances in knowledge of plant genetics and the advanced approaches to agronomic

management to deliver the required sustainable intensification in productivity. The program shall consist of the following components:

1) Enhancement of the climate change adaptive capacity of rice-based farming systems.
2) Ensuring household food and income security in climate change vulnerable areas.
3) Generation and management of climate change-related knowledge and information

Program 2: Farming Without Fossil Energy

"Despite a near tripling of world oil prices, non-OPEC production, which accounts for 60% of world output, hasn't increased significantly since 2004. And many of those same experts, as well as some major oil companies, don't see it increasing again—ever," declared Richard Kerr in his article "Peak Oil Production May Already Be Here," published in *Science*, March 25,2011 issue.

In his essay published on Resilience (http://www.resilience.org) and titled "What will we eat as the oil runs out," Post Carbon Institute senior fellow Richard Heinberg laid out four dilemmas that comprise an unprecedentedly wide-scoped crisis that fossil fuel-dependent global agriculture and food system faces: 1) direct impacts on agriculture of higher oil prices are increased costs of tractor fuel, agricultural fertilizers and chemicals, and the transport of farm inputs and outputs; 2) an indirect consequence of high oil prices, the increased demand for biofuels, which is resulting in farmland being turned from food production to fuel production, making food more costly, 3) impacts of climate change and extreme weather events caused by fuel-based greenhouse gas emissions, and 4) degradation or loss of basic natural resources, principally topsoil and fresh water supplies, as a result of high rates and unsustainable methods of production stimulated by decades of cheap energy. Heinberg averred that we need a more fundamental reform of agriculture than anything we have had before to get to the heart of the crisis, and the solution is an agriculture and food system that does not require fossil fuels.

This program shall lay the foundation for and formulate science and technology-based solutions toward a fossil-fuel free rice-based agriculture in the Philippines. It shall be composed of the following projects:

1) Development of alternative, renewable, diversified and decentralized energy resource systems for and from rice-based agriculture.
2) Improving the energy resource use efficiency in rice-based farming.
3) Development of low external energy inputs in rice-based farming.

Program 3: High-Value Products from Rice and Its Environment

Poverty is a sad reality for the rice-based farming households in the country. It is also not uncommon that most of their income is devoted to food expenses. It is therefore important to empower farming communities not only to improve their practices, reduce farming cost, and increase the value of their produce, but also to explore additional sources of income from production of non-traditional raw materials, such as algae and single cell proteins, in order to improve their economic condition.

The program will generate high-value products from the rice environment to help increase the income of rice-based farming communities. Value-adding systems will be developed, evaluated and refined to increase the value and profitability of rice farming and processing of new products as an enterprise. The program consists of the following components:

1) High-value rice grain
2) High-value products from the rice grain and other parts of the rice plant
3) Beneficial organisms in the rice environment.

Program 4. Intensified Rice-Based Agri-Bio Systems

The productivity and income of many small rice farmers remain low because of the declining profitability of growing mono-crop rice. With rice yields reaching a plateau and the increasing cost of labor and other inputs, the income of farmers has decreased tremendously. Results of analysis of the household poverty and food security impact in relation to the income derived from rice-based farming vis-à-vis household basic needs and food expenditure show that rural incomes are relatively low.

The annual net income derived from growing rice in irrigated areas is Php 45,000.00 per hectare in 2012 (BAS 2013), which is less than half the annual poverty threshold income of Php 94, 675.00 in 2012 (NSCB 2014). Indeed, this makes it difficult for the farm family to meet their food requirements. This implies the crucial importance of other farming components such as vegetables and other crops, fish, and livestock in augmenting farming income in order that necessary food and non-food requirements are met. There is therefore a need to promote diversified and integrated farming systems to generate incomes above the poverty threshold. More importantly, there is a need to integrate diversification strategies in the national rice program to achieve a meaningful impact in terms of increasing household income and productivity of rice-based farmers.

Hence, it is critical to identify and evaluate climate adaptation strategies and introduce innovative measures for enhancing resilience of food systems and natural systems including adaptation of agricultural-biological (agri-bio) production systems, building adaptive capacity and climate resilience of all stakeholders, and sustaining collaboration and partnership among stakeholders in the countryside.

The intensified rice-based agri-bio systems model (Palayamanan Plus) is a community- or village-scale model aimed to increase income by purposive integration of certain farming components that will enhance rice and rice-based crops productivity, profitability and sustainability, cost reduction, value-adding through product processing and utilization rice-biomass and mechanization. An appropriate agri-bio systems model piloted at each PhilRice station is envisioned to spin-off into community agribusiness activities that can generate a calculated annual income of Php 1 million per hectare from all production and economic activities to generate the desired social and economic impact and progress. The program shall consist of the following projects:

1) Agri-biosystems mapping and scoping;
2) Assessment of agri-biosystems models; and
3) Pilot implementation of agri-biosystems models

Program 5. FutureRice

Rice farming in the Philippines will face several challenges in the future. With a very limited irrigated area of only 2 million hectares, it must produce 18 million metric tons of rice to feed an estimated 95 million Filipinos in 2012. The remaining 1.2 million hectares are without irrigation and depend on seasonal rains. The impact of climate change has also brought further destruction of remaining irrigation systems, and in some areas, much flooding and landslide due to shift in cyclone path. High population growth rate of 2.4% and rapid urbanization contribute to further reduction of prime agricultural land in the Philippines.

The challenge for R&D is to produce more food output from the same unit of land, and at the same time, protect the soil and the environment from further degradation due to intensive crop cultivation. This challenge is compounded the dwindling supply, and increasing costs of petroleum based products for farm fuel, pesticides, and fertilizers. The increasing production costs at the farm level are eroding potential income and profits of farmers.

Given this emerging environment, there is a need to develop and test new crop management innovations that will promote self-sufficiency, sustainability and competitiveness in the 21st century. We need to revolutionize and transform our food

production and delivery system through the application of engineering, information technology, and biotechnology. This means that we have to upgrade the skills of extension agents and farmers on green, practical, and smart farming. Finally, these efforts must act as catalysts to transform farming communities into ecologically vibrant and competitive economies.

Key program components are as follows:

1) Rice Innovation Center.
2) Smart Rice Farms
3) Rice Academy.
4) Farmer Cyber Community.
5) Project Management and Support Communication.

C.2. Discipline-Based and Upstream Rice R4D Projects

In support of the implementation of the Rice R&D programs, PhilRice is implementing basic and upstream research activities through its R&D divisions:

Plant Breeding and Biotechnology focuses on enhancing genetic variability of potential rice varieties/elite lines; developing breeding materials with yield-enhancing, stabilizing and value-adding traits for use as parents in hybridization programs and/or direct utilization as varieties; characterizing important germplasm and making available nucleus seeds for commercial cultivation. It seeks to ensure stable and sustainable rice production through the development of high-yielding, pest and abiotic stress-resistant and good grain quality rice varieties suitable to major rice growing ecosystems.

Agronomy, Soils, and Plant Physiology leads research efforts to evaluate, refine, and facilitate the delivery of improved soil, nutrient, and water management practices to enhance soil quality and profitability and plant resource use efficiency.

Crop Protection seeks to help attain rice self-sufficiency and build a competitive rice economy through the generation, development, and promotion of pest management strategies, which are environment-friendly, economical, sustainable, and compatible with each other to address farmers' needs. It also assists breeders in screening potential varieties for insect and disease resistance.

Genetic Resources carries out germplasm collection, conservation, management, dissemination and utilization. It ensures availability of fully characterized germplasm to rice plant breeders and researchers. It also conducts research on genetic diversity.

Rice Engineering and Mechanization develops machines and tools to increase the national level of farm mechanization and modernize rice production and postharvest operations to increase farm efficiency and productivity.

Rice Chemistry and Food Science focuses on increasing the productivity and profitability of rice farming systems by determining grain quality characteristics of rice; developing technologies on other uses of rice and its by-products; and promoting these high-quality and value-added products to benefit consumers/farmers and food manufacturers.

Seed Technology performs basic studies on seed biology and physiology, health and pathology, purity and quality control, production, preservation and storage, coating/treatment and mechanical seeding. It also ensures that high-quality seeds are available to farmers/stakeholders, and helps make rice farming a profitable business by developing cost-effective and environment-friendly rice seed technologies. In addition, it runs and maintains a lab and facility for seed health and quality testing as prescribed in the international seed testing rules by ISTA.

Socioeconomics conducts research and policy studies to help develop an efficient, competitive; and sustainable rice industry, nurtured by sound policy environments. It supports PhilRice's function of providing timely information to the industry.

Technology Management and Services promotes/disseminates high-impact rice technologies through area-based technology promotion, and training and education to help increase the productivity and income of rice farmers'. Likewise, it enhances capacities of extension workers and other change agents through retooling or rice science and technology updates.

Development Communication promotes rice science for sustainable development through strategic use of communication media. It plays a major and significant part in communicating the results/products of rice science effectively, particularly to the intended users.

Information Systems and Data Management will interactively and collaboratively cater to the data information needs of rice stakeholders. The integration of information systems with the rice R&D will help to systematically plan, schedule, share, and document key activities that support the development of rice production technologies, farm equipment, technology transfer, and the production of high-quality rice varieties.

C.3. Area-Based Rice R4D Projects

Cutting across R&D programs are station-based projects that address location-specific problems in areas of operations of PhilRice Batac, Isabela, Los Baños, Bicol, Negros, Midsayap, and Agusan branch stations.

PhilRice Batac serves as the nucleus or core for development and improvement of intensified rice-based agri-bio systems (IRBAS) technologies and enterprises in semi-arid areas and other environments in Northwestern Luzon. It shall also develop technologies and management options for rice and rice-based crops in the rainfed and drought-prone environments, such as water harvesting, conservation and management, and mechanized rice-based farm production and postproduction operations.

PhilRice Isabela focuses on development of IRBAS technology packages and enterprises for Northeastern Luzon that also features the high-yielding yet low-cost 10-5 (10 tons per hectare at Php 5.00 per kg palay unit production cost) technology system anchored on hybrid rice.

PhilRice Los Baños, in addition to being the Institute's principal office, serves as nucleus for developing and radiating IRBAS technology and enterprise systems in the Calabarzon region (Region IV-A). Its partnership with IRRI and host, UPLB will also focus on basic research studies in plant breeding, crop protection, agronomy and soils, rice chemistry and food science for the generation of new products out of invention, innovation or discovery. The station also shall oversee the development of ***PhilRice Mindoro*** satellite station as the IRBAS nucleus estate model for the entire Mindoro Island.

PhilRice Bicol develops and promotes IRBAS technology packages and enterprise systems for the Bicol Region with special focus on climate change adaptation and resilience. It will also shepherd the ***PhilRice Samar*** satellite station which will be developed as the IRBAS-focused nucleus to spur rural transformation and development and attain inclusive growth in the entire Samar Island.

PhilRice Negros pilot-tests, fine-tunes and radiates fossil fuel-free IRBAS technology packages and enterprises for Western Visayas, even as it is being transformed into an organic rice-based integrated and diversified product development center.

PhilRice Agusan is the Institute's IRBAS nucleus estate for Northern Mindanao. Similar to PhilRice Bicol, it will also refine and promote IRBAS technologies and enterprises to CARAGA communities vulnerable to adverse effects of climate change. Moreover, it will also address challenges, such as nutrient-deficient and problem soils

and low solar radiation in the area because of frequent rainfall. It also oversees the ***PhilRice CMU*** field station and office located inside the Central Mindano University campus in Maramag, Bukidnon, where 100 hectares have been made available by CMU to PhilRice for rice seed production and IRBAS technology and enterprise development and promotion in Central Mindanao. In addition, PhilRice Agusan also initially supervises the development of the ***PhilRice Zamboanga*** satellite station into the IRBAS nucleus estate model for the Zamboanga Peninsula.

PhilRice Midsayap is being transformed to be the IRBAS nucleus estate model for Southern Mindanao, with focus on ecological engineering and integrated pest management practices because of the prevalence of pests of rice and other crops within the region

C.4. Specialized Rice R&D Projects

The PhilRice-based Crop Biotechnology Center implements a rationalized, effective, and efficient agricultural biotechnology R&D program for the Department of Agriculture with the end view of generating improved agricultural technologies, productivity, profitability and enhanced commercial potential, value, and activities for agricultural crops.

C.5. New Initiatives

C.5.1. Construction of Genetic Resources Building and Acquisition of Equipment and Facilities for ex situ Germplasm Conservation and Management

The PhilRice Genebank provides seeds of the genetic materials that are being used as parents in breeding rice varieties that are high yielding, good grain quality and resistance to biotic and abiotic stresses. From the seeds of the varieties produced by breeders, rice varieties are propagated and produced in commercial scale using seeds that need to be processed in the most advanced seed processing facility to ensure that good quality seeds are provided to farmers for commercial rice production, high yield and profitability. It is essential to develop/upgrade the system of handling germplasm materials since breeding depends on good seed management, with seed and data retrieval system properly in place. Conservation and maintenance guarantee seed availability for breeders' needs and R&D workers as well preservation of rice germplasm, which is precious Philippine treasure. With PhilRice's mandate to promote the collection of rice germplasm materials and ensure that these important genetic resources are managed in an efficient and sustainable system of ex situ conservation, there is a need to improve the current facility and equipment of PhilRice Genebank. Specifically the project will:

1. Enhance/improve efficiency of germplasm conservation and management by constructing a genetic resources facility.
2. Ensure availability of quality seeds and provide the right information of materials as required by breeders and rice R&D workers by upgading the system of germplasm handling
3. Ensure proper storage of PhilRice breeding lines and elite rice germplasm as well as those acquired from partnership with international organizations.

C.5.2. Modernizing the Rice Research Laboratories of PhilRice for Responsive Science-Based Research

For 30 years, PhilRice has delivered high-quality research products, technologies and services to its internal and external clients. It has been certified to ISO 9001:2008 (Quality Management), ISO 14001:2004 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series), proving its excellent quality of service. The research laboratories are at the forefront in continuously developing relevant technologies. These laboratories have been established in early 1990s through JICA. Since then, no grants received hence, no major renovations have been done.

Modernizing the laboratories will enable PhilRice to constantly respond to current and emerging challenges in rice and rice farming in the country, and other issues concerning the rice consuming public. This will ensure the development of up-to-date technologies to achieve its vision of a rice-secure Philippines, enhance its research capacity, and boost its national and international competitiveness.

To improve the capacity of PhilRice to conduct relevant R&D activities that conform to international standards the project will:

1. Upgrade and modernize the physical facility of the laboratories and provide it with state-of-the-art equipment;
2. Establish a functional food laboratory;
3. Set up a testing and calibration laboratory that would cater to the needs of in-house and external clients (research, academe, industry, etc.); and
4. Improve the occupational safety features of the laboratories

D. Linkages of Corporate Priorities/Programs/Projects with the National/Sectoral Plan, the Medium-Term Philippine Development Plan, and National Pronouncements

As the lead agency for rice R4D, PhilRice and its partners envision a *"Rice-Secure Philippines"*. Rice security, in our parlance, means availability, affordability, and

accessibility to high-quality and nutritious rice at all times. This vision therefore encompasses broad areas relating to rice cultivation, commerce, consumption, and competitiveness. It is founded on the President's and DA's vision of a food-secure society where farmers enjoy decent and rising standards of living with available and affordable food for all Filipinos.

For 2017-2022, PhilRice has laid down concrete targets that it commits itself to achieving guided by its vision of a "Rice-Secure Philippines". This Plan orchestrates all known voices in rice R4D such as those from plant breeders, agronomists, rice machine experts, crop protection specialists, social scientists, and resource-poor farmers.

It is anchored on global targets set forth in the *UN's Transforming Our World: The 2030 Sustainable Development Agenda* (Assembly, 2015). This agenda takes off from the Millennium Development Goals. Specifically, it responds to Goal 1 (Eradicate poverty in all its forms everywhere) and Goal 2 (End hunger, achieve food security and improved nutrition, and promote sustainable agriculture).

Moreover it also adheres to the vision of the ***Philippine Development Plan 2017-2022, Chapter 8 – Expanding economic opportunities in Agriculture, Forestry and Fisheries*** as it focuses on expanding economic opportunities in Agriculture, Forestry and Fishery (AFF); and increasing access to economic opportunities by small farmers and fisherfolks**.**

For the **Gender and Development Initiatives** the committee ensures gender is mainstreamed in the Institute's research and development projects. Specifically, development projects are required to have a gender component so that the Institute's technologies and rice information are accessed and available to both men and women rice stakeholders. Proposed research projects that mainstream gender in its activities will have a higher chance of being implemented. The committee also leads in the capacity enhancement of PhilRice staff on gender and development. All these improve the Institute's reach to women and other disadvantaged stakeholders in the rice community thereby, optimizing research and development contributions. The mainstreaming of gender in the Institute's R&D is in response to Republic Act 7192 (otherwise known as the Women in Development and Nation Building Act) which affirms the State's recognition of women's role in nation building.