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Strengthening the Philippine Rice Seed System

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INTRODUCTION

The Food Staples Self-Sufficiency Program (FSSP) launched by the Philippine's Department of Agriculture is the country's key initiative for increasing food production and achieving food security. While a number of staple commodities are covered by the program, its primary focus is increasing rice production.[1] Rice is the key staple food of Filipinos and rice farming is the primary livelihood of 3.5 million farmers and the source of income for 6.4 million agricultural laborers. The technology package to achieve the FSSP objective is that of the Green Revolution that advocates the combined use of high-yielding seed varieties (HYV), fertilizer, and irrigation. The contribution of HYVs to the rapid increase of rice production in the Philippines and elsewhere in Asia is documented in various studies (Umetsu et al. 2003; Estudillo and Otsuka, 2006). Rice yields have more than doubled in Asia over the 50-year period from an average level of 2.2 tons per hectare in 1966-1969 to an average level of 4.5 tons per hectare in 2010-2012. For the same period, average yield level in the Philippines rose from 1.4 tons per hectare to 3.7 tons per hectare.

This brief aims to identify the factors contributing to low certified seed use by evaluating the evolution of rice seed varieties, analyzing the trends in seed adoption, and describing the Philippine seed system and its regulatory structure. It concludes with a summary of these issues leading to key recommendations to improve and strengthen the rice seed industry.

EVOLUTION OF IMPROVED RICE SEED VARIETIES

During the early stages of the Green Revolution, rice varieties available in the Philippines came primarily from the International Rice Research Institute (IRRI), starting with the highly successful variety IR8 in 1966. However, in the early 1990s the development and release of rice varieties by local institutions was boosted with the establishment of the Philippine Rice Research Institute (PhilRice). Between 1968 and 2011, 215 rice varieties were approved for commercial release by the Philippine Seed Board (PSB) or what is now the National Seed Industry Council (NSIC) (Table 1). The varieties first released in the Philippines (mostly developed by IRRI) were bred primarily for lodging-resistance, enhanced solar energy absorption, and fertilizer use efficiency to achieve high yields (Barker and Herdt 1985). Varieties more suitable for areas with adverse environments as well as varieties for direct seeding in rainfed lowland were developed mostly after the 1990s. Only more recently have breeders started to incorporate genes that enhance resistance to pests and diseases and improve grain quality. In addition to PhilRice and IRRI, current public breeders include the University of the Philippines Los Baños (UPLB), and recently, the Philippine-Sino Center for Agricultural Technology (PhilsCAT), a Philippine-China research cooperative venture.

IRRI remains the lead public breeding institution of both inbred and hybrid rice varieties, but immense government support of the sector through the implementation of the Hybrid Rice Commercialization Program (HRCP) in 2001 has provided the private sector enough incentive to become more engaged in hybrid rice breeding and production. Of the 44 hybrid rice varieties commercially released by PSB/NSIC to date, 24 varieties (or 54 percent) are developed by private companies and 20 (or 46 percent) were developed by the public sector including IRRI. Among the main private sector breeders are Syngenta, Bayer, and DevGen, each having developed three hybrid seeds.

[1] The other staples include white corn, root crops (primarily cassava and sweet potato) and the *saba* banana variety.

Table 1—Number of officially released rice varieties in the Philippines, 1968-2011

Rice Ecosystem	Irrigated Lowland	Irrigated Lowland-Hybrid	Irrigated Lowland-Glutinous	Irrigated Lowland-Saline prone	Rainfed Lowland	Cool-elevated	Upland	TOTAL
1966-1975	14		1		1		1	17
1976-1985	17		4		3		6	30
1986-1995	18	1		2	8	2	1	32
1996-2005	21	7	4	6	7	4	5	54
2006-2011	25	36	1	9	11			82
TOTAL	**95**	**44**	**10**	**17**	**30**	**6**	**13**	**215**

Source: Table 1 of Launio and Manalili (2012)

ADOPTION OF THE MODERN RICE VARIETIES

The use of modern rice varieties (MVs) has continued to increase overtime. In the 1970s, the rate of adoption of MVs was already at 66 percent of total planted area. By 1980, estimates showed 88 percent of the irrigated areas and 80 percent of the lowland rainfed areas were planted with MVs. Estudillo and Otsuka (2006) reported that in the 1990s, more than 90 percent of the rice area harvested in the Philippines was planted with MVs. The latest estimate on the extent of MV adoption was 97 percent of the total area harvested (Launio and Manalili, 2012). The majority of these varieties are inbred lines with hybrids only occupying around 4 percent of the total harvest area (Table 2).

While most farmers are using modern varieties created in the last two decades, they are not necessarily regularly participating in seed markets and purchasing new seed (Table 2). Farmers' own-saved seeds accounted for more than 50 percent of the harvested rice area from 2009 to 2012, although the percentage share has declined from about 57 percent in 2009 to 51 percent in 2012. The rate of area expansion has been strong at around 5 percent per year for both certified-inbred and hybrid seed cultivation. More than 60 percent of the adopted rice varieties were bred by IRRI and more than a quarter of farmers adopted PhilRice varieties, while less than 10 percent adopted privately bred varieties, of which majority were bred by Bayer and SL Agritech (Launio and Manalili, 2012). The table also shows the expansion of area cultivated with traditional varieties, which happened in response to the growing export demand of the good quality organic rice grown in the uplands. In 2013, the country exported 35 tons of this heirloom rice to Dubai, 45 tons to Singapore and another 20 tons to the United States of America.

Table 2—Area harvested to rice by varietal type, 2009 to 2012

	2009	2010	2011	2012	(% to total per ecosystem)	% change 2009 to 2012
AREA HARVESTED (000 Ha)	4198	4354.2	4536.6	4690	100.0%	11.7
Hybrid	185.6	186.3	177.5	222.8	4.8%	20.1
Certified-Inbred	1534.8	1799.4	1834.3	1869.1	39.9%	21.8
Farmers'/Good Seeds	2393	2245.3	2378.9	2453.3	52.3%	2.5
Traditional/Native	84.6	123.1	146	144.8	3.1%	71.2
Irrigated	*2859*	*3008.3*	*3072.6*	*3163.2*	100.0%	*10.6*
Hybrid	173.3	179.7	170.7	208.6	6.6%	20.4
Certified-Inbred	1190.9	1453.7	1459.8	1511.1	47.8%	26.9
Farmers'/Good Seeds	1475.1	1360.8	1426.1	1428.7	45.2%	-3.1
Traditional/Native	19.7	14.2	16.1	14.8	0.5%	-24.8
Rainfed	*1339*	*1345.8*	*1464*	*1526.8*	100.0%	*14*
Hybrid	12.3	6.6	6.8	14.2	0.9%	16
Certified-Inbred	343.9	345.7	374.5	358	23.4%	4.1
Farmers'/Good Seeds	917.9	884.6	952.8	1024.6	67.1%	11.6
Traditional/Native	64.9	108.9	129.9	130	8.5%	100.2

Source: Department of Agriculture- Management Information Division (DA-MIS)

Despite the yield advantage of high quality certified-inbred and hybrid seeds, not all farmers are using the seeds. In the case of hybrids, the major reason for their low adoption is the high cost of seeds. In the Philippines transport infrastructure and other facilities that affect the efficient production and distribution of seeds is inadequate, thereby increasing the costs of seed production. This coupled with the high cost of fertilizer and gibberellic acid, also adds to production cost and decreases the appeal of purchasing MVs. The low farmgate price of seeds also does not provide enough incentive for seed producers to enhance production.

In an effort to improve the adoption of high-quality inbred and hybrid lines, from 2002 until 2010 the government instituted a floor price for high-quality varieties to incentivize production and a subsidized price for farmers to increase adoption. While the subsidy is no longer in place, publically produced varieties, including hybrids, still retail at costs set by the government that are below the private sector competitive price.

GOVERNANCE OF THE PHILIPPINE SEED INDUSTRY

The Bureau of Plant Industry (BPI) of the Department of Agriculture (DA) is the main arm governing the country's seed system. Its duty is to ensure a continuous and stable supply of quality seeds and plant materials of improved crop varieties and cultivars, to accredit plant nursery operators and seed growers, registering crop varieties for commercial release, and to maintain and control seed quality standards. Under the BPI is NSIC, which prioritizes plant breeding activities, encourages the adoption of practices that improve seed quality, and promotes the establishment of infrastructure and other support services for the further development of the industry. It is also directly responsible for the regulation of all rice seed varieties developed by public and private breeders. Similarly, the Seed Act reconstituted the National Seed Quality Control and Services, also under BPI, to strengthen supervision of field inspections and seed testing laboratories to ensure seed quality. The Plant Quarantine Services (PQS) office is the regulatory arm of BPI and inspects and controls the movement of seed.

Box 1—The Philippine Seed Act of 1992

Republic Act No. 7308 or the Philippine Seed Act became a law in 1992 with the mandate to strengthen the local seed industry. The Act restricts the importation, in commercial quantities, of seeds that are grown locally, except seeds that are difficult to grow under ordinary conditions or cannot be produced adequately to meet 90 percent of their perceived demand at competitive prices. Competitive price, under the law, is defined as the price charged by seed wholesalers to dealers at point of entry plus import duties and taxes. Administrative Order (AO) No. 4 s. 2009 of the DA also explicitly states that only seed of varieties that passed the national cooperative trial and approved by the NSIC can be imported at a commercial scale.

SEED DEVELOPMENT, PRODUCTION, AND DISTRIBUTION CHAIN

Regional Seed Offices develop the production targets of certified seeds which includes a 10 percent buffer stock based on farmers' demand for a variety, varietal performance including the reaction to pests and diseases, and agro-climatic adaptability. In order to be recognized, a new variety must undergo multi-location yield testing by PhilRice. The results of these trials are the main basis for recommending a new variety for release by NSIC and the process takes 1 to 2 years after the yield testing.

New varieties that are publicly bred are certified by NSQCS of BPI to guarantee the uniformity and purity of the seeds. Breeder seeds are distributed to PhilRice branch stations, universities, and IRRI for further multiplication to become foundation seed, which are inspected by NSQCS. Only foundation seed that is certified 98 percent pure is multiplied by PhilRice branch stations and the members of the National Rice Seed Production Network (SeedNet) for release as registered seeds. SeedNet is a national network of seed producers created by PhilRice in 1994 and as of 2010, had 78 members comprised of state universities and colleges, other local government agricultural units, farmers' cooperatives, and non-government organizations (NGOs). Registered seeds, produced by PhilRice and SeedNet, are then sold to accredited seed growers, usually through seed cooperatives or associations, to produce certified seeds. As of 2012, there are 5,856 accredited seed growers in the Philippines. The seeds are then delivered to the distribution points identified by the government, which include the PhilRice branch stations and other government units. Prior to 2005, the seed growers and suppliers were only allowed to sell their seeds to these authorized hybrid rice distributors. However, since 2005, they have also been allowed to sell their seeds to private dealers, input suppliers, and directly to farmers to facilitate the spread and use of hybrid seeds in support of the Hybrid Rice Commercialization Program.

For privately bred hybrid varieties, companies are monitored by BPI and required to provide regular updates about seed production and distribution. However, quality control, certification and tagging of these seeds are not as rigorous as that of the publicly bred because of the limited capacity of the government to extend the same regulatory exercise to the private seed companies. This imbalanced application of quality control has aroused criticisms on the rice seed industry. Distribution of privately bred seeds to farmers can be through private dealers or through local government units and DA-Regional Field Units under specific government programs such as the Hybridization Program. The local and multinational seed companies, on the other hand, either breed their own hybrid rice varieties or import hybrid rice seeds from other countries like China.

The informal seed system continues to remain more popular than the formal system. First, some seed growers prefer to sell their seeds informally to avoid the costs and burdens of testing. Second, growers sell their certified seeds to traders and millers prematurely due to the need for money. Lastly, some farmers prefer buying untagged seeds because of the lower price point compared to certified hybrid and inbred seeds.

RECOMMENDATIONS

Given the relatively high yield associated with the modern rice varieties, there is room to improve rice productivity and profitability, and consequently, to enhance agriculture more broadly through continued strengthening of the seed industry. In light of the ongoing issues that hinder the optimal performance of the seed sector, the following recommendations are suggested:

1. Provide technical support and equipment (e.g. cleaners, dryers, storage, and irrigation) that can strengthen small-scale seed growers such as cooperatives and farmers' associations, in remote areas to improve the availability of high-quality seeds at lower costs.
2. Increase investments in hybrid rice R&D to further improve yield stability, eating quality, and adaptability. Labor saving technologies especially in pulling and transplanting activities will also be helpful to ease the labor burden.
3. Review the pricing policy for publicly bred hybrid seeds to ensure a more competitive price and therefore a more reasonable profit for the seed growers. The current mandated fixed price of public hybrid rice discourages some growers from selling their seeds through formal channels.
4. Develop a more balanced system to enforce quality control for both public and private hybrid seeds.

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