IS THE PHILIPPINES' LEADING RICE-PRODUCING PROVINCE FARING GOOD ENOUGH?

THE CASE OF RICE FARMING IN NUEVA ECIJA

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The Philippine Rice Research Institute (PhilRice) is a chartered government corporate entity under the Department of Agriculture. It was created through Executive Order 1061 on November 5, 1985 (as amended) to help develop high-yielding, cost-reducing, and environment-friendly technologies so farmers can produce enough rice for all Filipinos.

It accomplishes this mission through research, development, and extension work in its central and seven branch stations, coordinating with a network that includes 57 agencies and 70 seed centers strategically located nationwide.

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

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The International Rice Research Institute (IRRI) is the world's premier research organization dedicated to reducing poverty and hunger through rice science; improving the health and welfare of rice farmers and consumers; and protecting the rice-growing environment for future generations. IRRI is an independent, nonprofit, research and educational institute, founded in 1960 by the Ford and Rockefeller foundations with support from the Philippine government. The institute, headquartered in Los Baños, Philippines, has offices in 17 rice-growing countries in Asia and Africa, and more than 1,000 staff members.

Working with in-country partners, IRRI develops advanced rice varieties that yield more grain and better withstand pests and disease as well as flooding, drought, and other harmful effects of climate change. More than half of the rice area in Asia is planted to IRRI-bred varieties or their progenies. The institute develops new and improved methods and technologies that enable farmers to manage their farms profitably and sustainably, and recommends rice varieties and agricultural practices suitable to particular farm conditions as well as consumer preferences. IRRI assists national agricultural research and extension systems in formulating and implementing country rice sector strategies.

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PREFACE

In 1995, the International Rice Research Institute coordinated an international effort that looked into the causes of declining productivity trends in intensive irrigated rice systems in the Philippines, China, Indonesia, Thailand, Vietnam and India. A major feature of this study is the development of a database on input use, level of rice output, prices and detailed cost of rice production. In this study with the costs of producing rice in Central Luzon, Philippines were compared with those in Central Plain, Thailand; Mekong Delta, Vietnam; West Java, Indonesia; Tamil Nadu, India and Zhejiang, China. More than a decade has passed since then, and new government policies, as well as trade regimes, may have caused changes in relative prices. A cost structure of paddy production that is comparable across countries is in short supply. Thus, it is imperative to update the findings of the study.

Rice is intricately related to food security and international trade policies in major rice producing countries. As a result, the Philippine Rice Research Institute of the Department of Agriculture and the International Rice Research Institute, with the participation of the Philippine Council for Agriculture and Fisheries also of the Department of Agriculture jointly planned, designed and implemented a project entitled "Benchmarking the Philippine Rice Economy Relative to Major Rice–Producing Countries in Asia" . The Philippine government, through the Department of Agriculture, provided the full financial support for this undertaking.

The country monograph is one of the major outputs of this project. This monograph is intended for a general audience who would like to learn about the current status of rice production in Asian countries. It attempts to provide the most detailed information on rice farming in intensively cultivated irrigated rice areas of the major rice-producing countries in Asia. These countries include Indonesia, Philippines, Thailand, Vietnam, India and China. All of these countries are among the top 10 rice producers in the world. Data from each country were collected through interviews using electronic questionnaires, which included questions on paddy output, input use, cost of rice production for crop year 2013-14, as well as basic farm and household characteristics.

Each monograph contains a detailed description of each country's crop management practices, input use, labor using and labor-saving practices and various support and services provided by their government to enhance rice production. Given the impending implementation of the free trade agreement which is expected to increase the flow of rice trade among Asian rice bowls, these studies also evaluated the costs and profitability of producing paddy rice.

Results from this study can provide insights on how a country can further improve its competitiveness in rice production and marketing. We gain a perspective on the policies being implemented by our neighbors to make their respective rice industry competitive. By understanding the costs of producing and marketing rice amidst different government policy frameworks in major rice-producing countries, agricultural policymakers can make appropriate decisions on how to best position the country's interest in terms of rice food security. Policymakers and planners can use this information in crafting sustainable development programs for the rice industry.

Project Leaders

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ABSTRACT

Achieving "zero rice import" remains the single most sought after target in Philippine agriculture, irrespective of any political administration. This resolve is strengthened each time a major rice crisis hits the world or the country itself. Two commonly asked questions are "How profitable is rice production in the Philippines?" and "Can it produce at a price competitive with that in the world market?". A 1996-to-1999 IRRI study in Nueva Ecija partly answered the question on how the country compares with other Asian countries. This study revisited the case of the Philippines' largest rice- producing province using 2013 two-season survey data gathered from 103 irrigated rice farmers. Results indicate that Nueva Ecija rice farmers produced on average 6.34 t fresh paddy ha^{-1} in the DS and 4.52 t ha^{-1} in the WS at US$0.23 and US$0.28 kg^{-1} production cost, respectively. At these levels and at 2013 paddy prices, farmers earned net private profits in both seasons. With the current trade protection, the import parity price of rice coming from Vietnam was also higher than the Nueva Ecija average wholesale price. However, when tariff rate was assumed to be zero, the estimated wholesale IPP was much lower than the domestic price in Nueva Ecija. Implications include a greater focus on increasing yield potential, optimizing DS fertilizer application, reducing hired labor cost through widespread mechanization of harvesting and adoption of direct seeding. In terms of rice policy, it appears that the country's largest rice-producing province may have difficulty competing if or when trade protection is removed. While high-cost producers will not likely stop producing rice and there are low-cost producers in other regions, it is important for the government to ensure available rice supply by improving its ability to forecast domestic rice requirements and monitor global supply outlook.

INTRODUCTION

Rice self-sufficiency or achieving “zero rice importation” remains the single most sought after target in Philippine agriculture, irrespective of any political administration. This is so in spite of the fact that the Philippines has been, historically, a net importer of rice, except in some years in the late 1970s and early 1980s when the country started marginally exporting rice. The motivation for this quest is that rice farming continues to be a major source of income for many Filipino smallholder farmers. Millions of landless laborers depend on working in rice-based farms and related industries. In addition, rice is the sole staple food for most Filipino households, especially those in the lower income groups. In 2009, 47% of total caloric intake and 35% of total protein intake of Filipinos came from rice (Maclean et al., 2011).

It did not help that the country was badly hit by three major rice crises in the last two decades: in 1995, when the policy to hold the National Food Authority (NFA) inventories and imports down led to the rise in domestic rice prices (Tolentino, 2002); in 1998, when El Niño caused a major domestic rice shortage; and in late 2007 to early 2008, when speculation and panic on the part of government, domestic farmers, traders, and consumers also led to soaring world and domestic rice prices (Dawe, 2010). Such events strengthened all the more the government’s resolve to aim for reduced reliance in the world market.

A commonly asked question is how profitable and competitive rice production in the Philippines is. A firm is said to be competitive if it can produce products and services of superior quality and lower costs than its domestic or international competitors (Buckley, 1988 as cited by Yap, 2004). Given the technological capacity and the existing domestic and trade policies in the Philippines and that of other countries, are Filipino farmers producing or can they produce rice at a price competitive with that in the world market? An accurate and reliable answer to this question has big implications on the attainability (or when attained, the sustainability) of the country’s self-sufficiency in rice.

Because of the country’s wide variation in geography, production ecosystem, and technological capability, it is possible that one farmer or one province is more competitive than others. The concept of Philippine competitiveness in rice production is therefore difficult to account. As Yap (2004) pointed out, the concept of “national competitiveness” is faulty since competitiveness is technically a firm-level concept. With this in mind, the contribution of this paper is to take the case of the largest rice-producing province as benchmark for the Philippine rice sector’s general level of productivity and profitability in rice production.

While many other provinces, especially those in Mindanao, produce rice at a lower production cost per kg relative to Nueva Ecija (Dawe, 2004), this paper argues that if even Nueva Ecija—which represents the case of intensive rice farming in Central Luzon (dubbed "the rice granary of the country)," whose well-trained farmers have access to good irrigation, new seeds and technologies, training, and input markets—fails to produce commercial rice at a competitive price in the world market, then the country's overall competitiveness in rice may be hard to attain. And, although it does not mean and is highly unlikely that high-cost producers will completely stop planting rice, much can be learned to inform policymakers by looking more closely at the case of this largest rice-producing province.

In 1999, the International Rice Research Institute (IRRI) examined the costs of intensive rice production of selected Asian countries and found that the cost of producing a metric ton (t) of paddy rice was highest in Nueva Ecija at US$96 (Moya et al., 2004). The cost of producing a ton of paddy rice in the same period in SuphanBuri, Thailand, was US$59; the Mekong and Red River deltas in Vietnam spent US$74 and US$86, respectively; and West Java, Indonesia recorded US$69. On a per-hectare basis, Nueva Ecija produced rice at US$2,083 compared with US$1,160 in the Mekong Delta, Vietnam, and US$1,302 in SuphanBuri, Thailand. These data, however, were gathered more than a decade ago and did not include land rental cost, which is a major item when one talks about competitiveness.

This study revisits rice farming in Nueva Ecija, considering the possible impacts on production cost of changes in technology and government policies and programs in the last decade. The goal is to assess the level of competitiveness of rice farming in Nueva Ecija, Philippines. Specifically, it aims to (1) examine paddy yield and technological level of Nueva Ecija farmers in terms of input use, crop management, and level of mechanization; (2) examine the cost of producing commercial paddy in Nueva Ecija; (3) examine the net private profitability of producing rice; (4) estimate import parity price of comparable rice varieties; and (5) draw implications for research and policy from the results of the study.

The Philippine rice economy

The Philippines is the world's eighth largest rice producer (GRiSP, 2013). In 2013, it produced more than 18 million t from a total harvested area of 4.75 million ha. Rice is grown in almost all provinces, although more than 50% of total production comes from only 13 major rice-growing provinces. Around 70% of the total rice area is lowland-irrigated, supported by national or communal surface irrigation systems and individual pumps. Average yield of irrigated rice in 2013 was 4.27 t ha^{-1}; that of rainfed rice was 3.06 t ha^{-1}.

Rice production has continuously increased, except in years when production dipped due to El Niño or super typhoons (Fig. 1). Growth in production may be partly explained by the increase in area harvested and increased cropping intensity due to irrigation investments, but more so, by the growth in yield owing to technological improvements. From 2009 to 2013, for example, the 13% growth in production may be explained by the 3% growth in area harvested and the 10% growth in yield.

Climate and cropping seasons vary within the country, but rice is generally harvested two times a year. Peak harvest months for the wet- or rainy-season crop are between October and December in most of the Luzon regions, and from March to May in many of the Visayan and Mindanao rice-producing regions. For the dry-season crop, peak harvest is from March to May in most of Luzon and from November to December in many regions in the Visayas and Mindanao. In 2013, 57% of the total annual production came from the wet-season harvest.

On the demand side, the country's population in 2010 was 92.3 million, growing at the rate of 1.9% per year based on 20-2010 population data (PSA-NSO, 2012). Annual rice per capita availability, on the other hand, was 117 kg milled rice based on the Philippines' Bureau of Agricultural Statistics (BAS) supply utilization accounts. In terms of per capita milled rice consumption, national nutrition surveys indicated increasing trends—103 kg in 1993, 111 kg in 2003, and 116 kg in 2008 (FNRI, 2011 as cited in Trinidad et al., 2013).

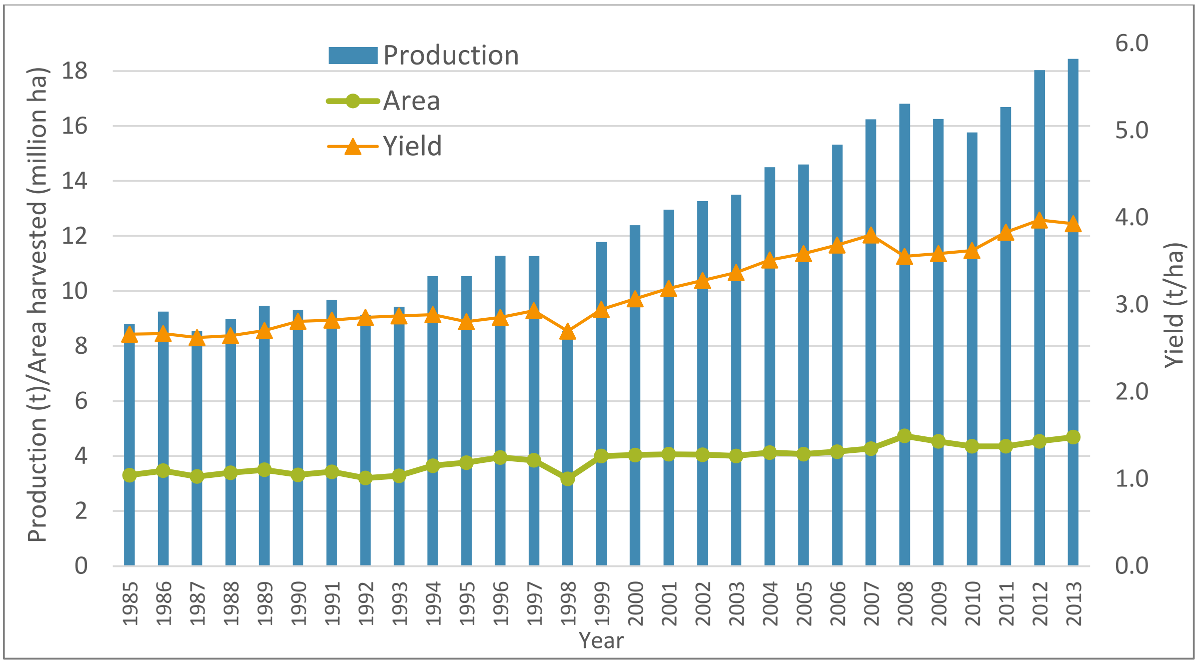

Fig. 1. Trends in Philippine rice production, area harvested, and yield, 1985-2013 (BAS, 2013).

Hence, the country's domestic rice production generally lagged behind its total rice requirement. This deficit is being met by rice imports, mostly from Southeast Asian neighbors such as Vietnam and Thailand. In the last 10 years, the country imported on average more than 1 million t of milled rice each year (Fig. 2). In fact, the Philippines was the biggest rice importer in the world in 2010 and 2011 (GRiSP, 2013).

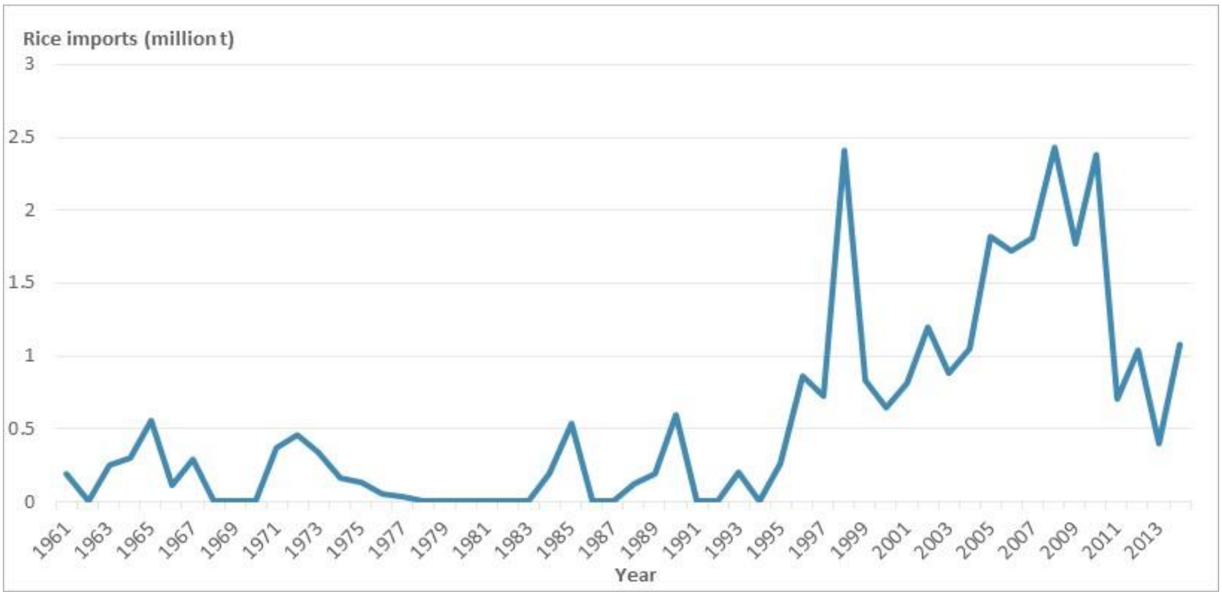

Fig. 2. Trends of rice importation in the Philippines, 1961-2014 (FAO, 2014).

The Philippine rice production policies and programs have revolved mainly around meeting the target of self-sufficiency. The Food Staple Sufficiency Program (FSSP) is focused, among others, on increasing and sustaining production, increasing level of farm mechanization reducing postharvest losses, and managing consumption (DA, 2012). It is similar to the various rice production programs implemented from 1973 to 2004: the components include support in the areas of irrigation, certified seed, credit, postharvest facilities, research and extension services, marketing support/assistance, and information campaign. One major deviation is that, despite the absence of a national seed subsidy program, the government embarked on a national program for farm mechanization where various production and postharvest machinery and equipment are provided to qualified farmer groups, cooperatives, irrigators' associations, and local government units under a counterpart agreement. Under this program, the government shoulders 85% of the acquisition cost of farm machinery, while the qualified recipient groups pay the remaining 15%. Irrigation improvement also comprised a large bulk of the total rice program budget in 2013.

Trade protection has also been a major support program for farmers over the past decades, largely favoring the millions of smallholder paddy farmers over rice consumers. In 2014, the country was able to negotiate an extension of quantitative restrictions for rice until 2017, although there was a larger minimum access volume yearly amounting to 805,200 t at 35% tariff (DA, 2014).

Another major feature of the Philippine rice economy is the presence of the NFA, a government agency tasked to procure paddy and distribute rice in order to ensure sufficient rice stocks for all regions at all times. It is involved in the procurement of paddy and importation of rice for use as buffer stock. The objective is to stabilize prices in the domestic local market. NFA owns postharvest and marketing facilities and controls the volume of rice imports.

The agriculture programs are complemented with the *Pantawid sa Pamilyang Pilipino* Program, a conditional cash transfer program that was started in 2008. Cash transfers are provided to poor households, including poor rice-based farmers, conditional upon investment on child education and health as well as on use of maternal health services (Chaudhury et al. 2013).

Rice farming in Nuva Ecija, Philippines

Nueva Ecija is located in the Central Luzon plain, which is the largest in the country. Located around 150 km north of Manila, Nueva Ecija is the largest rice-producing province. It is home to the Pantabangan Dam, which is the major source of irrigation water for rice farming in Central Luzon. Two large-scale irrigation facilities, the Upper Pampanga River Integrated Irrigation System (UPRIIS) and the Casecnan Multipurpose Irrigation and Power Plant, serve the province. In 2013, 87% of the rice areas were irrigated. The rest of the lowland areas are serviced through communal irrigation systems or by the use of pumped water from shallow tubewells. It is also the home of the Philippine Rice Research Institute (PhilRice) Central Experiment Station, making it easier for farmers to access rice production technologies. The climate in

Production area of foundation and registered seeds of various rice varieties in Philippine Rice Research Institute Central Experiment Station, Nueva Ecija.

Nueva Ecija is largely characterized as Type 1: two pronounced seasons, normally dry from November to April and wet during the rest of the year.

Nueva Ecija contributed an average of 8% to the country's total paddy production from 1990 to 2013. Its total paddy production increased from barely half a million t in 1970 to almost 2 million t in 2014. Total rice area harvested was 0.32 million ha.

The total population of Nueva Ecija was 1.96 million in 2010. The average annual per capita consumption in the region was 123 kg yr^{-1} (PhilRice, 2011). Hence, the province has a large rice surplus and is a major supplier of rice in Metro Manila and nearby regions.

METHODOLOGY

The paper used data gathered through face-to-face interviews with irrigated rice farmers using a pretested survey questionnaire in electronic MS access form. The reference periods for the input-output data collection were the January-June and July-December 2013 harvest seasons. Figure 3 shows the sample barangays and municipalities drawn from the survey areas in an earlier cross-country study of intensive rice farming in Asia (Moya et al., 2004). As much as possible, the respondents chosen in this study were the same farmers in the 2004 study who were interviewed in 1999. Additional samples were selected based on the following criteria: 1) farm is located in the same village as that of the original respondent; 2) have at least 10 years of farming experience; 3) farms were planted in 2013. A total of 101 farmers were interviewed during the dry season; there were 100 respondents during the wet season.

Data gathered included socioeconomic characteristics of farmers, farm characteristics, yield, use of material inputs and respective prices, labor usage and costs, machine use and rentals, and other production costs. Secondary data on existing government policies that affect rice production, marketing, and international trade in the Philippines were also gathered.

The study is largely descriptive, using means and frequency distribution, cost and return analysis, and partial factor productivity. To some extent, t tests were used to discern if differences in average yield, input use, and costs between seasons were statistically significant.

For the profitability analysis, net profit from rice farming was derived by subtracting all production costs from the gross revenue derived using the fresh paddy price. The cost structure was disaggregated by season. The relevant costs considered included those of seed, fertilizer, pesticides, herbicides, irrigation fees, machine rentals, fuel and oil, transportation, labor (land preparation, crop establishment, crop care and maintenance, harvesting and threshing, and postharvest), rental value of land, and some estimate of capital cost. For the land rental, the average rate applied to leasehold farmers was used to impute the land rental cost for farmers who own their farms. To arrive at the total capital cost, the farmer's total preharvest cash expense was estimated, after which interest rate for borrowed capital was applied for the borrowed portion of the cash expenditure and the average bank savings rate was applied for the owned capital or the difference between total cash expenditure and borrowed capital. Income of rice farmers, defined as the net profit from rice farming plus returns to own land and capital or both, was

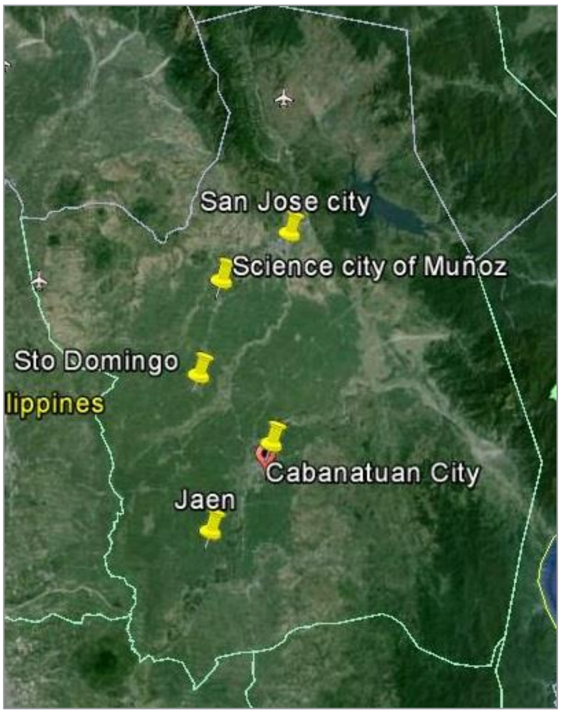

Fig. 3. Survey areas in Nueva Ecija, Philippines (Google Earth).

also derived to reflect the effective income of farmers from rice farming.

To some extent, import parity price was also derived and used as an indicator of competitiveness. Calculating a parity price involves taking the price of a commodity at a border post or port of entry and adjusting it for transport, marketing, and transaction costs incurred when bringing the commodity to the geographic location under consideration (Mabiso, 2008). In this study, the import parity price was estimated on the basis of the import price of 25% broken rice from Vietnam and this was compared with the wholesale prices of regular milled rice in Nueva Ecija obtained from BAS.

Data gathering through personal interview with farmer guided by a structured questionnaire.

RESULTS & DISCUSSION

Farmer and farm characteristics

The average age of sample respondents was 59; they had 33 years' farming experience on average. They typically completed elementary and reached 2 years of formal secondary education. Some 13% of the respondents were female. Like the average Filipino farm family, household size was five (4.6), a little below the average household size of six in the 1999 IRRI survey. The respondents estimated their annual income from rice to be more than 70% of their total household income. The most common alternative sources of income are other-farm labor, swine production, tending a *sari-sari* store, tricycle driving, operating farm machinery, and cultivation of selected fruits and vegetables.

Around 62% of the respondents have attended rice production-related training in the last 5 years. Only 64% claimed being members of farm organizations. Two-thirds of the respondents borrowed capital for rice farming, mostly for fertilizer and payment of pre-harvest hired labor. The common sources of credit were the private moneylenders that included traders, relatives and neighbors, and cooperatives. Some 3% of the sample respondents were beneficiaries of the *Sikat Saka* credit program of the Philippine Department of Agriculture. A significant number of farmers (31% during WS and 42% during DS) used the borrowed capital not just for rice farming but for other purposes as well.

Majority of the respondents operated one parcel of land that averaged 2.01 ha in size. Forty-six percent of the farmers used farms 1 ha and less; 14% grew rice on fields greater than 3 ha. More than 64% of the respondents were owner-operators, whereas 27% were renters who paid a fixed crop share, commonly 15 bags of 50 kg per season. Most of the farms covered in the survey are served by varying districts under the UPRIIS.

In terms of farm accessibility to markets, the survey areas, on average, were 5.4 km away from the nearest market center. The roads were mostly concrete (82%), the rest made of sand and gravel.

In**put use**

Variety, seed class, and crop establishment

Table 1 presents the top varieties planted in the two seasons covered, the methods of crop establishment, and seeding rates (by method of crop establishment and by variety group). Hybrid rice adoption in intensively cultivated irrigated areas of Nueva Ecija was high at 27% during the DS and 6% during the WS. The most common hybrid rice variety planted was SL8 (or NSIC Rc32H) characterized as having resistance to blast and intermediate resistance to bacterial leaf blight (BLB). Other hybrid rice varieties planted were Arize 64, PHB73, Bigante, Mestizo, NK5017 and SL7.

Table 1. Seed class, variety, and method of crop establishment, Nueva Ecija, Philippines 2013.

Item	DS (n=101)	WS (n=100)	Pooled (n=201)
Seed class			
Hybrid	26.7	6.0	16.4
Certified	58.4	76.0	67.2
Registered[1]	5.0	7.0	6.0
Farmers' seed	9.9	11.0	10.4
Top variety planted			
NSIC Rc222	33.7	41.0	37.3
SL8	18.8	0.0	9.5
NSIC RC216	9.9	15.0	12.4
Diamond X	5.9	8.0	7.0
NSIC Rc160	5.9	1.0	3.5
NSIC Rc240	5.9	3.0	4.5
NSIC Rc238	4.0	8.0	6.0
IL29	2.0	5.0	3.5
Method of crop establishment			
Direct seeding			
Broadcast	17.8	1.0	9.5
Drum seeder	2.0	0.0	1.0
Transplanting	79.2	99.0	89.1
Direct seeding/transplanting	1.0	0.0	0.5
Mean seeding rate (kg ha^{-1})			
Inbred variety	88	82	85
Hybrid variety	26	30	27
Mean seeding rate, by crop establishment method			
Direct seeding, broadcast	76	81	76
Direct seeding, drum seeder	35	-	35
Transplanting	72	79	76

[1]Registered seeds are produced from foundation seeds that passed the certification criteria.

The top inbred variety planted in both seasons were NSIC Rc222, followed by NSIC Rc216 and Diamond X. NSIC Rc222 is also the most commonly planted variety nationwide based on the 2012 rice-based farm household survey (Launio et al., 2014). It is a medium-duration, high-yielding variety that is moderately resistant to major insect pests such brown planthoppers, green leafhoppers, and yellow stem borers. It has also intermediate resistance to blast and BLB. NSIC Rc160 and NSIC Rc240 were also popular during the DS, while NSIC Rc238 and IL29 were also top varieties planted in the 2013 WS. NSIC Rc222, NSIC Rc238, and NSIC Rc240 had, at the time of release, yields of 10 t ha^{-1} and higher (PhilRice, 2013).

Manual transplanting of rice seedlings in Nueva Ecija.

With majority of seed growers and seed centers located in Nueva Ecija, the use of certified seed in the province was high (83% in WS and 63% in DS) compared with the national figures of 41% and 37%, respectively (PhilRice, 2012).

Almost all farmers practiced transplanting during the WS. In the DS, 20% of the respondents practiced broadcast direct-seeding and 2% used drum seeders. The average seeding rate for transplanted and broadcast direct-seeded rice did not appear to differ significantly (76 kg ha^{-1}). The use of drum seeders reduced seeding rate significantly. The average seeding rate also significantly differed between hybrid and inbred rice farmers, regardless of season. Hybrid rice farmers used an average of 26−30 kg ha^{-1} while certified inbred rice farmers used an average of 82−88 kg ha^{-1}. These seeding rates were much less than the more than 100 kg ha^{-1} used by farmers who plant their own or other farm's previously harvested seeds.

The average price of seeds in the DS was US$1.86 kg^{-1}; it was US$0.93 kg^{-1} in the WS. Inbred certified seeds in both seasons cost around US$0.70 kg^{-1} while price of hybrid rice seeds ranged from US$5.19 kg^{-1} to US$5.30 kg^{-1}.

Fertilizer use and nutrient management

Nueva Ecija farmers used an average of 114 kg ha^{-1} N during DS and 107 kg ha^{-1} during WS in their rice farms (Table 2). The DS N use was relatively lower than the average value reported in the 1999 IRRI survey, while WS N-use was higher. Statistical tests revealed no significant difference in N use during both seasons. Considering the optimal N requirements of Nueva Ecija farms, estimated at 56 and 133 kg ha^{-1} N for WS and DS, respectively (Dawe and Moya, 1999 as cited by Dawe et al., 2006), farmers appeared to 'over-apply' during WS and 'under-apply' during DS. If this is true, then site-specific N application rates may contribute to yield and productivity improvement.

The average P_2O_5 application during the DS was 40 kg ha^{-1} (P=18 kg ha^{-1}), which was significantly higher than the 34 kg ha^{-1} (P=15 kg ha^{-1}) WS application rate. For K_2O, the average application was 31 and 28 kg ha^{-1} for DS and WS, respectively. Such application rates (equivalent to 25 kg K ha^{-1} for DS and 23 kg K ha^{-1}

Table 2. Average material input use, Nueva Ecija, Philippines, 2013.[a]

Item	Jan-Jun	Jul-Dec	Difference	
Area (ha)	1.57	1.51	0.06	ns
Seeds (kg ha^{-1})	72	79	-7	*
Fertilizer use (kg ha^{-1})				
N_2O	114	107	7	ns
P_2O_5	40	34	6	***
K_2O	31	28	3	ns
Pesticide use (kg ai ha^{-1})				
Herbicides	0.39	0.34	0.05	ns
Insecticides	0.30	0.69	-0.39	*
Fungicides	0.17	0.18	-0.01	ns
Rodenticides	0.05	0.27	-0.22	*
Molluscicides	0.34	0.4	-0.06	ns

[a] *, **, *** indicate significance at 90%, 95%, and 99% confidence level, respectively.
ns = not significant

for WS) were slightly higher than the counterpart rates in 1999 at 22 and 19 kg ha^{-1}. This is attributed to the more common use of mixed fertilizers such as 14-14-14 (%N_2O, %P_2O_5, %K_2O) and 17-0-17 and also to the growing popularity of the single-element fertilizer muriate of potash (0-0-60) and potassium nitrate (17-0-17).

Majority of the farmers in Nueva Ecija applied fertilizer two times per cropping during WS and three times per cropping during DS (Table 3). Regardless of frequency of fertilizer application, the first application on the main field fell within 2 wk of crop establishment. Those who applied three times during the DS, for example, applied, on average, 12, 28, and 44 d after transplanting or direct seeding (DAT). Even for those who applied fertilizer on the seedbed, the first application was 9–11 d after sowing (DAS).

Table 3. Frequency and timing of fertilizer application, by season, Nueva Ecija, Philippines, 2013.

Crop stage/ frequency of application	2013 DS						2013 WS					
	Farmers (%)	Av DAS/DAT					Farmers (%)	Av DAS/DAT				
		1st	2nd	3rd	4th	5th		1st	2nd	3rd	4th	5th
Seedbed (DAS)												
None	0.0	-					1.0	-				
Once	62.5	9					43.4	11				
2x	35.0	9	17				54.5	9	17			
3x	2.5	6	11	17			1.0	6	15	20		
Field (DAS/DAT)												
None	0.0	-					0.0	-				
Once	2.0	11					2.0	13				
2x	33.7	14	37				59.0	13	31			
3x	53.5	12	28	44			33.0	11	25	44		
4x	8.9	8	18	30	45		5.0	7	16	33	47	
5x	2.0	9	18	29	38	48	1.0	7	15	25	30	45

*DAS=days after sowing; DAT= days after transplanting.

The most common fertilizers used did not change much from those applied more than a decade ago: urea (46-0-0), complete (14-14-14), ammonium phosphate (16-20-0), and ammonium sulfate (21-0-0). Potassium nitrate (17-0-17) was the latest addition to the five most used fertilizer grades. Around 3% of the respondents used organic fertilizer, mostly hybrid rice farmers.

In 2013, the mode price of urea (46-0-0) did not differ, at around US$26 bag^{-1} of 50 kg. The average price of ammonium phosphate was US$23 bag^{-1} while ammonium sulfate cost US$16−19 bag^{-1}.

Pesticide use

Table 2 also presents the mean kg active ingredient (ai) applied, by pesticide category and season. In general, except for insecticide application during WS, application rates for a particular category were less than 0.5 kg or liter ai. Farmers in Nueva Ecija generally applied chemicals five times per cropping: one herbicide; two insecticides; one rodenticide, and one molluscicide (Table 4). Fungicides were used by a quarter of the respondents.

Table 4. Frequency of pesticide application, by category and by season, Nueva Ecija, Philippines, 2013.

Application frequency	2013 DS				2013 WS			
	Seedbed		Standing crop		Seedbed		Standing crop	
	No.	%	No.	%	No.	%	No.	%
Herbicides								
0	71	89.9	16	15.8	88	88.0	25	25.0
1x	8	10.1	66	65.3	11	11.0	69	69.0
2x	0	0.0	17	16.8	0	0.0	6	6.0
3x	0	0.0	2	2.0	0	0.0	0	0.0
Insecticides								
0	49	62.0	23	22.8	54	54.0	15	15.0
1x	29	36.7	29	28.7	40	40.0	28	28.0
2x	1	1.3	25	24.8	5	5.0	34	34.0
3x	0	0.0	23	22.8	0	0.0	15	15.0
4x	0	0.0	0	0.0	0	0.0	7	7.0
5x	0	0.0	1	1.0	0	0.0	1	1.0
Fungicides								
0	78	98.7	72	71.3	97	97.0	73	73.0
1x	1	1.3	24	23.8	2	2.0	26	26.0
2x	0	0.0	5	5.0	0	0.0	1	1.0
3x	0	0.0	0	0.0	0	0.0	0	0.0
Rodenticides								
0x	76	96.2	53	52.5	89	89.0	57	57.0
1x	3	3.8	27	26.7	8	8.0	21	21.0
2x	0	0.0	17	16.8	0	0.0	12	12.0
3x	0	0.0	3	3.0	2	2.0	4	4.0
4x	0	0.0	0	0.0	0	0.0	2	2.0
5x	0	0.0	1	1.0	0	0.0	3	3.0
6x	0	0.0	0	0.0	0	0.0	1	1.0
Molluscicides								
0	66	83.5	15	14.9	80	80.0	16	16.0
1x	13	16.5	68	67.3	16	16.0	71	71.0
2x	0	0.0	14	13.9	3	3.0	12	12.0
3x	0	0.0	4	4.0	0	0.0	1	1.0

Herbicides were used by 75% of farmers during WS and by 85% during DS. The average herbicide application appeared to be higher in the 2013 WS compared with that in the IRRI 1995-96 survey (0.24−0.28 kg ai ha^{-1} in WS) (Serrano et al., 1999). The average application rate during 2013 DS, however, was closer to the 1995 and 1996 DS rates, 0.33− 0.40 kg ai ha^{-1} on average. The most common ai of herbicides used were butachlor (e.g., Machete, Advance), 2,4-D, pyribenzoxim (Pyanchor), and MCPA (Agroxone). Majority of the first application of herbicide is done within 10 d from planting.

Molluscicides were the next most commonly used type of pesticide. Farmers commonly applied once, 1-2 DAT, then they proceeded to sporadically crush the eggs and handpick the remaining snails during the early stages of the rice crop. The most common molluscicides used were Niclosamide (more than 60%) and Methaldehyde. The application rates for molluscicides appeared to have increased relative to those found in the 1994−96 IRRI surveys in Nueva Ecija (Serrano et al., 1999).

Insecticides were also commonly used, applied, on average, twice in a cropping. The popular ones used were cypermethrin-based insecticides (Cymbush, Chix, etc.) and chlorpyrifos+BPMC (Brodan). Application was higher than the 1994−1996 survey rates, especially during WS.

Only 28% of the respondents reported using fungicides in any season. There was a marked increase in the average use of fungicides, when compared with the almost zero application during the 1994−96 IRRI surveys. The most common fungicide used was Armure. Around 50−60% used rodenticides, the most popular brand was Racumin (ai, coumatetralyl).

Labor use and mechanization

The average total mandays (md) devoted to rice farming per hectare was around 70 for both seasons, including both hired and operator, family and exchange labor (Table 5). Hired labor can be contracted labor paid in cash or in kind, or daily wage labor. In the case of Nueva Ecija, more than three-quarters of total person-days came from contracted hired labor, confirming conclusions in Dawe et al. (2006) that farm laborers, not paddy farmers, do the bulk of the work in producing rice. Table 5 further presents labor use, by major farm operation (land preparation, crop establishment, crop care and maintenance, harvesting and threshing, and postharvest) and by source of labor. Crop establishment and harvesting and threshing were the two most laborious operations, owing to the practice of transplanting and manual harvesting. The estimated number of person-days for crop establishment was 21−24 md and that for harvesting was 18−22 md.

Land preparation using a power tiller or hand tractor.

Table 5. Average labor use (8-h person-days ha^{-1}), by source, major activity, and season, Nueva Ecija, Philippines, 2013.[a]

Labor item	Jan-Jun	Jul-Dec	Difference	
Hired	52	55	-3	**
Land reparation	7	6	1	ns
Crop establishment	19	21	-2	ns
Crop care and maintenance	6	5	1	ns
Harvesting and threshing	18	22	-4	**
Postharvest	2	2	0	***
Operator, family, and exchange	17	15	1	ns
Land preparation	2	3	-1	ns
Crop establishment	2	3	-1	ns
Crop care and maintenance	12	9	4	**
Harvesting and threshing	0	1	0	ns
Postharvest	0	0	0	ns
Total	69	70	-2	ns
Land preparation	9	9	0	ns
Crop establishment	21	24	-4	**
Crop care and maintenance	19	14	5	**
Harvesting and threshing	18	22	-4	**
Postharvest	2	2	0	***

[a] *, **, *** indicate significance at 90%, 95%, and 99% confidence level, respectively.
ns = not sigificant

The practice of using permanently hired laborers (PHL) or those hired for the whole cropping season and paid a crop share from that season's harvest was common in Nueva Ecija. In both seasons, 43% of the respondents had PHL doing most of the crop care and maintenance activities. They also supervised or helped the operator supervise the crop establishment and harvesting and threshing activities. PHLs were commonly paid 10% of the gross harvest.

The commonly mechanized operations in rice farming in Nueva Ecija were land preparation and threshing, although the survey data showed farmers beginning to custom-hire combine harvesters. Farmers used two-wheel tractors for land preparation; the steps usually included one plowing, two harrowing passes, and leveling. Some farmers used carabaos for second leveling to ensure that fields are properly leveled. Other farmers would use four-wheel tractors for initial plowing after which, a two-wheel tractor would complete the other land preparation activities. The riding type two-wheel tractor, which reduces the drudgery of plowing and harrowing, was also becoming popular in the province.

The axial flow thresher is the most common type of thresher used in Nueva Ecija. Even if the threshing operation is mechanized, at least 4−5 person-days are still required when operating 1 ha of farm. In 2013, some 3% during the DS and 5% during the WS used combine harvester to operate in their farms. As of the survey period, the rental rate for combine harvester was a share of the crop ranging from 14 to 16% of gross harvest. This percentage of crop share is expected to decrease as a result of competition. The same thing was experienced in making payments for the use of reapers in Pangasinan (C. Tado, PhilRice, pers. commun.)

Yield and partial factor productivity

Average fresh yield in Nueva Ecija was 6.34 t ha^{-1} in the DS and 4.52 t ha^{-1} in the WS (5.68 t ha^{-1} in DS and 3.84 t ha^{-1} in WS at 14% moisture content). The DS yield was much higher than the national average of 4.30 t ha^{-1} for the irrigated ecosystem during the January to June period. The WS yield was relatively

Mechanized rice threshing in Nueva Ecija

lower than the 4.24 t ha^{-1} average from July to December (BAS, 2014). A scatterplot of farmers' yields show that the spread in the DS was pretty wide with a standard deviation of more than 2.0. A significant number of respondents had yields more than 8 t ha^{-1} in the DS but 20% still attained yields less than 4 t ha^{-1}. During WS, around 70% of the respondents got yields between 3 and 5 t ha^{-1} (Fig. 4). If all farmers in the bottom 70% were to have yields equal to the average of the top 30% and if this yield gap were similar throughout the country, then the country's production would increase by more than 50%.

Compared with yields in the 1999 IRRI survey, which covered almost the same villages, the increase in yield appeared to be not significant. The yield then averaged 3.6 t ha^{-1} during WS and 5.6 t ha^{-1} during DS (Moya et al., 2004). These results confirm the findings of a study done based on longterm data in two intensive rice bowls in the Philippines (Nueva Ecija and Laguna) that pointed to a stagnation of productivity in these intensively irrigated rice areas (Tiongco and Dawe, 2002).

Partial factor productivity (PFP) of labor (measured in terms of kg grain md^{-1}) averaged 113 in the DS and 75 in the WS. Compared with data from IRRI's 1994-96 survey, PFP of labor in the DS was, on average,

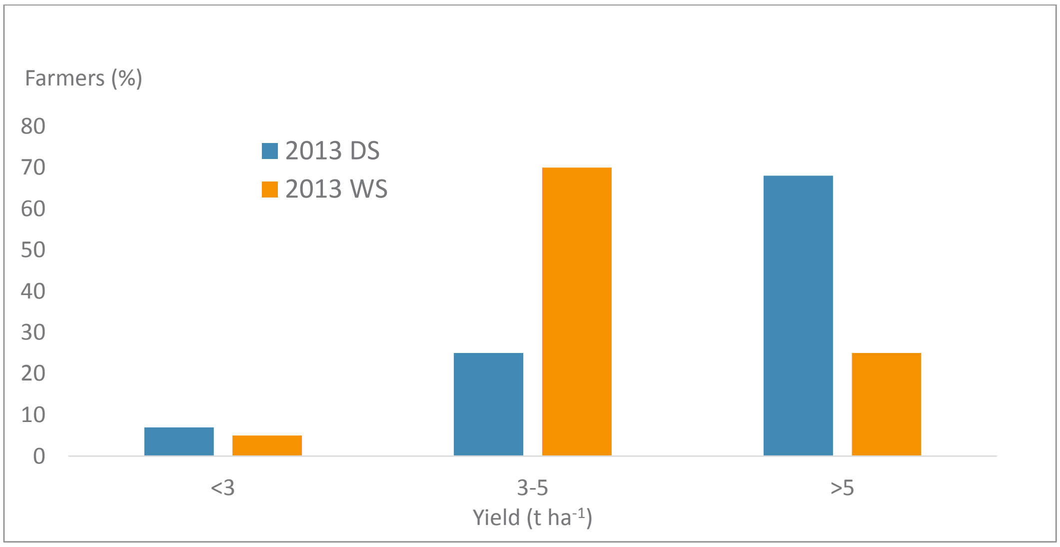

Fig. 4. Distribution of farmers' yields, Nueva Ecija, Philippines, 2013.

slightly lower in the 2013 DS while that in the WS increased by 20%. The increase in PFP of labor in the WS was attributed to the decrease in total person-days and increase in average yield.

On the PFP of applied N, average value was 49 kg paddy kg^{-1} N during WS and 62 during DS. This whole farm PFP of applied N did not differ so much from the estimated 50 kg paddy kg^{-1} N for DS and 55 kg paddy kg^{-1} N for WS reported in the previous IRRI study, except for a slight decrease in the WS and a slight increase in the DS. This suggests that the varieties used in the farms more than a decade ago and the farmers' nutrient management practices may not have changed significantly between the two periods.

Production cost and input cost share

Table 6 (a,b) presents the average costs and returns of rice production in Nueva Ecija and Figures 5a and 5b show the cost share of major cost items, by season. The major costs incurred were for hired labor, fertilizer, power rental and fuel, and estimated land rent. Hired labor cost comprised 84–86% of total labor cost. It included paid daily wages, contract cost paid in cash and in kind, and the cash equivalent of the permanent hired laborer's share. Land rent, comprising around 16–18%, is considered a cost of rice production because it is the estimated forgone income had the farmer decided to rent out the land instead of to plant rice. In Nueva Ecija, land rent is usually a fixed share paid in kind to the owner.

Harvesting and threshing in Nueva Ecija were still paid in kind as a share of the harvest, similar to what was followed almost more than a decade ago. In the same way, permanently hired laborers were given the usual 10% of the gross harvest and paid in kind. The practice of paying harvesting and threshing activities in kind results in higher per unit cost. Hence, increased yield also increases total hired labor, power, and production cost in general. A possible upside to this payment system is lower supervision cost because harvesters and threshers will care enough to harvest and thresh properly to increase gross harvest, which is the basis of their payment.

Table 6a. Average costs and returns of paddy production in peso terms, Nueva Ecija, Philippines, 2013.[a]

Item	Jan-Jun	Jul-Dec	Difference	
Returns				
Yield (kg ha^{-1})	6,344	4,524	1,820	***
Paddy price (PhP kg^{-1})	14.80	15.46	-1	***
Gross revenue (PhP ha^{-1})	93,892	69,956	23,946	***
Costs (PhP ha^{-1})				
Seed	3,057	2,430	626	***
Fertilizer	9,848	8,613	1,235	***
Chemicals	1,805	1,621	206	ns
Hired labor	19,269	16,537	2,732	***
Operator, family, and exchange labor	3,209	3,039	170	***
Animal, machine, fuel and oil	8,759	7,671	1,089	***
Irrigation	2,536	1,712	824	***
Food	1,088	708	380	***
Transportation	308	250	58	ns
Tax	190	210	-20	ns
Land rent	10,245	9,242	1,004	***
Interest on capital	2,289	1,844	445	*
Other inputs	590	424	165	***
Total cost (PhP ha^{-1})	63,194	54,301	8,914	***
Cost per unit (PhP kg^{-1})	9.96	12.00	-2.04	***
Net income from rice farming (PhP ha^{-1})	30,699	15,654	15,044	***

a *, **, *** indicate significance at 90%, 95%, and 99% confidence level, respectively.
ns = not sigificant

Table 6b. Average costs and returns of paddy production in dollar terms, Nueva Ecija, Philippines, 2013.[a]

Item	Jan-Jun	Jul-Dec	Difference	
Returns				
Yield (kg ha^{-1})	6,344	4,524	1,820	***
Paddy price (US$ kg^{-1})	0.35	0.36	0	***
Gross revenue (US$ ha^{-1})	2,212.05	1,647.95	564	***
Costs (US$ ha^{-1})				
Seed	72.01	57.26	15	***
Fertilizer	231.99	202.89	29	***
Chemicals	42.53	38.19	5	ns
Hired labor	453.92	389.55	64	***
Operator, family, and exchange labor	75.60	71.59	4	***
Animal, machine, fuel and oil	206.35	180.70	26	***
Irrigation	59.73	40.32	19	***
Food	25.63	16.67	9	***
Transportation	7.26	5.90	1	ns
Tax	4.48	4.96	0	ns
Land rent	241.35	217.70	24	***
Interest on capital	53.92	43.44	10	*
Other inputs	13.90	10.00	4	***
Total cost (US$ ha^{-1})	1,488.66	1,279.18	210	***
Cost per unit (US$ kg^{-1})	0.23	0.28	0.05	***
Net income from rice farming (US$ ha^{-1})	723.17	368.77	354	***

a *, **, *** indicate significance at 90%, 95%, and 99% confidence level, respectively.
ns = not sigificant
Exchange rate used: US$1 = PhP 42.45.

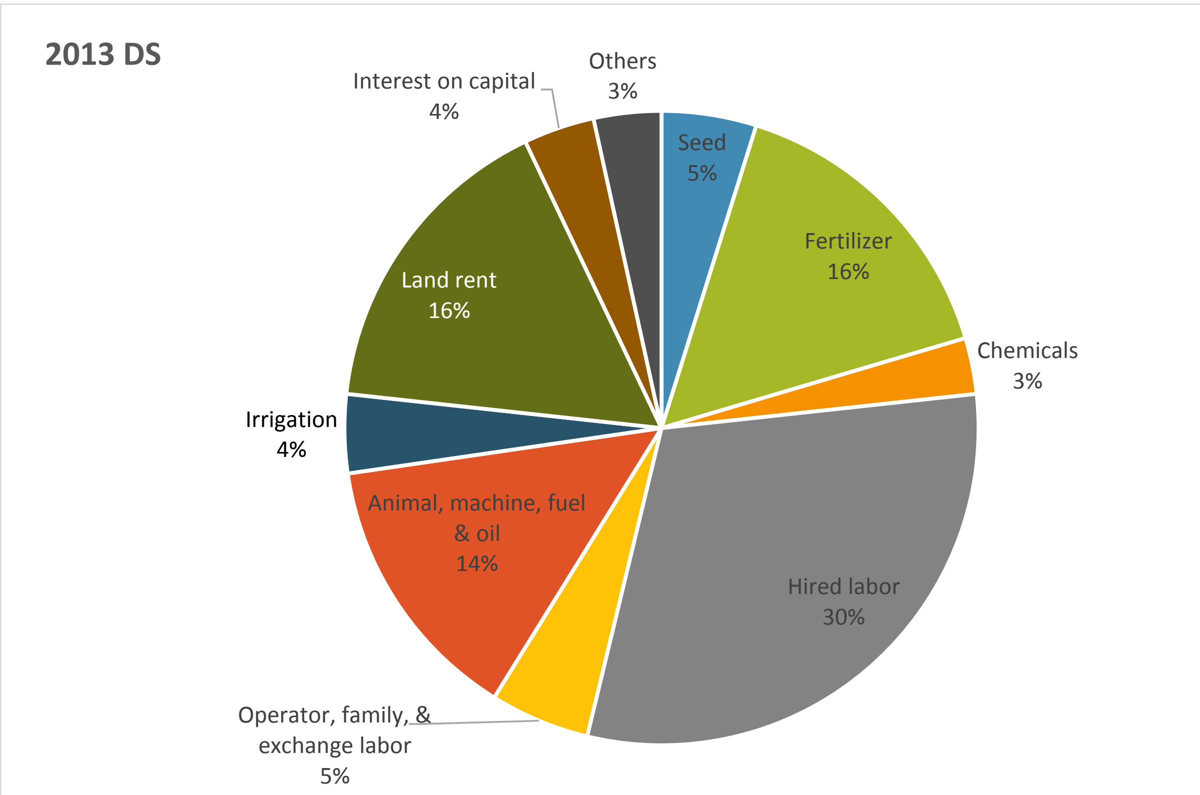

Fig. 5a. Cost-share distribution of rice production, Nueva Ecija, Philippines, 2013 DS.

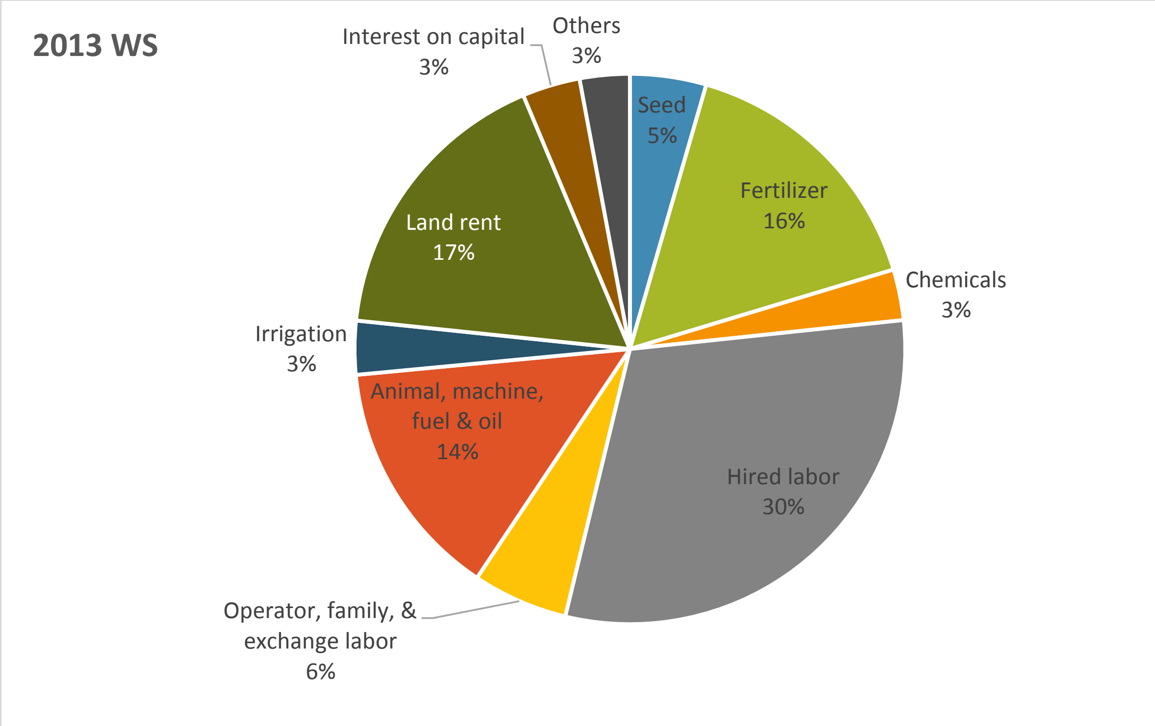

Fig. 5b. Cost-share distribution of rice production, Nueva Ecija, Philippines, 2013 WS.

Other major costs covered seed, irrigation, estimated interest on capital, and chemicals. The National Irrigation Administration (NIA) has regular rates of irrigation fees that differ between seasons—around US\$36 ha^{-1} during WS and US\$58 ha^{-1} during DS. This fee is waived if the farmers' crop is damaged in that season—i.e., yield is less than 2 t ha^{-1}.

On a per unit basis, the cost of producing 1 kg of paddy in Nueva Ecija was US\$ 0.23 kg^{-1} in DS and US\$0.28 kg^{-1} in WS. Not including land rent, the average cost per kg paddy was US\$0.20 kg^{-1} (PhP 8.35 kg^{-1}) in DS and US\$0.23 kg^{-1} (PhP 9.96 kg^{-1}) in WS. These figures in 2013 were roughly 30% higher compared with the 1999 IRRI survey per unit peso production cost adjusted for inflation, suggesting a real increase in production expenses between the periods.

Profitability and competitiveness

The average paddy price during the survey period was US\$0.34 kg^{-1} and US\$0.36 kg^{-1}, during the DS and WS, respectively. Average net profit to rice farming was thus US\$714 ha^{-1} during DS and US\$364 ha^{-1} during WS. In ratio terms, a US\$1 invested in rice production returned a profit of US\$0.49 during DS and US\$0.29 during WS. Although profitability is better analyzed considering average profitability over a greater number of periods (Porter, 2008), the survey results based on the two seasons suggest that rice farmers in Nueva Ecija have private incentives to keep on producing, even in the WS. Rice farming at existing prices is still profitable relative to current savings or time deposit interest rates.

If land rent, cost of capital, and cost of own labor were added to rice farming profit in order to estimate the income of the farm owner-operator, the value would amount to US\$1080 ha^{-1} and US\$693 ha^{-1} during DS and WS, respectively.

Considering, however, that rice is a traded commodity so that it is possible to source out rice from the world market, it is also important to compare import parity price (IPP) with the price in the source of origin. Table 7 presents an estimation with respect to 25% broken imported rice from Vietnam, which is comparable with the regular milled rice in the Philippines. At the average import price of US\$366 t^{-1} between January and June 2013 and US\$361 t^{-1} between July and December 2013, the estimated

IPP (or price of imported rice considering existing tariff rates equivalent to quantitative restriction and transportation costs to Nueva Ecija) was US$0.76 kg^{-1} (PhP 32.70 kg^{-1}) and US$0.75 kg^{-1} (PhP 32.30 kg^{-1}), in the first and second half of the year, respectively. The average wholesale price in Nueva Ecija during the January to June period was US$0.68 kg^{-1} (PhP 29.03 kg^{-1}) and US$0.73 kg^{-1} (PhP 31.24 kg^{-1}) during the July to December period. Since the IPP is higher than these domestic wholesale prices, it is not profitable to import under existing policies. Using a price forecasting model developed by Beltran et al. (2013), the corresponding estimated farmgate price at this milled rice price was approximately US$0.37 kg^{-1} (PhP 16 kg^{-1}), which is comparable with the Nueva Ecija WS scenario. This assumes a tariff equivalent of 63%.

Assuming, however, that farmers are not protected with tariff quotas and rice is allowed to be imported at zero tariff rates, then the estimated IPP would be around US0.47kg^{-1}$ (PhP 20 kg^{-1}) at 2013 import prices. At this price, Nueva Ecija farmers cannot compete with imported rice, and traders (when supply allows it) are better off importing rice rather than buying from local producers.

Table 7. Estimated import parity price of rice.

Item	Jan to Jun	Jul to Dec
FOB price of 25% broken ($ t^{-1})[a]	366	361
+ Freight and insurance cost ($ t^{-1})[b]	61	61
+ Other charges and costs (PhP t^{-1})[c]	28	28
Cost of commodity, freight, and insurance (CIF) ($ t^{-1})	454	449
Peso-dollar official exchange rate (PhP $\$^{-1}$)	42.45	42.45
Cost of commodity, freight, and insurance (PhP t^{-1})	19,279	19,053
+tariff payment (PhP t^{-1})[d]	12,146	12,003
CIF+tariff payment (PhP t^{-1})	31,425	31,056
+ transportation cost to Nueva Ecija	1,232	1,232
Wholesale import parity price (PhP t^{-1})	32,657	32,288
Estimated farmgate price of wet paddy equivalent (PhP kg^{-1})[e]	16,009	15,801

[a] Average price of 25% broken rice from Vietnam from January to June 2013. Source: http://ricestat.irri.org:8080/wrs2/entrypoint.htm

[b] Vinafoods II contract with vessel is $25/$t^{-1}$; insurance is 5t^{-1}$; Vinafoods II contract with DYA SeaAir International Corp is 30.70t^{-1}$ for inclusive handling, delivery, and forwarding costs between Philippine ports of arrival and NFA-designated warehouses. Source: http://manilastandardtoday.com/mobile/2014/02/25/-nfa-execs-wined-dined-in-vietnam-/

[c] The Philippines levied a fee of US$660 on a 20-foot container in 2013. It was assumed that this container can contain 24 t. These include costs for documentation, administrative fees for custom clearance and technical control, customs broker fees, terminal handling, and inland transport. Source: http://www.doingbusiness.org/

[d] Tariff rate equivalent of quantitative restriction, assumed at 63%.
[e] Farmgate price of wet paddy equivalent was estimated using the price forecasting model developed by Beltran et al. (2013) based on marketing margin and cost estimation method from Dawe et al. (2006).

SUMMARY & IMPLICATIONS

Nueva Ecija rice farmers produced an average yield of 6.34 t ha^{-1} in the DS and 4.52 t ha^{-1} in the WS at US$0.23 and US$0.28 kg^{-1} production cost, respectively. At these levels and with paddy prices at US$0.34 and US$0.36 during DS and WS, respectively, they got positive net private profits, indicating that, for both seasons, rice farming is profitable. The yield results did not differ much from the survey results in the 1999 crop year, although costs and paddy prices were much higher. Most of the input use, management practices, and level of mechanization also did not differ much from the previous period. At 2013 prices and considering the existing trade protection, the IPP of rice coming from Vietnam was higher than the Nueva Ecija average wholesale price. However, when tariff rate is reduced or becomes zero, the domestic price in Nueva Ecija is much higher than the wholesale IPP, suggesting that traders (if government policy were to allow it) would be better off importing rice than buying from Nueva Ecija producers.

Considering the technological profile and the current production support being given to rice farmers, some implications may be drawn. These are expected to increase competitiveness in rice production:

1. Yields in Nueva Ecija's intensively cropped areas appear to have stagnated as shown by the yields found in this study being similar to levels reported more than a decade ago. One particular area for intervention is the DS application rates for nitrogen and potassium, which did not vary across seasons. In addition, it may help if farmers are encouraged to practice straight-row planting by using markers or drum seeders. Finally, the top most planted varieties are those with potential yields of more than 10 t ha^{-1} at release time, suggesting that potential yield is a major variety characteristic that affects adoption. Continuous promotion of hybrid rice in the province during DS can also increase overall yield.

2. Hired labor, particularly for crop establishment and harvesting and threshing, remains the largest in terms of cost share. Encouraging farmers to shift to direct seeding is one intervention that can be explored. R&D support toward this direction is in order because some apprehension about direct seeding involves the perceived yield penalty. On the other hand, the use of combine harvesters has started in Nueva Ecija. It is important to sustain the trend by increasing its use while creating opportunities for displaced laborers.

3. Another major cost item in rice production is fertilizer. Giving fertilizer subsidy at the industry level may be considered. However, a large fertilizer subsidy would consume large amounts of

government resources that could be used more effectively for agricultural research, extension, or irrigation. A small fertilizer subsidy, on the other hand, would provide little benefit while incurring large administrative costs. Hence, when government decides to give fertilizer subsidy, it should plan and firmly implement a subsidy phase-out schedule.

4. Rental rates for the use of machinery also contribute much to increased production cost. The national program for farm mechanization, which offers government subsidy for farm machinery procurement, should therefore be continued. The subsidy can then be gradually reduced with the schedule announced in advance so that purchase of machinery increases in the short run before the subsidy is reduced. Fuel subsidy may also be considered, although the above considerations with respect to fertilizer subsidy apply.

5. Interventions to reduce cost of capital are also important. It was shown that only a quarter of the respondents did not borrow. Promotion of income diversification activities and crop diversification schemes to include cash crops may reduce the need to borrow.

On the matter of policy, this study shows that with the trade protection and existing prices, Nueva Ecija farmers get positive profits from planting rice higher than current savings or time deposit interest rates. Farmers, even in this largest rice-producing province of the Philippines, however, may have difficulty producing rice at a price competitive in that with the world market if or when tariffs are removed. This does not mean, however, that local rice production will completely stop because even the high-cost owner-operators still get income from their rice farms and will unlikely abandon rice farming. There are also low-cost domestic rice farmers in the spectrum who will likely continue intensifying their production. It does mean that, when tariffs are reduced or removed, import dependence may likely increase. Hence, while the country continues to work on reducing production cost and increasing yield, it is important for the government to take advantage of the implementation of the trade agreement among ASEAN and improve its ability to forecast domestic rice demand and global supply outlook. This may help ensure available supply when the country needs to import rice and it will come at the right time and at the right price.

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