ATTAINING RICE SELF-SUFFICIENCY IN THE PHILIPPINES:

Lessons from Major Rice Producing Countries

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The Philippines is one of the most populous countries in Asia. It also has one of the highest population growth rates. Compared with other rice-producing countries in the region such as Thailand and Vietnam, however, its land resources for staple crop cultivation are fairly limited.

Rice in the Philippines is cultivated in 4.0 million ha. However, the crop is harvested from some 3.8 million ha. in two seasons, where 2.5 million ha. are irrigated (1.25 million ha. planted twice a year; 1.2 million ha, rain-fed; and 0.14 million ha., upland). In contrast, Thailand has from 9-10 million ha., Vietnam has 7.7 million ha., and China has over 30 million ha. of land planted to rice, respectively.

In the 1990s rice production in the Philippines grew by only 1.8 percent per year while population grew at a relatively rapid annual rate of 2.3 percent. Over the next two decades, the country's rice requirement, which currently stands at 27,000 metric tons (mt)/day, is expected to grow by at least 65 percent.[1]

Table 1. Average Annual Rice Production Growth Rates 1990-2000 (%)

Country	Growth Rate (%)
Thailand	2.8
USA	2.1
Vietnam	5.4
China	0.7
Indonesia	1.2
Malaysia	0.5
PHILIPPINES	1.8

Source: Rice Almanac, 3rd Edition

Notwithstanding the steady increases in production, the Philippines has remained a net importer of rice, as reflected by the figures in the past decade. In 1990, the country imported 620,795 mt of rice. Imports went down to as low as 198,864 mt in 1995 but again climbed to 862,380 mt in 1996 and up to a record high of 2.1 million mt in 1998 because of the occurrence of El Niño. However, imports dropped again to 781,717 mt in 1999. The volume of importation for 2003 was about 1 million mt. The rice import volume, on the average, was 800,000 to 1,000,000 mt per year.(WB)[2]

That the Philippines has remained a net importer of rice can be attributed primarily to the rapid increase in the country's population. Records show that the country's population has more than doubled since the first high-yielding varieties (HYVs) were released by the International Rice Research Institute (IRRI) in the mid-1960s. At the time, the population was pegged at 32.7 million. It soared to 48 million in 1980, and further to 60 million in 1990. The country's population is expected to reach 84 million in 2004. The Ginintuang Masaganang Ani ("golden bountiful harvest" in English) or GMA Rice Program of the Department of Agriculture estimates that if the population had remained at the 1990 level of 60 million, the Philippines would be exporting at least 1.5-2 million mt of rice by now.

Given a current annual population increase of 2.36 percent, close to 2 million are born every year according to government estimates. The population could balloon to 170 million in less than 30 years according to the state agency, the Commission on Population (PopCom).[3] One of the main problems for the country in the coming decades, therefore, is how to feed its burgeoning population on its limited resource endowment. The rapid increase in population will pose serious problems for the country's food security in the long run if a way to keep rice production a step ahead of population growth, is not found.

The first part of this section is a survey of the host of interventions implemented by different countries to ensure that domestic production continues to keep pace with the growing rice demand of their respective populations. The experiences of these countries may provide important policy and technology insights for the Philippines in its quest for long-term food security. The second part looks at other intervention options for the Philippines. The third part focuses on hybrid rice technology and other alternative rice production techniques including the System of Rice Intensification (SRI). The former is being touted by government as the solution to the country's rice production shortage. The latter, on the other hand, is being promoted by sustainable agriculture advocates.

The Experiences of Other Countries

Thailand

Domestic production has generally kept pace with population growth. From the mid-1990s onwards production growth even outpaced population growth. A key factor behind Thailand's rice production surplus is the vast area planted to rice.

The case of Thailand is unique in that, unlike most of its Asian neighbors, the Green Revolution was not a major factor in the development of its rice industry. Land utilization was the driving force behind the long-term performance of Thailand's rice sector before the 1980s. Thailand's per capita cropland, for example, increased by 60 percent between 1965 and 1996 (compared to 4 percent for the Philippines).[4]

Diffusion of modern high-yielding varieties has been slow, partly as a result of the relative unimportance of the irrigated ecosystem. The substantial price advantage commanded by low-yielding, high-quality traditional varieties (TRV) and improved local varieties also constituted a disincentive to the adoption of HYVs.

This is not to say that the government did not play a role in rice sector development. Public expenditure in the sector has been relatively robust. In the 1960s and 1970s, government invested in upgrading the country's road network, giving Thailand one of the most extensive paved road networks among the six countries included in this research. There was heavy public spending for irrigation in Thailand's Central Plains-where the bulk of the country's HYV crop has been concentrated-during the period between the 1950s and the 1980s.

Vietnam

More than half or 4.2 million hectares of Vietnam's total farm area is devoted to rice production (total rice area of Vietnam is 4,199,000 hectares). The rise in output and productivity of Vietnam's rice industry is attributed to the use of HYVs (not necessarily IRRI's HYVs, but improved varieties in general) and irrigation development. The major factors which contributed to the fast growth rate of rice production in Vietnam included: promoting farmers' incentives for increasing production owing to the renovation/after the American war; government investment in irrigation or for reclamation of unused resources especially in the Mekong River Delta-land improvement led to expanded planted area; technological factors including expanded area planted to HYV and improved farmers' knowledge on intensive agriculture (there was heavy investment in extension, integrated pest management (IPM), etc. by the state); increase in supply of input materials under a deregulated system. In addition, the price of rice has a tendency to rise compared to input materials in 1990s (Kenji and Hironori 2001).

At least 75 percent of Vietnam's rice lands are planted to HYVs with rice yield pegged at a national average of 4.2 MT per hectare[5] as compared to the 2.81 MT per hectare registered in 1986. As much as 75 percent of the 4.2 million hectares rice area is irrigated allowing at least two rice croppings per year. The increase in yield coupled with irrigation development resulted in a dramatic increase in production from 16 million MT in 1986 to 32 million MT in 2001.

The abolition of the contract system, similar to China's Household Production Responsibility System (HPRS) in 1981 is said to be also responsible for the increase in rice production. Also, with more secure land use rights guaranteed under the Land Law of 1988 and subsequent decrees that allowed for full-fledged private farming, the farmers have invested heavily in increasing their production.

Aside from limited direct support through fertilizer and seed subsidies, the government also provided fertilizer support through a reduction of import tariffs for inputs particularly urea and other important fertilizer and pesticides needed by the industry. At times, government also provides transportation subsidies for traders buying rice in the mountainous areas.

Indonesia

Rice production growth has been sluggish. Yield improvements were largely the result of irrigation expansion; increased use of HYVs and fertilizer application.

In the mid-1980s, Indonesia achieved self-sufficiency in rice mainly due to the use of HYVs, fertilizers and pesticides, and irrigation expansion. However, this was not sustained. The early 1990s saw decreasing state investments for irrigation and post-harvest facilities. At the same time, fertilizer subsidies were dramatically reduced and eventually phased out in 1997. Since the pesticide and insecticide subsidies had already been removed as early as 1983, the removal of the fertilizer subsidy adversely affected the majority of Indonesian farmers, 85 percent of whom are still dependent on HYVs.[6]

Lack of infrastructure support, primarily irrigation facilities, also continues to hamper productivity. Government's irrigation expansion program has slowed since the 1990s compared with its massive irrigation investments in the 1980s. Irrigated lands as percent of total area harvested declined to 41 percent in 1995 from 43 percent in 1985.

Input subsidies have also been reduced since the 1990s. In 1997, fertilizer subsidies were almost eliminated. But when the national rice production dipped in 1998, the subsidies were re-introduced. HYVs which in the early years contributed to dramatic increases in yield have clearly reached a plateau, as evidenced by stagnant yield performance since 1990.

The Indonesian experience closely mirrors that of the Philippines. The Philippines also achieved brief periods of self-sufficiency through the widespread adoption of HYVs coupled with heavy public investment in infrastructure and provision of input subsidies. The subsequent decline in production following a dramatic reduction of state support further bolsters the argument for continued public sector intervention for food security considerations.

China

The state provided heavy government support for research and support services. The main source of increase in China's rice production has been yield increase. From 1980 to 2001, rice (paddy) production grew at an annual rate of 1.07 percent despite the decrease in areas planted to rice. Increase in yield has been made possible through the use of modern varieties (including hybrid rice) and cultivation technologies and heavy application of chemical fertilizer and pesticides.

As a result of the prioritization of infrastructure, and also owing to past investments in irrigation and flood control projects, more than 90 percent of China's rice areas are now irrigated.

China has been, for the most part, self-sufficient in rice for the last two decades. The upward trend in rice production started in the 1980s with the implementation of the "Household Production Responsibility System" or HPRS. The system basically tied land use rights to rice production. In exchange for the right to use the land, a farmer or his household must meet a certain rice production quota to be sold to the "Grains Bureau" for a fixed price. Beyond the quota, however, the surplus production of a farmer can be sold in the open rural market. Since the open rural market price is often higher than the quota price, the HPRS motivated farmers to produce beyond their quota. At the same time, the implementation of the huoko system which basically disallowed migration from rural to urban areas complemented the HPRS since it ensured the steady number of farmers producing rice.

In the 1980s that the Chinese government started increasing its expenditures for agricultural infrastructure resulting in the expansion of irrigated areas. Money poured into research and development paved the way for the introduction of new seed technologies. Government also provided subsidized inputs and subsidized credit to further boost production. In 1985, however, production slowed down with the elimination of the country-specific HPRS incentives and the flooding brought about by excessive rainfall in China.

Government also monopolized rice procurement through the procurement contract system which is tied to the HPRS. Farmers can only sign procurement contracts with government, thus ensuring the steady supply of rice.

A notable decrease in areas planted to rice was observed from 1991 to 1994 due to crop conversions. Areas traditionally devoted to rice were planted instead with high value crops like vegetables which fetch a better price in the open rural market. The quota was adhered to by farmers even during this period, however, ensuring steady supply of domestically produced rice.

In 1995, to arrest the possible decline in production, the government localized rice self-sufficiency policy by the implementation of the "Government Grains Bag Responsibility System" or GGBRS. The GGBRS basically transferred formulation and implementation of rice policies, specifically production and supply management, to the provincial leaders.

In 1995 the Agricultural Law of the Peoples' Republic of China basically guaranteeing annual increases in the national agriculture budget was passed. By then, at least 65 to 75 percent of the agricultural budget was allocated to agriculture production and operation while 19 to 20 percent was allocated to agricultural infrastructure resulting in the expansion of irrigated areas to almost 90 percent of China's arable lands.

In 1998, government implemented the "Three Policies, One Reform" policy. The Three Policies are that (1) state-owned enterprises must monopolize grains purchasing, effectively eliminating private traders procurement of rice; (2) state-owned enterprises would sell rice to traders at a price higher than their procurement price to earn profits; and

(3) profits would be used for purchasing only. The One Reform refers to the acceleration of reform in the state grains sector as a result of the implementation of the three policies. The three policies were discontinued in 2000 due to the proliferation of black markets in the grains industry.

The Philippines' Hybrid Rice Commercialization Program was inspired by the Chinese success with hybrid rice. The yield increases in China during the period 1975-1990 were attributed largely to the diffusion of hybrid varieties to 50 percent of the country's rice area. It must be noted, however, that China's successful hybrid rice program was only made possible by high levels of subsidy. For example, subsidies went directly to the seed industry for the production of hybrid rice seed. In the 1990s when those subsidies were lifted temporarily, the area under hybrid rice quickly decreased by 2 million hectares. (Kuyek 2000). For a resource-constrained country like the Philippines, therefore, a major question would be whether a hybrid rice program can work without the subsidies since clearly the Chinese model is practically out of the question.

In a stark contrast with the situation in China, the Philippines does not have a strong seeds research and development sector both in the public and private spheres, neither does a sound seed industry exist. A strong research and development sector that developed and bred improved seeds, particularly hybrid rice, working closely with a strong seed industry that has earlier put in place an efficient system of seeds distribution is the key to China's success in this strategy which is largely fueled by heavy government subsidization.

Malaysia

Rice production in Malaysia has continually increased from 2.04M MT in 1980 to 2.23 in 2000, except in 1997 when production decreased to 1.97M MT. This despite the fact that areas devoted to rice production has decreased from 716,800 hectares in 1980 to 660,000 hectares in 1995. The continuing increase in production is attributed to yield improvements from 2.85 MT per hectare in the 1980 to 3.12 MT per hectare in 1995.

Yield improvements can be traced to government's efforts to modernize the sector through mechanization as well as significant investments for an infrastructure program which increased the irrigated area devoted to rice in the country. Aside from public investments directed at improving physical infrastructure, such as roads, drainage and irrigation facilities, the government has provided production cost subsidies such as fertilizers, pesticides and seeds to increase rice production as contained in the last three National Agricultural Policies (NAP) implemented by government. The government also promoted the adoption of multiple cropping annually. Likewise, the government undertakes active research and development in rice by seeking high-yielding seeds and varieties. The government also provides extension services and established marketing channels for rice.

At the same time, rice production remains stable since the government has declared eight granaries which accounts for 57 percent of total land planted to rice as permanent rice production areas.

Rice production in the country may still increase however with the efforts of the Malaysian government to allow the development of the Sabah and Sarawak areas for large-scale paddy production by the private sector. At present, the rice-growing areas in Sabah and Sarawak tilled by the indigenous population are not considered as priority granary areas by the government that must be supported and developed.

Though the country has implemented a rice self sufficiency policy since the 1960s, the country has never achieved total rice self sufficiency. At present, the Malaysian government is targeting only 65 percent rice self sufficiency levels and is dependent on imports for the remaining 35 percent.

Malaysia is an example of a country that has consistently maintained state support for the rice sector more for political reasons and less for food security motivations. The delicate racial balance in the country and the economic drive to optimize its fertile lands through the production of commercial crops has given rise to this policy strategy. The Philippines' unique political context, the low level of support given to the rice sector in general and the lack of clear policy in striking a balance between the interests of consumers and producers have placed it in a different league from Malaysia.

United States

Rice production in the United States is capital-intensive and highly mechanized. All rice farms are irrigated and farmers usually employ laser (for precision leveling of the soil) and computer technology in rice production.

The national rice yield has steadily increased from the 3.6 mt/ha in 1958 to 7.4 mt/ha in 2002-2003. This performance far surpasses that of other countries in the study. Apart from the adoption of sophisticated farming technologies, high yields can be attributed to the use of HYVs, better fertilization, irrigation and pest management.

In the 1990s, the domestic market overtook the export market with at least 56 percent of production consumed domestically. Domestic consumption of rice has been increasing due to increase in population and immigration from Asia, Latin America and Africa; healthier lifestyles; and increased use of rice for processed food.

From 1987 to 1997, the number of farms growing rice declined. The rice sector is now dominated by a few large producers and large farms. Part-owners and tenants comprise the majority of rice producers in the US.

The US Rice Sector has a budgetary allocation of more than $1 billion. The rice sector continues to receive a host of subsidies in the form of direct payments and marketing loans. State support for rice includes income support for farmers, price support, marketing loans, etc.

US experience in rice production, characterized by large-scale farming, stands in stark contrast to the experience of Asian countries where small farms dominate rice production. With its reliance on sophisticated technologies, chemical-based agriculture, mechanization and massive subsidies, it is doubtful whether emulating the US model would be feasible or indeed, desirable, for a developing country like the Philippines that suffers from perennial budgetary deficits. The reliance of millions of small-scale farmers on rice production, the environmental conditions in Asia—which is considered as the center of origin and diversity of rice—and the lack of priority given by governments to the rice sector obviously do not provide appropriate conditions for the adoption of the US model.

State Intervention Is Key

Strong public sector intervention is a defining feature of the rice economies of the countries included in the study. A characteristic element of rice production in the top Asian rice producers is state intervention aimed at increasing rice output. This is understandable given that rice is the main staple and production is primarily intended for domestic consumption. The forms of interventions included employment of modern rice technologies (with heavy dependence on the adoption of improved rice varieties, promotion of inorganic/chemical inputs and extension of infrastructure support particularly irrigation) to policies explicitly aimed at securing a production quota.

In the US, where rice is not the primary staple and domestic consumption remains minuscule relative to that of Asian countries, government's intervention is geared primarily towards ensuring the income of its rice producers. In this case, interventions ranged from direct payments for rice producers to liberal provision of crop insurance.

Intervention by the state invariably played a critical role in ensuring the continued viability of rice production and guaranteeing farmers in sufficient numbers would continue to plant enough rice to feed the population. In the case of China, the state even went so far as inhibiting the movement of the labor force through the *huoku* system which discourages migration from rural to urban areas. Those who leave the rural areas lose their agricultural land use rights.

The experience of Asia's rice-producing countries shows that state intervention played a largely positive role in ensuring that the goals of producing enough rice for a growing population and guaranteeing favorable income levels for the producers are met. The country studies also tend to show that continued state intervention was not only desirable but in most cases necessary. In instances where government support was removed or reduced, the impact on production was immediate and later led to the reinstitution of support as was the case with China (for hybrid rice) and Indonesia (input subsidies).

Strong state intervention, of course, means additional costs in terms of government resources. A valid question for the Philippines, as well as for the other countries in the study, therefore, is whether it can afford to continue supporting rice production despite the heavy burden it places on limited budgetary resources. The issue of limited resource availability is very prominent in economically struggling countries like the Philippines, and the long-term political repercussions and impact on national food security of any decision make the situation much more complex.

The issue of state support for the rice sector, however, is more than a question of economic efficiency. As the staple food for the overwhelming majority of the population, rice is ultimately a food security concern. For the countries in the study, it is clear that the government's duty to provide substantial intervention in terms of both regulation and support is indispensable, thus the trade-off was accepted as necessary. With 1.3 billion mouths to feed, self-sufficiency at whatever cost was seen as essential to ensuring food security. This argument is bolstered by the current trend of declining world rice production and the recent rise in world grains prices. In the end, however, the question is a political one and the resolution will hinge on whether the state has the will to pay the political and economic costs of supporting the rice sub-sector.

Specific Areas for Intervention

Under the framework of continuing state intervention, the Philippines has a range of options for raising rice production to meet domestic requirements. Clearly, there is no “silver bullet” to the country's rice supply problem. Finding the appropriate formula comprising production-related and market-based interventions will determine whether the elusive goal of achieving self-sufficiency will ultimately be realized.

Seeds Technology

Seeds remain critical inputs in rice production. Based on IRRI statistics, modern varieties already account for 97 percent of palay production in the Philippines. This is a substantial increase from 55 percent in 1970 (STRIVE Foundation 2003). A closer look, however, will reveal that the bulk of the rice seeds used by Filipino farmers are actually farmer-adapted/improved varieties obtained through on-farm selection, informal farmer-to-farmer sharing and exchanges, often with no specific government intervention in breeding or selection techniques. Certified seed usage in the Philippines is low compared to other countries, estimated at only about 25 percent of the total rice seeds planted. The use of certified seeds is severely limited by the costs and availability of seeds, and the budgetary constraints of the Department of Agriculture.

It should be noted that the government's certified seed intervention has been shown to have a significant impact in increasing rice production, according to reports from the Department of Agriculture. According to the GMA Rice Program, average yields from certified rice seeds are currently at 4.3 mt/ha. In contrast, the average yield from homegrown seeds is only 2.5 mt/ha. It is not clear from government statistics, however, if those yield data are from irrigated or rain-fed areas, or from lowland or upland areas.

A technical working group constituted by the National Agriculture and Fisheries Council (NAFC), a multi-sectoral body under the Department of Agriculture, estimates that by focusing support on certified seeds alone, the Philippines will reach rice self-sufficiency by the turn of the decade.[7] A more recent and controversial intervention in seeds, hybrid seed technology, is being hailed by top agriculture officials as the most promising tool for erasing the perennial rice production shortage in the country.

Hybrid rice technology, first developed in China, has become the focus of attention-and much controversy-in recent years. In pursuing the goal of increasing production to self-sufficiency levels, the Philippine government under Pres. Macapagal-Arroyo is looking at hybrid rice to increase domestic rice production.

A hybrid rice variety is the product of crossing two or more genetically different lines. Hybrid rice varieties are said to have a yield advantage of 15-20 percent over the best inbred varieties. Exploitation of hybrid technology to increase rice yields has been successfully demonstrated in China where almost 18 million ha. out of a total 33 million ha. of harvested rice land were planted to hybrid rice by 1992. In fact, rice experts attribute the yield increases in China during the period 1975-1990 largely to the diffusion of hybrid varieties to 50 percent of the rice area.[8]

Hybrid rice commercialization in the Philippines began in 2001 when President Gloria Macapagal-Arroyo signed Administrative Order 25 for the Hybrid Rice Commercialization Program. Only about 6,000 hectares were initially planted with hybrids. For 2004, however, the government is targeting 600,000 ha. for hybrid rice cultivation. The ultimate goal is to have 1 million hectares planted to hybrid rice.

With hybrid rice, farmers will be forced to buy new F1 seeds for each planting-diverging from the traditional farmers' practice of saving and using seeds. Even with the government subsidizing half of the cost of hybrid seeds [P1,200 out of P2,400 for a 20-kilogram bag](see table 3). With that cost, it is not surprising that hybrid rice seeds are accessible only to those farmers who can afford the seeds and the prescribed technology (i.e., irrigation) that comes with it, thus further increasing income gaps in the rural areas.

The interest of seeds transnational corporations in the development and commercialization of hybrid rice in the Philippines has given rise to criticisms that hybrid rice technology will lead to the concentration of control over seeds in corporate hands. Critics of hybrid rice technology also argue that hybrid rice production will only aggravate the erosion of biodiversity resulting from the massive adoption of HYVs. Experts admit that rice mono-cropping that came in the wake of the Green Revolution has led to greater susceptibility to pests and diseases. This is further magnified by the inherent susceptibility of hybrid varieties to certain pests and disease outbreaks.

Table 2. Production Costs and Returns of Paddy Rice Production (P/ha)

Item	Certified Seeds	Hybrid Rice
Seeds	650.00	2,400.00
Fertilizer	3,882.00	3,882.00
Chemicals	680.00	680.00
Hired Labor		
Land Preparation	1,282.00	1,282.00
Crop establishment	232.00	232.00
Crop care and maintenance	324.00	324.00
Harvester/thresher's share	6,164.00	6,164.00
Post-harvest	742.00	742.00
Imputed Operator/family labor	2,253.00	2,253.00
Other costs		
Machine rentals	128.00	128.00
Fuel and oil	345.00	345.00
Irrigation fee	228.00	228.00
Transport expense	468.00	468.00
Interest on capital	270.00	270.00
Land rental	1,109.00	1,109.00
Depreciation	5,046.00	5046.00
Landlord's share	1,688.00	1,688.00
Total cost	25,591.00	27,341.00
Gross returns	41,420.00	58,900.00
Yield (kg/ha)	4,360.00	6,200.00
Price P/kg)	9.50	9.50
Net returns	15,829.00	31,559.00
Net returns/cost ration	0.62	1.15
Cost per kg.	5.87	4.41

Source: Ginintuang Masaganang Ani Rice Program

Table 3. Budget for Hybrid Rice Program (P,000)

Year	2001	2002	2003	2004	2005
Budget*	327,392.00	378,060.00	289,000.00	945,400.00	801,500.00

** With additional P110 million from PhilRice (Office of the President)*
Source: Ginintuang Masaganang Ani Rice Program

It is striking to note that none of the Philippine government's interventions in the rice seeds area involved seeds improvement or development by the farmers themselves. From the Green Revolution era, all the extension programs pertaining to seeds involved the promotion and dissemination of "improved" and certified seeds, including hybrid seeds, to rice farmers. Critics argue that even more important than providing certified seeds and "improved" varieties is helping farmers themselves improve the quality of their seeds according to their particular needs, practices and environment. Intervention should focus on assisting farmers and building their capacity to improve their seed selection, breeding and storage techniques, and in providing support services to allow farmers to conduct seeds improvement and development more efficiently. In the process, farmers build their capacity to manage their own resource, make them less dependent on seed companies/seed producers.

Studies show that, yield can increase by 15 percent by improving seed quality through enhancement of seed selection techniques and seed storage system of farmers (SEARICE 2002). In the municipality of Bilar in Bohol province, farmers observed the poor performance of IR72 seeds which were promoted and distributed by the local arm of the Department of Agriculture in late 1990's (CBDC 2001). There were many unfilled grains, yield was low and had low germination, with some not germinating at all. Seedlings turned reddish brown and were susceptible to diseases. With no assurance on seed quality and at P800 per 40kg-sack, the local farmers opted to discontinue using certified seeds and reverted to their own home-grown varieties which provided them more assurance since they themselves selected and improved the seeds. Local farmers are no longer using certified seeds because they are now able to improve the seed quality of their preferred varieties. This translated to some savings as they do not need to buy certified seeds and they have more control over the quality of the seeds that they themselves produced and purified.

In one study conducted by the Community Biodiversity Development and Conservation (CBDC) program in Bohol, registered PSBRC18 seeds from the Philippine Rice Research Institute (PhilRice) were compared with farm-saved seeds of the same variety (CBDC 2001). Technically, registered seeds are more pure and are superior in quality than certified seeds. Seed quality is assessed by looking at different parameters like purity (fraction of pure seed viz. inert matter and seeds of other species), germination (ability of the seed to germinate/break into a normal seedling with the essential structures for normal plant growth), speed of germination (how fast the seedling breaks from the seed), seed health (degree of pest and disease infestation on the seed lot) and moisture content (percentage of water in the seed lot). Field tests to look at genetic purity grain yield are conducted to ascertain the quality and performance of seed lots.

The comparative study showed that there is no significant difference in seed quality and yield between registered seeds and farmers' saved seeds. Purity analysis showed that farmers' PSBRC18 seeds are almost 100 percent pure, with less than 0.1 percent impurities. This is way above the acceptable standards of 98 percent purity (or allowable presence of 2 percent impurities). The purity of farmer-saved seeds is the same as registered PSBRC18. In terms of seed germination, 99 percent of farmers PSBRC 18 seeds germinated compared to only 95 percent for the registered seeds. This is despite the observation that farmer-saved seeds showed high amount of discolored seeds than registered seeds and have higher moisture content than registered seeds, although still below the 14 percent standard level. In terms of grain yield, there was no significant difference between farmer-saved seeds and registered seeds. From this study, it can be seen that farmers have the intrinsic knowledge and skills to ensure good-quality seeds. Unfortunately, this is not recognized and tapped despite the fact that almost 80 percent of the rice seed requirements in the country comes from farm-saved seeds.

In Vietnam, as part of a community-based plant genetic resources conservation, development and use project jointly implemented by the government and some NGOs, farmers' skills and the local seed system are tapped to ensure the supply of good quality seeds for farmers within and outside the community (BUCAP 2003). SEARICE in cooperation with the Plant Protection Department of the Ministry of Agriculture and Rural Development of Vietnam, through its Provincial Plant Protection Sub-department at the provincial levels supported a community-based initiative to develop farmer seeds and enhance the local seed system. Plant protection specialists and extension agents were given trainings on seed management, on-farm conservation techniques and plant breeding. They in turn provided trainings and technical backstopping to farmers, building on the local knowledge system. Trainers (which later included farmers) were continually provided with six-month refresher workshops and were sent to other countries for exchange visits, exposure and training.

In Hoa Binh, a province North of Hanoi, communities are now recognized by the Provincial Department of Agriculture and Rural Development as community seed production units, certifying officially the quality of seeds produced under farmers own quality standards, under their own pricing terms and guarantee system. In the summer season of 2003, the seed production communities supplied 31.35 tons of 13 varieties of rice seeds in the province.

In Kim Boi District, the district policy is for hybrid rice to cover 80% of the total rice area every season. But in the spring season 2003 farmers planted farmer-selected and -adapted varieties instead of hybrid rice, arguing that their materials/seeds were more adaptable to their own environment than hybrid rice (BUCAP 2003). This prompted the seed company to complain to district authorities, who in turn investigated the case and found that performance of hybrid rice was indeed inferior to farmer-adapted varieties. As a result the district authorities collected seeds and included farmer-adapted seeds for multiplication and distribution in the next season in the District.

The Vietnam case shows that there are farmer-developed/adapted varieties that can outperform hybrid rice. That it is possible to develop the farmer seed system if the government provides appropriate support to extension agents and farmer group.

In view of the experiences showing the advantages of farmer-developed seeds, it is highly recommended that the Philippine government shift the funding from its hybrid rice program to farmer-led seeds development. Of course, this would require government support for the efforts of communities in seeds development and improvement, extension services to provide training and skills enhancement, as well as incentives to farmers involved in seeds development and improvement.

Irrigation

As shown in the country studies, infrastructure support, largely in the form of public sector investment in irrigation, contributed significantly to raising production. Irrigation formed part of the package of technology which came with the propagation of HYVs. Unfortunately, the level of irrigation development in the Philippines remains relatively low. Currently, the country's irrigation systems cover only 45% of the total irrigable lands (see table 2).

According to experts from the National Irrigation Administration (NIA), the low level of irrigation development is largely the result of limited funding support and the rising system development costs. This has led to a constrained food security program and deficit production. Insufficient water supply results in low average irrigated cropping intensity at only 135% per year.[8]

Irrigation development will not come cheap, however. According to a study commissioned by the Department of Agriculture, if national and

Table 4. Status of Irrigation Development, as of December 31, 2003 (In hectares)

	Estimated Total Irrigable Area v a/	National Irrigation System	Communal Irrigation System	Private Irrigation System	Total	Irrigation Develop-ment (%)	Remaining Potential Areas to be Developed
Total	3,126,340	689,732	532,149	174,200	1,396,081	45	1,730,259

a/ - Estimated Total Irrigable Area (ETIA) is based on the 3% slope criteria.
Source: Ginintuang Masaganang Ani Rice Program

communal irrigation expansion were to be the major source of growth in production, the required additional area to address the deficit in 2003 alone would be 108,000 hectares. The estimated budgetary requirement for this area is P10.8 billion at P100,000/hectare.

With this reality in mind, it would appear to be more effective if government focused its efforts into communal irrigation systems as well as supporting the repair and rehabilitation of current and existing national and communal irrigation rather than building new capital-intensive large-scale irrigation projects. Small-scale rice farmers should be given preferential access to these facilities.

Fertilizers

Actual fertilizer usage has remained below recommended levels. Based on a nationwide survey conducted by PhilRice, fertilizer application rates amounted to only 5 bags per hectare whereas the recommended fertilization rate is 6 to 8 bags per hectare. Studies have shown that in Central Luzon, in the late 1980s, nitrogen fertilizer use significantly increased yield per hectare, with farmers producing 5 tons or more used more fertilizers (Rola and Pingali 1993).

Encouraging farmers to raise their fertilizer usage from current levels will not be easy since this would mean higher costs of production. Fertilizers already account for some 15 percent of the cost of production. Not surprisingly, based on the country studies, this line of intervention can only succeed with government support.

On the other hand, studies by the Department of Agriculture's Bureau of Soils and Water Management (BSWM) also reveal that the increasing use of nitrogenous fertilizers has led to imbalanced plant nutrition, which caused increasing deficiencies in major plant food nutrients, including a number of micronutrients such as zinc and boron. The single use of urea likewise resulted in sulfur deficiency in major rice-producing provinces located on light soils.

During the National Rice Summit in 2003, Dr. Rogelio Concepcion of the BSWM reported that the national yield of rice remained practically at a standstill since the 1980s . It was noted based on results of soil analysis that zinc deficiency is a major cause of low rice yields in the major rice producing provinces such as Iloilo, Cagayan Valley, Nueva Ecija, Bulacan, Camarines Sur and in flooded ricelands in Samar and Leyte, Bicol River Basin and CARAGA rice areas.

It is clear that while the spread of HYVs with the coming of the Green Revolution in the 1960s had a significant impact on plugging the rice supply gap and its positive impact on production was immediate, the negative effects on the environment, particularly on the health of the soil took many years to manifest. The present noticeable decline in yields in areas planted to HYVs is acknowledged by experts to be largely the result of decades of intensive cultivation coupled with massive use of inorganic inputs. The soil could already be degraded with some areas exhibiting multiple nutrient deficiencies. Evidence of declining yield is mounting especially from recent studies done at the IRRI. The rapid yield growth from 1965 to 1980 was due largely to the adoption of modern rice varieties and increased use of nitrogen fertilizer.

Soil rehabilitation is necessary to address this problem. The Department of Agriculture claims that it has the technology, e.g., addressing micronutrient deficiencies, needed to accomplish this. Funding will have to be increased substantially, however, for this to have any impact beyond the limited soil analysis which the agriculture department currently provides.

A “low-tech” (and lower cost) solution, on the other is the promotion of more sustainable agricultural practices (e.g. use of organic instead of chemical fertilizer) which will rehabilitate the soil over the long run. Unfortunately, the Department of Agriculture remains generally unconvinced about the viability of SA approaches and has been reluctant to fund sustainable agriculture promotion. It has been largely left to non-government organizations and farmer's organizations to support SA initiatives.

Dr. Concepcion pointed out that techno demos on balanced fertilization where organic fertilizers and inorganic fertilizers are combined and combined for specific soil types and locations, clearly indicated that yield of rice can be improved by as much as 6 to 7 mt/ha. Sustainable agriculture has also produced comparable yields using purely organic fertilizers. These studies clearly point out that the government should shift its attention and resources to organic inputs and re-channel support to these more ecologically sustainable options.

Government should support efforts by farmers to veer away from the use of expensive, ecologically harmful synthetic fertilizers by adopting a comprehensive approach in promoting organic fertilization methodologies and technologies. This will include introducing technologies at the farm level aimed at rehabilitating and conserving soil fertility, recycling organic materials into soil nutrients through composting and other methods, using less soil-intensive cropping techniques, and diversifying land use into a more integrated farming system, among others. Such technologies can drastically reduce and totally eliminate synthetic fertilizer use leading to more sustainable soil management and better farm productivity that translate into greater savings and improved net incomes for farmers.

At the same time, government can address farmers' requirements for processed organic fertilizers by supporting initiatives of local governments to implement solid waste management and recycling projects as mandated by RA 9003 (Ecological Solid Waste Management Act), which requires local government units (LGUs) to set up bio-composting facilities for bio-degradable materials. In this regard, government can help establish linkages between and among LGUs and with other sectors, such as NGOs, in setting up these bio-composting facilities and in providing mechanisms for the marketing and making available organic fertilizers to farmers. Government must strengthen the adoption by farmers of organic production approaches by supporting initiatives to market farmers' organic products.

Post-Harvest

The current rice milling recovery rate, at 65 percent, needs to be increased. This is largely due to outmoded processing technology and equipment which result in low milling efficiency. Post-harvest losses are also high due to the dearth of post-harvest facilities. The predominance of solar dryers, basically sun-drying on roads and multi-purpose pavements, for example, results in unnecessary losses resulting from direct grain wastage and high rate of broken grains when milled.

Adoption of more efficient technology and machinery, therefore, is another possible area for intervention. On the other hand, since milling operations in the country are largely controlled by the private sector, government cannot substantially effect this shift. Regulations coupled with an incentive program especially for small millers to encourage a shift would be ideal.

The National Food Authority's current program of providing free storage for a limited period for rice farmers is a step in the right direction. Aside from its warehouses, the NFA has also invested substantially, especially during its earlier years, in mechanical dyers, rice mills, de-hullers, graders, polishers, packaging machines, and bag closers (see table 5 below). It also invested in a large-scale rice bran oil extraction plant and rice oil refinery in Sultan Kudarat. During the Marcos administration, the rice oil extracted from these plants were sold in KADIWA stores. At one stage, the Sultan Kudarat facility was able to generate electricity from rice bran burning enough to operate the entire complex and even the neighboring community. The oil refinery machine was acquired through a foreign grant. It is unfortunate that these investments in post-harvest facilities and equipment were not fully maximized (see table 5). NFA should provide programs to maximize such investments by making them available, at a fair cost, to small rice farmers and NGOs involved in actual production and marketing of organic rice, who should be given preferential treatment.

The government should also increase its palay procurement fund for NFA to counter the influence of the rice cartel. A price support scheme for producers should also be created as a short-term intervention and in the long run, withdrawal of price support geared towards improved productivity by allocating money for infrastructure.

Training and Extension

According to one study, one way to address the decline in yields among intensive input users is to lessen external inputs and to substitute with knowledge-intensive technologies such as Integrated Pest Management (IPM). (Rola, San Valentin and Dumayas 1999) There is evidence that farmers have been able to decrease the use of external inputs while still maintaining or even increasing yields. With the use of IPM for example, farmers have been able to minimize pesticide use while still attaining high yields. Sustainable agriculture practitioners have in fact been doing this for many years.

Knowledge-intensive technologies, however, should not be limited to technologies and knowledge systems generated by the formal institutions but must include indigenous/traditional knowledge. As shown by the IPM model, farmer-to-farmer, farmer-scientist extension approaches

Table 5. Harvest Facilities and Warehouse Inventory (as of September 2004)

Facility/ Equipment	No. of Units	Effective Capacity	Status	
			Operational	Non-Operational
NFA-Owned	326	22,176,954.00 cavans	No status report available	
	272	19,247,193.00 cavans		
	54	2,929,761.00 cavans		
Mechanical Dryers***	325	199.86 tons/hr.	246	68
- out of the 246 operational mechanical dryers, 27 is/are or was/were: a. for repair (chimney and feeder lines rewiring (1), minor repair (5), elevator (1), panel board (2) ,water curtain (1)) b. installation of dust collection (3) c. dismantled (1) d. recommended for transfer (1) e. net being utilized (2) f. pre cleaner no operational (1) - out of the 68 non-operational mechanical dryers, 25 is/are or was/were for: a. repair ((9) dyer house roofing (1), minor repair (1); and, repair of drying bin (1) b. dismantled (1) c. transfer (1) d. dismantling and recommisioning (1) e. replacement (burner and ignition system (1)) f. rehabilitation (1) g. provision of dust bin (1) h. dismantled (1) i. not utilized (1)				
Rice Mill**	79	192.47 tons/hr.	62	15
- out of the 62 operational rice mills, 9 is/are for/serves as: a. rehabilitation and upgrading of hull, dust, and rice bran collection system (1) b. recommended for transfer to other province (1) c. recommended for disposal (2) d. repair (destoner and separator (1); dust and bran collection (2); hull collector (1)) e. polisher of the Sakate dehuller (1) - out of the 15 non-operational dehullers, 6 is/are a. for repair of hushker and polisher b. for disposal or rehabilitation (1) c. for major repair (1) d. for disposal (2); and, e. defective hushker, paddy separator, and weigher.				
Dehuller	9	29.00 tons/hr.	6	3
- out of the 6 operational dehuller, 2 are not being utilized - 2 for repair				
Grader	30	134.50 tons/hr.	25	5
ded for transfer				
Polisher	13	43.00 tons/hr.	12	1
- out of the 12 operational polishers, 2 are being utilized for remilling only - 2 operational polisher is for repair and 1 is recommended for transfer				
Packaging machine	28	16.80 tons/hr.	26	2
- Out of the 26 operational packaging machines, 9 are not being utilized				
Bag closer	7	---	43	35
8 - for repair, 4 - stationary, 15 - serviceable				
Truckscale*	26	1,350 ton	No status report available	

Source: National Food Authority
** inventory as of December 2004*
*** 3 were not categorized as operational or non-operational*
**** 11 were not categorized as operational or non-operational*

should be the principal form of extension service. Government should provide the platform and mechanisms for such farmer-centered exchanges and learning processes, while at the same time provide incentives (i.e., recognition, monetary, etc.) to scientists to come up with more farmer-friendly, ecologically sustainable, practical and useful researches. Finally, the active participation of women in trainings will need to be ensured.

One formidable challenge to extension work in the Philippines is the devolution of agricultural extension work to the local government units (LGUs) with the passage of the Republic Act 7160, also known as the Local Government Code of the Philippines. Local agricultural extension work is now under the supervision of the local executives, making it more difficult for the Department of Agriculture to oversee the implementation of national agricultural programs at the grassroots level. While local devolution provides ample opportunities for more direct involvement of local extension workers and the farmers themselves in agricultural extension, the predominance of traditional political structures and patronage-based practices in many localities often abort the realization of such potentials.

Given this reality, the reorientation of the entire framework of the Philippine agricultural extension system to knowledge-intensive farmer-based technologies is in order and should start at the local level. Extension work should involve more support to farmer-led efforts, rather than promotion of products and technologies solely generated by public institutions and the private enterprises. Incentives should be given to extension workers who are able to assist in strengthening the capacities of farmers' organizations, rather than to those who are simply able to meet the quota for selling hybrid rice seeds. Extension workers should be trained to respect farmers as holders of knowledge and innovations rather than mere recipients of seeds, agro-chemical inputs and modern technologies. The primary role of extension workers is to assist and build farmers' capacity in coping with their technical and technological problems in the farm, not to sell products and promote technologies of private enterprises.

Research and Development

In the case of research and development, a re-direction of the research priorities and agenda of public rice research institutions must be given utmost attention. A farmer-centered and farmer-led research and development agenda must be adopted, in recognition of the important role of farmers in rice research and development, and the importance of farmers' knowledge systems in evolving new and appropriate technologies in rice farming systems. Farmers must now be recognized as researchers whose knowledge and innovations are at par with their counterparts in the formal institutions. Researchers and scientists must adopt genuinely participatory approaches in research and development based on farmers' capacities and realities. Researches should be geared toward the real needs and actual situations of farmers rather than simply adopting technologies that worked in other countries or those that are ardently pushed by companies.

Research institutions should allow increased access by farmers to research results and make these available in easily understandable language and popular forms. Traditional knowledge systems in rice farming should be widely promoted while at the same time properly protected from misappropriation. Local and traditional varieties should be conserved, promoted and made accessible to farmers while at the same time adequately protected through such systems as community registries, local databases, etc.

The national seed certification system needs to be reviewed. The process and criteria for seed certification require serious consideration in view of the recognition of the value of farmer-bred varieties which often cannot comply with the certification standards. A distinct and separate system of recognition of farmer varieties that need not follow the distinct-uniform-stable standards set should be put in place, to encourage farmers to breed their own adopted varieties and reward on-farm innovations.

Regional/local seed certification system should be adopted to ensure that certified seeds are adapted to local agro-climatic conditions, while strengthening the capacity of local agencies to do seed certification. Decentralization, characterized by direct local participation, should be the aim of such system. The revision of the National Seed Industry Law and the re-structuring of the National Seed Industry Council (NSIC) will be an important step toward this end.

Credit Support

One important area in the agricultural system where government intervention matters substantially is credit support to farmers. This assertion is strongly supported by the experiences of the rice-producing countries reviewed for this study. Credit is particularly crucial in countries where the majority of the farmers cannot afford the high cost of inputs and the government promotes rice production beyond the subsistence level in order to support population pressure. The Green Revolution has shown that with massive government intervention in the form of agricultural credits, either to individual farmers or farmer groups, a particular technology can achieve phenomenal impact and wide adoption rate even among small farmers. The capacity and institutional mechanisms of governments to collect payments and to instill credit responsibility among farmer-borrowers, however, is another matter. As shown in the Green Revolution era, in the case of the Philippines specifically, the credit support extended to farmers has encouraged dependence on "dole outs" from the government, resulting in higher farmer indebtedness, and worse, landlessness. In turn, the unpaid debts of farmers have added to the public debt burden since most of these credit facilities were supported by loans from multilateral or foreign financial institutions.

At present, government credit support for small rice farmers is non-existent. Government and quasi-government financial institutions such as the Development Bank of the Philippines (DBP), Land Bank of the Philippines (DBP) and Quedan Corporation have limited agricultural credit windows that are accessible to poor rice farmers. Often, these credit facilities are made available to farmer-groups that have sufficient collateral capacity such as substantial land and other fixed assets-requirements that practically exclude poor rice farmers who are mainly farming for subsistence. As a result, poor rice farmers are left at the mercy of local money lenders and loan sharks who often extend production loans in kind, often in the form of chemical inputs and certified seeds.

As practiced by both public and private financial institutions, agricultural credit support may only be availed of by farmers who are using high-yielding seeds, inorganic fertilizers and chemical pesticides-all of which are generally perceived by institutional lenders as assurance of good harvests. This has been widely practiced since the heyday of the Green Revolution, despite the fact that there is no law or official policy that exists in the Philippines mandating these requirements. This practice has clearly worked to the disadvantage of rice farmers who save, re-use, select and breed their own varieties instead of buying certified seeds. It has also excluded farmers who opt to use organic inputs in growing rice, thus relying on their own initiatives or with some help from non-government organizations promoting sustainable agriculture.

Despite the rhetoric of Philippine agriculture officials in support of sustainable agriculture, no clear programs in support of alternative farming systems exist. The Land Bank of the Philippines has had some informal initiatives to explore the possibility of opening up special loan windows for sustainable agriculture or organic farming, but none were actually operationalized. Recently, the Philippine Development Assistance Program (PDAP), a Canadian government-supported non-governmental financial mechanism, forged a partnership with the Land Bank to open a limited credit window for organic farmers, initially in areas where PDAP has been implementing organic rice production projects with local organizations, namely in Camarines Sur and Bukidnon. The pilot program is envisioned to lead to the institutionalization of credit support for organic farmers in the future.

It is imperative on the part of the Philippine government to prioritize the extension of credit support to poor rice farmers, particularly those practicing sustainable agriculture systems. Current financial resources allotted for credit support to big farmers and farmer-groups that can afford the collateral requirement and bureaucratic processes should be rechanneled to support poor rice farmers, many of whom are organized but lack the resources to access mainstream credit facilities. Such credit support should encourage farmers to use their farm-saved and developed seeds, as well as adopt sustainable farming systems relying on resources available in their farms. The financial resource requirements on the part of the government would predictably be minimal, and available resources would be able to benefit more farmers and would have bigger impact on the overall national food security situation. The financial support program should be closely tied with the re-orientation of government extension system geared towards strengthening the capacity of farmers to organize themselves, increasing their awareness on issues that affect agriculture, instilling the values of credit responsibility, and supporting farmers' on-farm efforts in seeds conservation and local resource utilization.

Defining the Road to Self-Sufficiency

The Philippines has practically reached its limit in terms of land frontiers. This was further aggravated by the loss of rice lands to rampant land use conversions from agricultural to industrial and/or residential, both legal and illegal. Future increases in rice production, therefore, will have to come from increases in yields. It is towards this end that the Philippine government is promoting the widespread adoption of hybrid rice technology as a flagship of its GMA rice program, inspired by its unprecedented successes in China.

The obsession of the GMA administration to duplicate the feat of China in hybrid rice technology in the Philippines can be gleaned from the massive financial and institutional support that it extends to the national program that promotes the hybrid rice. Such infusion of funding was paralleled only by the experience in the era of the Green Revolution when so-called high-yielding varieties coupled with the use of chemical pesticides and fertilizers were massively promoted through direct subsidies and credit facilities with the aid of foreign financial support. Notably, no such program or support is extended to farmers who choose to use traditional or farmer-based systems or seeds, which is a perverse way of promoting a hybrid and modern technology at the expense of broadening farmers' options, regardless of the potentials these offer.

One alternative which promises significant yield advantage over current rice technologies while simultaneously bringing down production costs for the farmer is the System of Rice Intensification (SRI). Developed in Madagascar in the 1980s, SRI, which is basically a set of farm management practices including among others, seed selection, plant spacing and proper water management, promises to boost yields by up to 50-100 percent. This is significantly higher than the 15-20 percent promised by hybrid rice.

Apart from the significant increase in yield, proponents of SRI cite more efficient use of resources as a major advantage of using SRI. It increases water use efficiency since yields double with only half as much water. It increases the productivity of land since yields can average about 8 t/ha if the methods are used correctly, with higher yields possible when they are used with precision and skill. And while SRI does require more labor-about 26 percent in one Madagascar evaluation-the value of increased production increases the returns to labor by at least 50 percent, depending on the cost of labor (Labiano et al. n.d.). SRI also has the benefit of being particularly accessible for farmers who have small landholdings and need to get the highest yields possible from the little land they have.

Although SRI was largely ignored by agricultural scientists for many years, this attitude is now changing. While most interest came initially from NGO and academic circles, national research programs and international research institutions (including the IRRI) in the Philippines are now also looking into SRI. In March 2004, the Department of Agriculture, through its research arm, the Bureau of Agricultural Research, and its extension arm, the Agricultural Training Institute (ATI) and the Philippine Rice Research Institute (PhilRice) hosted seminars on SRI. The National Irrigation Administration (NIA) now has evaluations available from its first year of work with SRI, showing profitability with SRI methods increasing by 100-200 percent compared with conventional farmer practice. The ATI's center in Cotabato in southern Mindanao conducted SRI evaluations in 2002, using three varieties developed by PhilRice. The average yield was 12 mt/ha, based on crop-cut extrapolations.

Hybrid rice technology and SRI have, in recent years, been promoted, by the agriculture department and civil society advocates respectively, as possible answers to the Philippine's rice supply problems. While SRI introduces an off-the-conventional system in rice farming, hybrid focuses on a particular technology in seed development which also comes with a specific farming approach. There are other approaches to increase rice yield as well that primarily focus on the promotion of farmer-developed rice varieties. There are, for example, farmer selections and farmer-developed varieties which have comparable yield and performance as hybrid rice. Take the case of PhilRice's Mestizo hybrid line which has 5.4 t/ha (ave. yield), 9.9 t/ha (max yield), 123 days, 97 cm height. Bordagol, a farmer-developed variety has 4.8 t/ha (ave. yield), 10.3 t/ha (max yield), 124 days, 101 cm height. Pungko, a traditional rice variety and other farmer developed varieties such as GIFTS 5, GIFTS 20, San Pablo, CC 22, G11, GRT, AS 54, Con 0319 selection and CC 33 developed by farmers in North Cotabato, can give an actual yield of 5 to 5.5 t/ha in favorable areas, with comparable height and growth duration, mostly aromatic and with good eating quality. This is actual yield at farmers' fields under a farmer management system and not under experimental conditions, which is what is mostly published for hybrid rice. Farmers are currently experimenting, using their developed varieties under SRI conditions.

The experiences of farmers in striving for better rice harvests would point out that we should not only look at grain yield in order to increase production and feed the growing population. "Healthy rice" produced under no (or less) chemical input (less costly) with good yield addresses not just the grain supply problem but the welfare of both farmers and consumers, as well as the environment. Biodynamic farming is one alternative farming system which should be looked into. The biodynamic system involves the integration of traditional rice farming practices with astronomy-based knowledge systems anchored on the interrelationship of life forces. The system promotes zero use of synthetic and petroleum-based farming inputs. (Don Bosco 2004).

The success of the biodynamic farming system and the benefits that it provides in terms of good yield (grain and economic yield) to farmers is demonstrated by the 3,300 farming families (covering 2,978 hectares) who adopted the system in the provinces of North Cotabato and Davao del Sur. There is a growing demand from local rice consumers, too, for biodynamic rice (as a healthy option to conventionally produced rice) ensuring farmers of a secure local market for their produce. The experience in North Cotabato showed that consumers are willing to pay a premium price for organic rice, which enables farmers to earn more.

The broad range of experiences by several rice-producing countries in this study clearly points to state intervention as crucial factor in the success of rice producing countries in the study. The type of intervention is, however, is just as important- if not more important. Depending on the intervention, the state can either boost efforts to achieve self-sufficiency and promote farmer's welfare or hinder them. The Philippine government's insistence on promoting hybrid rice, despite the serious questions on the technology itself, its sustainability and the accompanying issues regarding control and access, is but one clear example of a misguided intervention creating more problems than it purports to solve.

Indeed, there is no one single solution to the problems in long-term food security. In its quest for this goal, the Philippines will have to employ various options, but such options should strictly adhere to basic principles that will not sacrifice environmental sustainability, farmer empowerment and democratic participation-elements that should be present if a country intends to seriously pursue long-term food security.

NOTES

1. GMA Rice Program
2. Ibid.
3. Sunday Times, January 4, 2004
4. Thailand Paper
5. Vietnam Paper
6. Indonesia Paper
7. PhilRice report to the Rice Core Group
8. Rice Almanac 3rd Edition
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