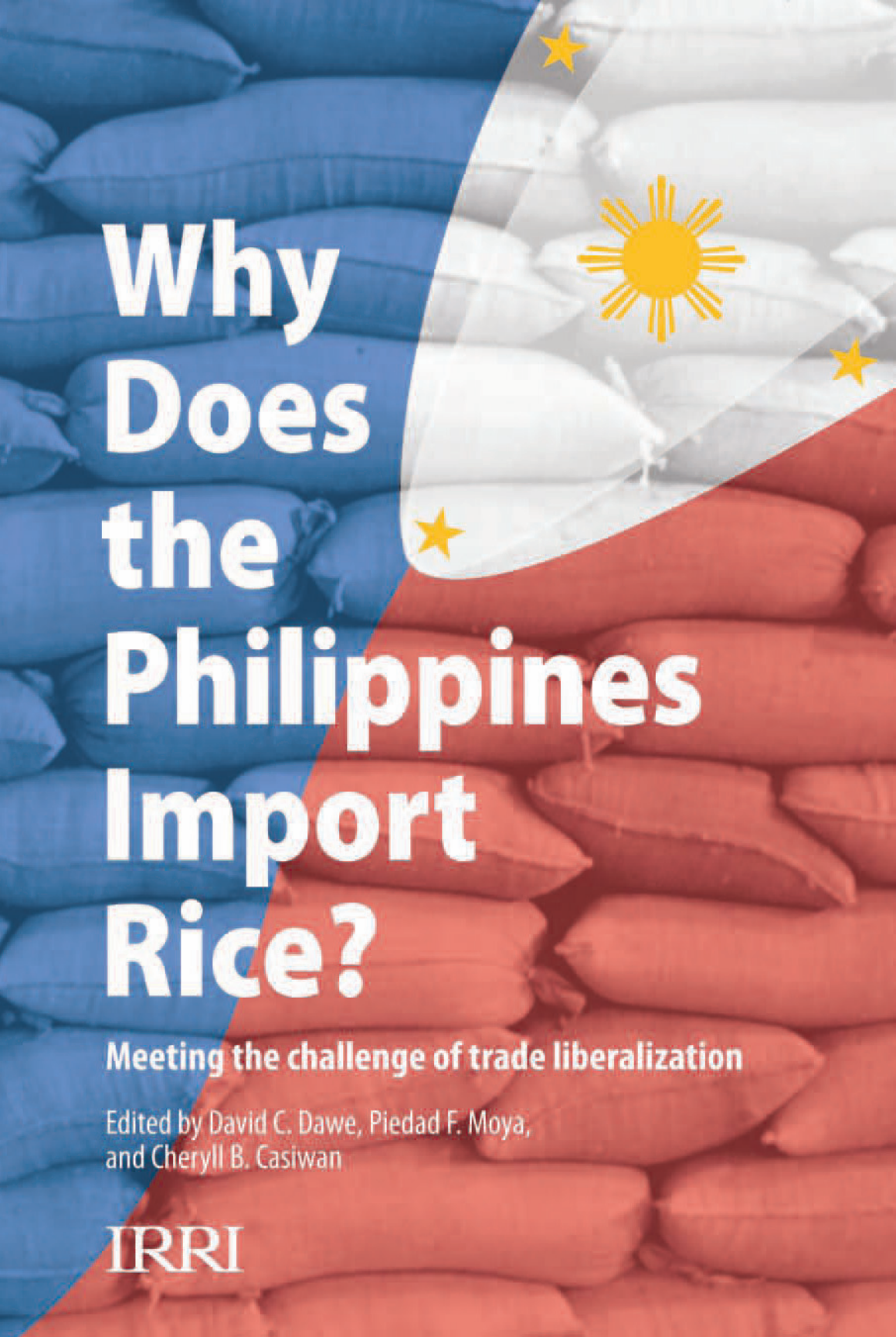

Why Does the Philippines Import Rice?

Meeting the challenge of trade liberalization

Edited by David C. Dawe, Piedad F. Moya, and Cheryll B. Casiwan

IRRI

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Contents

Foreword

In a country where half-full rice bins are a cause for great concern in any given household, having sufficient rice for all Filipinos' consumption is a necessary target. This is a moving target, but it is often not met; thus, the need to buy rice from other countries such as Thailand and Vietnam. Why can't we produce enough so that we no longer need to import? The first chapter in this book attempts to answer that question, and then proceeds to the even more difficult question of what would happen if rice trade were liberalized and the Philippines began to import more rice.

Although written by experts on the rice economy, and some of the country's young economists, this book is intended for a general audience. Readers need not be familiar with complex concepts and jargon in economics or mathematics in order to understand the arguments presented. All that is necessary is an open mind and a willingness to think carefully.

In line with scientific tradition, the analysis is informed by quantitative data as much as possible. Not everything can be reduced to numbers, but numbers can often shed light on key issues and dispel many myths and misunderstandings. Everyone is aware that rice is a politically sensitive commodity in the Philippines, and indeed throughout Asia. This makes it all the more important for debates about its future to be informed by facts, facts that often don't find their way into public discussion.

In contrast with much writing by economists, this publication places a great deal of emphasis on both efficiency and equity. Rice is eaten by millions of poor consumers and grown by millions of poor farmers in the Philippines, and to ignore fairness and equity would strip the analysis of much of its value. In that regard, we hope that this publication will also be read outside of the Philippines, by anyone who is interested in the effects of trade liberalization on the poor.

This book does not set out to make recommendations about trade liberalization, which needs to be debated by citizens and politicians. Rather, it attempts to analyze the likely effects of certain policies that are being widely discussed among Filipinos. Based on the analysis contained here, readers can

then come to their own conclusions. In fact, the only policy recommendation made regarding trade liberalization in the entire publication is that, if change is undertaken, it be done gradually. This is suggested for two reasons. First, gradual changes make it easier for all members of society to adjust their lives to changed circumstances. Second, any analyst with a dose of humility must admit to being less than perfect, and a gradual approach to reform would allow an assessment of changes before full reform is implemented. While the authors have put in much effort over many years to understand these issues, and they believe strongly in their conclusions, it must be admitted that some of the conclusions may be wrong.

The primary goal of this publication is educational. If readers have learned something new about the rice sector in the Philippines, and discussed this with friends and colleagues, the publication will have been successful.

Robert S. Zeigler
DIRECTOR GENERAL, IRRI

Leocadio S. Sebastian
EXECUTIVE DIRECTOR, PhilRice

Acknowledgments

This book has its origins in a research project supported by the Bureau of Agricultural Research (BAR) of the Department of Agriculture of the Philippines. Although much of the research for the book was carried out with other funds from the International Rice Research Institute (IRRI) and the Philippine Rice Research Institute (PhilRice), BAR's support allowed us to bring together agricultural experts from many other organizations, such as the Bureau of Agricultural Statistics (BAS), the National Food Authority (NFA), and state colleges and universities. BAR's financial support was very important, and we are grateful for it.

Many individuals not listed as authors of sections in this book have made contributions that have helped to improve the quality of the publication, although they should not be held responsible for any of its shortcomings. The director general of PhilRice, Leocadio S. Sebastian, always asked good questions designed to make sure that the analysis was as solid as possible. He does not agree with all (or maybe any) of the conclusions in the analysis, but he has made the analysis much better than it would have been otherwise. In the spirit of a good scientist, he has also consistently encouraged us to present our findings and subject them to criticism. We are very grateful for his encouragement and healthy scientific skepticism.

Professor Gelia Castillo gave the draft manuscript a comprehensive review and peppered us with dozens of comments, critical questions, and different perspectives throughout the period that this research took place, for which we are indebted. We have also benefited from comments on the book by Liborio Cabanilla, University of the Philippines at Los Baños, and George Norton, Virginia Tech University. Various parts of the manuscript and analysis have also benefited from the insights of Scott Pearson and C. Peter Timmer, for which we are very grateful.

Ronald Cantrell, the director general of IRRI while most of this work was done, managed and maintained a research environment where scientists were allowed to pursue research regardless of its outcome, provided that it was rigorous and well documented. It would have been difficult to write this

book in another environment. The supportive research environments at IRRI and PhilRice are also due to the staff in the Social Sciences Division (SSD) of IRRI and the Socio-Economics Division (SED) of PhilRice. Mahabub Hossain, head of IRRI's SSD, and others have always encouraged us to push forward with our analysis. SED graciously supplied its survey data on rice-based farm households, without which much of the analysis in this book would not have been possible. Lydia Damian has provided exceptional secretarial assistance throughout the process of bringing this book to fruition.

We are also very grateful to the staff of IRRI's Communication and Publications Services (CPS) for editing of the book to improve its clarity, style, and grammar, in particular Bill Hardy. The rest of the CPS production team—Gene Hettel, Anna Arsenal, Kathy Lopez, among others—has made key contributions to bringing this book to its final form so that it can be shared with the rest of the world.

We received tremendous cooperation from BAS and its director, Romeo Recide, in freely supplying the high-quality data that they collect. Analysis is not possible without good underlying data, and we are very grateful for all the functions performed by BAS. Myrna Reburiano of the National Food Authority participated in several of our workshops and, despite her busy schedule, provided her valuable insights and knowledge of the rice industry of the Philippines.

We would also like to thank our families and spouses for all the support and encouragement they have provided to us during the past two years and before—without them, this book would clearly not be possible. Last, but not least, we would like to thank Almighty God for the life and strength He continues to give us.

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Executive summary

A perpetual question on the minds of many Filipinos is "Why do we import rice, and why can't we produce enough of our staple food to feed ourselves?" Many answers have been given to this question, many of which injure national pride by alluding to bad politicians, corruption, incompetence, or laziness. But the real answer is not so bad: in a word, it is geography. The Philippines imports rice because it is a nation of islands without any major river deltas like those in Thailand and Vietnam. The major traditional exporters are all on the Southeast Asian mainland (Thailand, Vietnam, Cambodia, and Myanmar), while the countries that have been consistently importing rice for more than a hundred years (Indonesia, the Philippines, Sri Lanka, Japan, Korea, and Malaysia) are all islands or narrow peninsulas. Section 1 provides a more detailed explanation.

Trade liberalization is a term that is used widely today, although it is often not properly understood. Trade liberalization does not necessarily mean more imports for all commodities in all situations. What it does mean is that the price for a specific commodity inside the country (the domestic price) becomes the same as the price for that same commodity outside the country (the world price), after taking account of the exchange rate and any necessary transportation costs.

Generally speaking, for any commodity that is tradable across international borders, the domestic price will naturally tend to equal the world price unless the government intervenes with trade restrictions. If domestic prices are higher than world prices, private traders will try to profit by importing from abroad, buying low, and selling high. This process will continue until the additional supply of imports lowers domestic prices and erases those profits. The reverse will happen if world prices are higher than domestic prices: private traders will profit by exporting.

For rice in the Philippines, the government is the only entity that has the legal authority to arrange imports. Vested with this authority, the government limits the quantity of rice imports each year. Because imports are limited, the law of supply and demand suggests that domestic prices will rise, and, in fact,

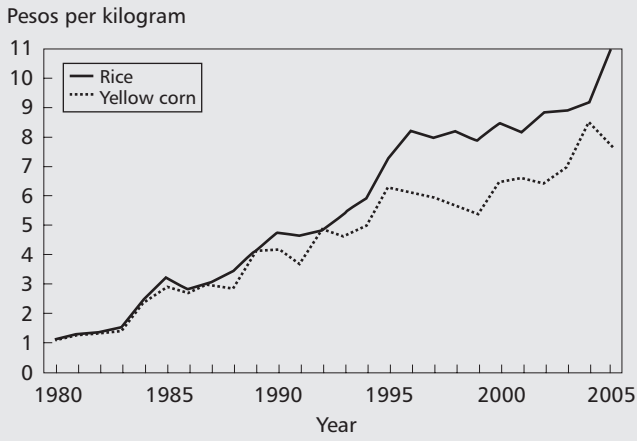

Fig. 1. Farm prices for palay and corn, Philippines, 1980 to 2005. Estimates of prices for 2005 are based on data through July. Sources of raw data: BAS (2005), PhilRice-BAS (1994, 2004).

they have. Although it is not widely known, Filipino farmers receive much higher prices for their *palay* (the Filipino word for rice at harvest, before the husk is removed) than do farmers in neighboring developing countries (see section 2). Further, farm prices for rice have increased during the past 10 years much faster than for other key agricultural commodities such as corn (Fig. 1).

Not surprisingly, the very high palay prices received by Filipino farmers translate into very high rice prices paid by consumers. These high domestic prices have nothing to do with the operational capabilities of the National Food Authority (NFA)—they arise naturally because the government has decided to limit the quantity of imports each and every year. Some smuggling does occur, but it is not enough to lower domestic prices to the same level as world prices. A comparison of wholesale market prices for rice between the Philippines and Thailand shows that while prices were similar in the two countries in the early 1980s, rice prices have increased much more rapidly since then in the Philippines (Fig. 2). The large gap between world prices and domestic rice prices not only harms consumers, it also creates opportunities for corruption that would disappear if the price differential were much smaller. Because palay and rice prices are higher in the Philippines than on world markets (in fact, sometimes they have been nearly double world prices), rice trade liberalization would mean more rice imports.

In addition to the high palay prices received by farmers, inefficient rice marketing also contributes to higher rice prices paid by consumers (although high palay prices contribute more than inefficient marketing). A detailed comparison of rice marketing systems in Thailand and the Philippines found no evidence of collusion or cartels from the farm up to the wholesale market—the marketing system is very competitive. In fact, one of the main problems is

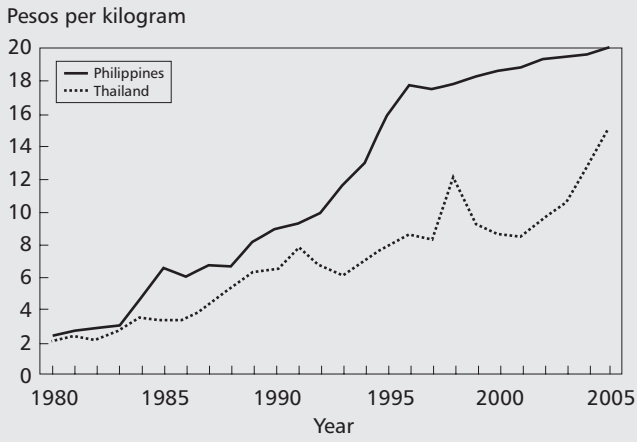

Fig. 2. Wholesale rice prices, Metro Manila and Bangkok, 1980 to 2005. Sources of raw data for the Philippines: BAS (2005), PhilRice-BAS (1994, 2004). Sources of raw data for Thailand: Rose (1985), IRRI (2005), Bank of Thailand (1995, 2005). Source of data for exchange rates: IMF (2005).

not too few traders controlling prices, but rather too many traders participating in the system: one typical Thai miller handles as much rice as 18 typical marketing agents in the Philippines. Other key reasons for high marketing margins in the Philippines are (1) an inefficient financial system that charges high interest rates and provides inadequate services; (2) rice import restrictions that increase working capital requirements, storage time, and land values, all of which increase marketing costs; and (3) poor road infrastructure, although this is less important than the other reasons. It is possible that some collusion is due to a cartel at the wholesale level itself, but the data show that the size of this effect is quite small (see section 3).

Greater rice imports would lower domestic palay and rice prices, but, to date, the Philippine government has not made any substantial international legal commitments to import large quantities of rice. Only a fraction of the imports that occur today is required by international treaty—the majority are at the discretion of the government. Thus, agreements made under the auspices of the World Trade Organization commit the Philippines to imports of only about 240,000 tons per year, less than 3% of current domestic consumption. Ongoing negotiations may raise this commitment slightly to 350,000 tons, which would still be less than 5% of domestic consumption.

Like all changes, rice trade liberalization would have both positive and negative effects. Lower palay and rice prices would of course hurt palay farmers, especially those with large surpluses to sell. Many palay farmers are poor, but many are not, and most of the benefits of high prices accrue to the larger, better-off farmers because they have the most surplus to sell (section 6). As a group, palay farmers are better off than other types of farmers in the Philippines, with the exception of some small groups of livestock, vegetable, and fruit producers. Palay farmers have higher levels of income, spend more money

on expensive foods rich in protein, live in better houses that are more likely to have electricity, running water, and hygienic toilets, are more likely to own televisions and refrigerators, and have lower levels of poverty (section 5). Furthermore, they hire the majority of labor that works on their farms: the average rice farming family (husband and wife) in the Philippines works about 18 days per person per year at the fundamental tasks of growing rice. That is less than one and a half days each per month. Most of the actual work done on rice farms is done by landless laborers, not the farmers themselves (section 4). Because rice farmers spend so little time in actual farming, they earn substantial amounts of money from other jobs. These other jobs typically account for about half of total family income.

On the other hand, lower prices would benefit the many poor consumers who spend more than 20% of their income on rice alone. These consumers consist of fishers, landless laborers, corn farmers, and the urban poor—in fact, most poor people in the Philippines are not rice farmers. High rice prices reduce the ability of these families to use their budgets to buy meats that are rich in micronutrients, pay for school supplies, or pay for medical services. For example, high rice prices have been shown to lead to increased levels of anemia among young children in Indonesia by reducing the amount of nutritious food their families are able to afford—thus, lower rice prices would increase opportunities for improved nutrition for the poor (section 6).

Lower rice prices could also make an important contribution to increasing employment in the industrial and service sectors of the economy. High rice prices raise the cost of living, and thus put upward pressure on wages. These artificially high wages provide no real benefit to workers because they serve only to compensate for high rice prices. However, the high wages do discourage entrepreneurs, both domestic and foreign, from hiring labor. The Philippines has one of the highest unemployment rates in the region, and lower rice prices could help alleviate this problem. In a world where growth in the nonagricultural sectors of the economy holds the key to poverty alleviation, it is likely to be counterproductive to set policies that create high prices for the main commodity consumed by laborers.

With trade liberalization and more rice imports, Filipino farmers would need to either become more competitive in rice production or explore alternative crops. One promising way to improve competitiveness is through the use of hybrid rice, a new technology that promises higher yields and profits in areas and seasons that are suitable for its cultivation (section 8). Another important way to become more competitive is to mechanize harvesting operations and establish the crop by direct seeding instead of transplanting because labor is the most important production cost (section 9). Yet another possibility is improved applications of nitrogen fertilizer, as it seems that farmers in some provinces do not apply enough nitrogen during the dry-season crop (section 10). A redirected seed subsidy that focuses on poorer, more marginal areas (instead of irrigated areas) might help to increase yields and production

efficiency by encouraging adoption of certified seeds where adoption rates are currently low, although it would be best to phase out seed subsidies entirely in the near term (section 11).

Other approaches to improving productivity are less likely to make a substantial impact. For example, many people think that credit is an important input, but simple analysis of costs and returns in rice farming (not necessarily in other types of farming) shows that borrowing costs are only a very small percentage of production costs. Because they are such a small percentage of costs for rice farmers, it is not possible to improve efficiency substantially with the use of credit subsidies (section 12). Improved use of pesticides also has little to contribute to making Filipino farmers more competitive, again because such costs are very small compared with other production costs. Furthermore, Filipino rice farmers are already among the lowest users of insecticides in Asia, so the adverse environmental effects of insecticides are less worrisome than in other countries (section 13). Fertilizer prices have increased substantially in recent years, but the problem is largely due to world oil prices and is thus beyond the control of the Philippines. In any event, fertilizer prices have also increased sharply in other countries in the region.

Other than lowering the production costs of rice farming, rice farmers can explore crops alternative to rice. The choice of alternative crops will vary from province to province, so section 15 explores these alternatives for eleven key rice-producing provinces in the Philippines from Luzon, Visayas, and Mindanao. Some of these alternative crops are even more profitable than rice and would make farmers wealthier. But these crops are often riskier to plant than rice, and the government and private sector will need to work together to reduce the effects of this risk on farmers. Some perspectives from progressive farmers on the role of crop diversification in improving farmer income are contained in section 16.

Even if they do switch crops, rice farmers will not lose their "household rice security." They can still choose to plant some rice after liberalization—only a small portion of their land (about 0.15 hectare of double-cropped land for a family of five) is necessary to feed their own family. Even with trade liberalization, it is unlikely that a very large percentage of rice farmers will need to switch crops. Most rice farmers will continue to plant rice, and most of the rice consumed in the Philippines will still come from domestic production (section 14).

If the Philippines decided to import more rice in order to benefit poor consumers, could the world market be trusted to provide those supplies? In the mid-1970s, the answer was uncertain. Today, however, the world rice market has fundamentally changed. World rice production is more stable because of more irrigation and high-yielding varieties with pest and disease resistance. In addition, more exporting countries are commercially oriented—the health of their own domestic rice economies depends on being reliable suppliers to the world market. As proof, the world market has successfully

weathered two recent events that did not turn into crises—the massive El Niño of 1998 and China's emergence as a rice importer in 2004. Today, although price fluctuations still occur on the world market, rice prices are more stable than ever before, and they are more stable than world prices for other cereal grains. In sum, the world rice market can be trusted once again (section 7).

At present, the Philippines imports about 10% of its consumption requirements on average (average from 1999 to 2003), equivalent to 860,000 tons per year. On the other hand, Malaysia regularly imports 30% of its consumption requirements and Indonesia imports much larger quantities (2 million tons per year on average from 1999 to 2003) than the Philippines without disrupting the market. Any increase in rice imports due to trade liberalization would be a small fraction of total imports of all goods and services, so there would be no disruption of the foreign exchange market (rice imports are usually about one half of one percent of total imports). Furthermore, more rice imports would lead to less dependence on wheat imports. The Philippines consumes higher quantities of wheat than its Southeast Asian neighbors, and to some extent this is because rice is relatively expensive. Cheaper rice will lead consumers to choose rice instead of wheat on some occasions, and the increased foreign exchange spent on rice will be offset by less foreign exchange spent on wheat.

Because trade liberalization will have both positive and negative effects, any relaxation of government import restrictions that does occur should be done gradually, not all at once. A sudden large fall in palay prices would not give palay farmers adequate time to adjust by increasing productivity or switching crops. A more gradual approach would allow palay and rice prices to avoid falling in absolute terms. Instead, domestic prices could remain approximately constant for some time while world prices (in peso terms) increase and catch up. Under such a scenario, domestic rice prices would decline only relative to world prices, not in absolute terms. This would allow more time for adjustment by farmers and give all stakeholders a chance to monitor the effects of trade liberalization, both positive and negative.

It is important to briefly mention recent developments on the world market. World market prices increased in 2004, and, if they continue to do so, it would not make sense for the Philippines to import rice because domestic and world prices would be at similar levels. However, as explained in section 1, history suggests that the Philippines does not have a comparative advantage in producing all of its rice. Thus, it seems likely that for the near future imported rice will be cheaper than some (but not most) domestically produced rice, as it has been for most of the past 130 years.

In thinking about the future of rice policy, it is important to keep a balanced perspective. Rice is what many farmers grow, but it is also what nearly all consumers eat. In many cases, farmers have more flexibility to switch crops than consumers (especially poor ones) do to switch their staple food. Although

self-sufficiency can be a laudable goal, it can cause great harm if it is pursued at all costs, without regard for the welfare of the poor. It is important that decisions be made with as much information as possible, and this book strives to provide that information so that decisions can be made to help the many Filipinos living in poverty.

Some little-known facts about rice in the Philippines

1 The Philippines imports rice because it is an island nation

David C. Dawe

Rice is such an integral part of history and culture in the Philippines that for many Filipinos rice imports are a source of national shame. Many reasons are typically advanced for the failure to achieve rice self-sufficiency—faulty government policy, corruption, conversion of rice land to other uses, backward rice farmers, deteriorating irrigation systems, and lack of farm credit, among others. But all countries, including several rice exporters, complain about these problems. Although some of these problems are important, they do not explain why the Philippines imports rice.

For example, losses of land to urbanization are easy to see because they occur in populated areas, but the effects are small and are more than offset by cropland expansion elsewhere. In fact, rice area harvested in the Philippines has been at record highs during the past five years, reaching 4 million hectares for the first time in history.

Some may think the Filipino farmer is simply backward and cannot produce rice efficiently. But a detailed survey of farmers in the various rice bowls of Asia found that Filipino farmers were among the leaders in reducing insecticide use, and have progressed farther in mechanizing land preparation and postharvest operations than their counterparts in any other developing Asian country except Thailand.

If these factors are not what causes the Philippines to import rice, then what is the reason? An examination of historical trading patterns among Asian countries where rice is the dominant staple food shows that countries are long-term members of one club for rice importers or, barring upheaval, another club for exporters. (India and China are excluded because wheat is the dominant staple food in large parts of these countries.) The fact that countries remain in one club or the other for long periods of time suggests that some deep force is at work. That deep force is endowments of land and water.

Exporters occupy river deltas with lots of land in general, and lots of land suitable for rice in particular. These countries are all located in mainland Southeast Asia: Thailand, Vietnam, Cambodia, and Myanmar. For example, Thailand has about four times the quantity of arable land per person as the

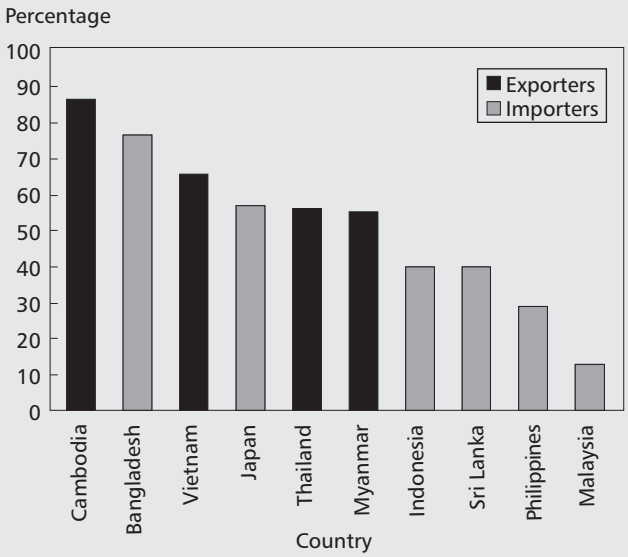

Fig. 1. Percentage of crop area planted to rice, selected Asian countries, 1990-2001.

Philippines. Consistent importers have less arable land per person and more varied landscapes favoring such alternatives as corn, oil palm, or coconut. These countries are all islands (Indonesia, the Philippines, Japan, Sri Lanka) or, in the case of Malaysia, part island and part narrow peninsula. The percentage of crop area devoted to rice tells the story. Figure 1 shows that all consistent rice importers plant less than half of their crop area to rice, whereas countries that plant more than half to rice are consistent exporters (Bangladesh and Japan, despite a relatively large percentage of area planted to rice, are net importers because of their tiny area of arable land per person).

Malaysia is the Asian country most reliant on rice imports, which account for 29% of its consumption. Other countries that import rice to meet a significant portion of demand, with percentages averaged for 1996-2003, are the Philippines (12%), Sri Lanka (8%), Japan (6%), and Indonesia (5%). Strikingly, all five have consistently imported rice for at least the past century (Fig. 2). The Philippines, for example, has imported rice almost every year since 1869. Java, the destination for most of Indonesia's rice imports today, has been a rice importer since the 16th century. Exports from these traditional importers have been sporadic and short-lived. The fact that all of these countries are islands and have imported rice so consistently for so long, despite some being rich and some being poor, strongly suggests that government policies are not the explanation.

The history of Asian rice exporters is similarly consistent, except when war and ideological zeal intervened to complicate matters in three of them.

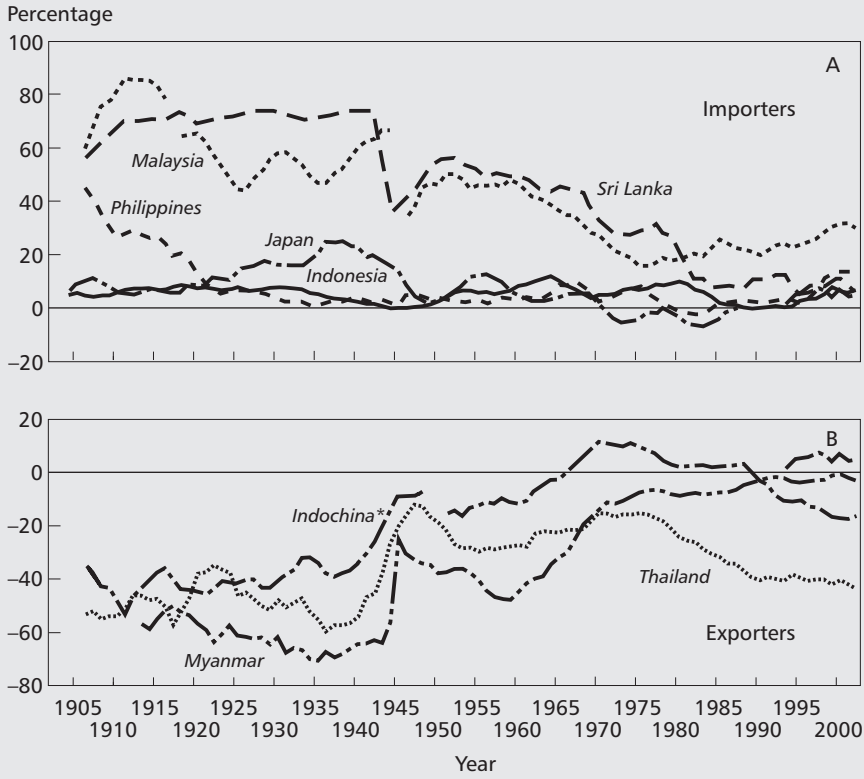

Fig. 2. Net rice trade status, selected Asian countries, 1905-2001. Note: The values shown are 5-year moving averages to smooth year-to-year fluctuations. When imports exceed exports (+), net trade status is expressed as a % of consumption. When exports exceed imports (–), net trade status is expressed as a % of production. This convention avoids reporting values exceeding 100%. Gaps reflect unavailable data.
***Indochina includes Vietnam, Cambodia, and Laos until 1949 and Vietnam and Cambodia from 1951, with trends in Vietnam dominating in both periods.**
Sources of raw data: Rose (1985) and FAO (2005).

Early in the 20th century, the countries that exported the largest percentage of their rice production were Myanmar, Cambodia, Thailand, and Vietnam—all mainland Southeast Asian countries with large river deltas. Today, Thailand dispatches 40% of its crop to world markets. Vietnam, having bounced back from more than a quarter century of upheavals, now exports a fifth of its rice production. Cambodia has struggled more than Vietnam, but now appears set to redeem its traditional role as a rice exporter. Political developments in Myanmar will clearly determine whether or not it can resume rice exports on a large scale.

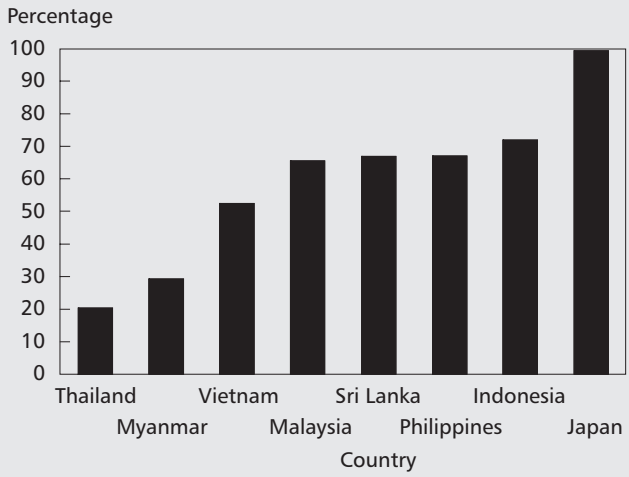

Fig. 3. Percentage of rice area that is irrigated, 1990s. Sources of raw data: data on irrigated rice area are from IRRI (2005) for the most recent year available. Data on total rice area are from FAO (2005) for the year corresponding to the data on irrigated rice area. Data for Malaysia come from Huke and Huke (1997).

All of the traditional importers have invested in irrigation systems to improve their land for rice. These countries now irrigate a much higher percentage of their rice land than do exporters (Fig. 3), but these increasingly costly efforts have failed to eliminate the need to import, underscoring how difficult it is for humans to overcome geography. Thus, lack of investment in irrigation is not the reason the Philippines imports rice.

Although the presence or absence of river deltas is the overriding factor in explaining why some Asian countries import rice and others export it, other reasons are at work as well in the case of the Philippines. Located off the eastern edge of the Asian continent, the Philippines bears the brunt of numerous typhoons, making rice production more difficult and risky. Thailand and the Mekong and Red River deltas are much less affected by such recurring disasters. Again, geography plays a key role. In addition, the Philippines' rice sector has high labor costs that must be reduced (without reducing wages) in order to increase productivity (see section 9).

Despite such constraints, the Philippines did achieve self-sufficiency in the 1970s and even exported small quantities of rice in the early 1980s. Why? Because the Green Revolution of irrigation, improved varieties, and fertilizers was able to overcome the natural disadvantages in land endowment. But nearly all Filipino farmers have already adopted this technology package; thus, it cannot contribute to further growth. Meanwhile, population growth is still above 2% per annum, much higher than in neighboring developing countries.

Is there any way to lessen dependence on imports without further raising prices and harming poor consumers? One possibility is reduced population growth, but this debate centers on issues larger than rice self-sufficiency. The best way to sustainably increase production is to invest in agricultural

research and transportation infrastructure, thereby providing farmers with more and better options in both production and marketing.

However, the fundamental factors behind Philippine rice imports—relatively small amounts of land and a lack of large river deltas—can't be changed. In trying to achieve self-sufficiency, the Philippines is fighting a battle against nature that its exporting neighbors are spared.

Notes

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Note: Much of this section is derived from Dawe (2004a). See page 162 for the complete reference.

2 Filipino farmers receive high palay prices

Jesusa M. Cabling and David C. Dawe

Filipino farmers often claim that farm-gate buying prices of *palay* (the Filipino word for rice at harvest, before the husk is removed) are low. But, from 1991 to 2002, the Philippines had the highest price among developing countries in Asia with an average of US$214 per ton of palay (Fig. 1). In 2002, the price of palay in the Philippines ($171 per ton) was about 66% higher than in Thailand ($103), 51% higher than in Vietnam ($113), 29% higher than in Indonesia ($132), 47% higher than in India ($116), and 21% higher than in China ($141). A joint IRRI-PhilRice study from 1994 to 1999 found that Filipino farmers were paid almost double what farmers in nearby countries received.

The Philippines' higher price is due to a lower supply of palay and higher production costs. In fact, production per capita (168 kg) is less than half that of Thailand (431 kg) and Vietnam (405 kg). One reason for the large palay supply in these other countries is a larger amount of land. In Thailand, the total agricultural land area is 19 million hectares, which is about 60% larger than the Philippines' 12 million hectares. This shows that Filipinos have lower

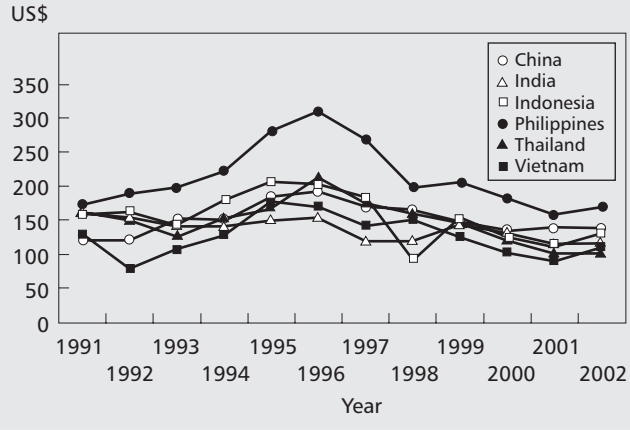

Fig. 1. Trends in farm-gate prices of palay, US$ per ton, 1991 to 2002. Source of raw data: FAO (2005).

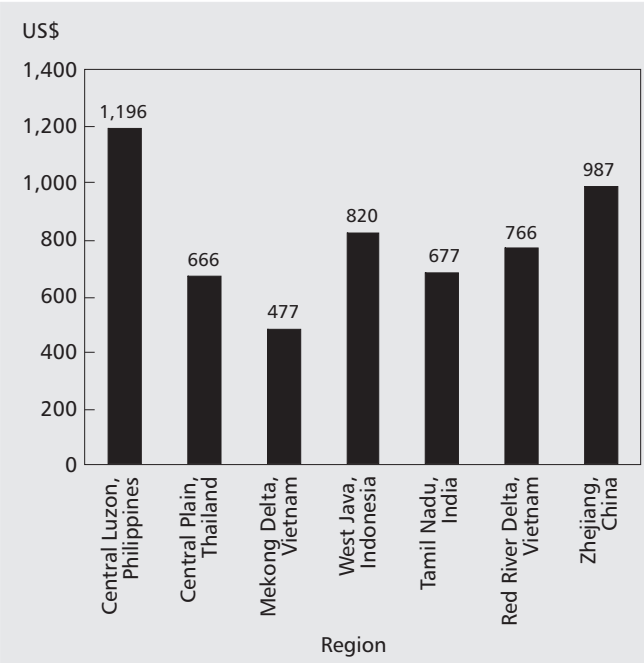

Fig. 2. Comparative net annual returns in rice production, US$ per hectare, 1999. Source of data: Moya et al (2004).

agricultural land per capita of only 0.15 hectare compared with 0.30 hectare for Thai people. Another reason is that other countries are more specialized in rice production than the Philippines. Only about 32% of the Philippines' total agricultural cropped areas are planted with rice. This is much less than in Vietnam (62%) and Thailand (57%). As a consequence of these two factors, rice area planted in Thailand (9.8 million hectares) and Vietnam (7.5 million hectares) is far bigger than in the Philippines (only about 4 million hectares annually).

The costs of rice production in Central Luzon, Philippines ($96 per ton), are also higher than those in the major rice-growing areas of Thailand ($59 per ton) and Vietnam ($74 per ton). Insufficient mechanization and excessively high labor use given the relatively high level of wages are the most important causes of high costs (see section 9). However, high production costs are also partially caused by high palay prices, which raise labor costs, land rents, seed prices, and pesticide prices (see section 6).

Although many farmers complain that they do not profit from rice farming, carefully collected data show that, among developing Asian countries, annual net returns per hectare in 1999 were the highest in the Philippines at nearly $1,200, primarily because of high farm prices of palay (Fig. 2). Total farm returns in the Philippines (with a mean farm size of about 2.2 hectares), however, are slightly lower than in Thailand, where farms are larger at about

4 hectares. Farmers in the rice bowls of other countries have much lower total returns than Central Luzon farmers, however.

It is true that these net returns are not enough to support a family of five or six members given an average expenditure per capita of $445 (2000 poverty threshold). However, it is unreasonable to expect farm households to make a living entirely from rice cultivation or even from farming. Farm sizes throughout Asia are small, and farmers in every country must resort to nonfarm jobs to make ends meet. Because a Filipino farmer with 2 hectares of double-cropped land works on average less than 40 person-days per year, it is not surprising that other jobs are essential to achieve a reasonable standard of living. In fact, one survey of rice farmers in Central Luzon showed that the percentage of household income coming from rice cultivation declined from 49% in 1985 to 36% in 1998 (Hossain et al 2000), similar to trends in other Asian countries. This shows the importance of the nonfarm economy to the well-being of farm households.

Notes

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3 Better banks and paddy wholesale markets are the key to reducing rice marketing margins

David C. Dawe, Piedad F. Moya, Cheryll B. Casiwan, and Jesusa M. Cabling

Rice marketing margins, defined as the difference between the farm price and the wholesale price, are much higher in the Philippines (Central Luzon to Manila) than in Thailand (Central Plain to Bangkok; Fig. 1). This difference is surprising given the similarities between the two marketing channels. For example, both production areas (the Central Plain and Central Luzon) grow similar types of modern varieties without any aroma or other salient quality characteristics, and are the major rice-growing areas in their respective countries. Second, both destinations (Bangkok and Manila) are the capitals and largest cities of their countries. Third, both rice-growing areas are connected by land to wholesale markets in the capital city, with no sea transportation involved. Fourth, the driving distance over land between the rice-growing area and the capital city is roughly similar—about 170 km in Thailand and 130 km in the Philippines. If marketing margins in

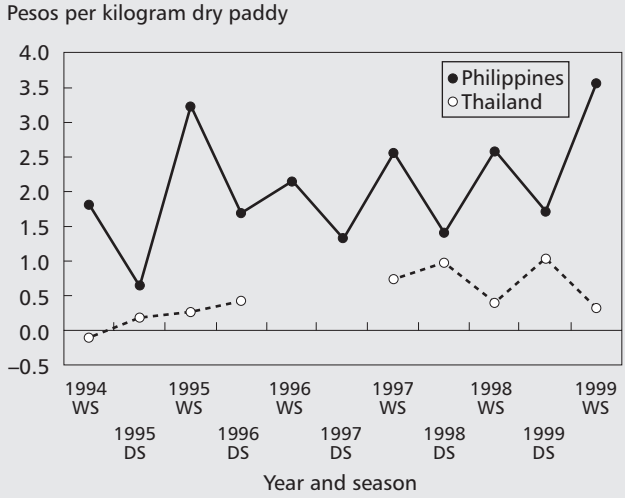

Fig. 1. Gross marketing margins, 1994 to 1999, Nueva Ecija to Manila (Philippines) and Suphan Buri to Bangkok (Thailand). Units are in pesos per kilogram of dry palay. WS = wet season, DS = dry season. No data for Thailand were collected for the 1996 WS and 1997 DS. Source of raw data: Moya et al (2004).

the Philippines could be lowered, both rice farmers and consumers could benefit, reducing the negative effects of trade liberalization on farmers.

We conducted a study to understand why margins are higher in the Philippines. Is it because of higher costs, collusion among traders, or other reasons? Our method of analysis was to compare marketing costs for particular functions in each of the two study areas, as opposed to the marketing costs of particular agents. This was judged more appropriate because the marketing functions of transportation, drying, storage, and milling are similar in the two areas. However, the marketing agents performed different combinations of those functions in the two study areas, making a direct comparison of agents difficult. To make comparisons, all data in Thai baht were converted to Philippines pesos using an exchange rate of 1.375 pesos per baht (based on exchange rates of 55 pesos per dollar and 40 baht per dollar, typical of those prevailing in 2003 during our study).

Although the marketing technology is broadly similar in the two locations, the two marketing systems have some differences. First, farmers in the Central Plain often sell their harvested palay at wholesale markets. To our knowledge, such markets are nonexistent for palay in the Philippines, although they are common for milled rice. Second, the existence of palay wholesale markets in Thailand has strongly reduced the role played by private traders who function only as traders (not millers), buying and selling palay on their own account. Instead, Thai farmers tend to sell directly to private millers or their agents. On the other hand, private, own-account traders who are not millers are an important fixture of the Philippine marketing system. Third, a much larger percentage of the palay crop is dried mechanically in Thailand than in the Philippines because higher wages in Thailand lead to a substitution of capital for labor. Fourth, trucks and mills have larger capacity in Thailand than in the Philippines. Subsequent analysis shows that some of these differences play an important role in explaining the difference in marketing margins between the two sites, whereas others are not so important.

Our detailed field surveys showed that gross marketing margins (GMM) in Thailand are substantially lower than in the Philippines (Table 1). The GMM in Thailand was calculated as just ₱0.85 per kilogram of dry palay vis-à-vis ₱3.67 per kilogram of dry palay in the Philippines.[1] Table 1 shows how marketing costs contribute to the GMM, and two main observations emerge from this table. First, marketing costs are substantially lower in Thailand than in the Philippines. Second, the difference in marketing costs between the two countries explains only about one-fourth of the difference in gross marketing margins, implying that lower costs in Thailand are only part of the explanation.

[1]All costs and margins in this section are reported per kilogram of dry palay, unless otherwise specified.

Table 1. Gross marketing margins and marketing costs by function, Nueva Ecija to Manila (Philippines) and Suphan Buri to Bangkok (Thailand). Units are in pesos per kilogram of dry palay. Totals may not add up because of rounding.

Item	Philippines	Thailand	Differential
Transport costs	0.70	0.40	0.29
Drying costs	0.14	0.15	–0.01
Storage costs	0.42	0.07	0.34
Milling costs	0.32	0.23	0.10
Total costs	1.57	0.85	0.72
Gross marketing margin	3.67	0.85	2.82

Differences in marketing costs

The importance of the financial system

The single most important reason marketing costs are lower in Thailand is the level of interest rates and the services provided by the financial system. In Thailand, millers and traders mentioned interest rates for borrowing of about 4% per annum, and this was confirmed in interviews with several banks. Interest rates were similar for either working or investment capital. By contrast, interest rates from banks in the Philippines were about 15% per annum. Furthermore, millers and traders in the Philippines do not borrow much from banks for their working capital needs because of excessive paperwork for such short-term loans. Instead, they borrow from moneylenders, who charge higher interest rates of 24% on an annual basis. A simulation of counterfactual costs assuming that real interest rates in the Philippines were the same as those in Thailand explains 58% (₱0.42 per kg) of the difference in marketing costs between the two countries.

In terms of function, the lower interest rates in Thailand make a difference in two main ways. First, lower interest rates lead to lower working capital requirements, which show up in Table 1 as reduced costs of storage. Second, lower interest rates reduce investment capital requirements by lowering the effective purchase price of trucks, buildings, sacks, and milling equipment.

Seasonality of production and openness to trade

Although interest rates are clearly the single most important factor, they are not the entire story. In the Central Plain of Thailand, there is less seasonality of harvesting because of more abundant water supplies in the Chao Phraya River delta. Many farms in the Central Plain harvest three crops of rice in a year, and different farms in nearby areas often have quite different harvesting dates. The result is a cropping system that resembles continuous factory pro-

duction. Seasonality of rice production in Central Luzon is much less pronounced than it was 35 years ago (the Green Revolution led to a large expansion of cropping in the dry season), but it is still more seasonal than in the Central Plain. Furthermore, international trade plays a much larger role in Thailand's rice economy (exports were 42% of domestic production from 1996 to 2002) than it does in the Philippines (where imports were 13% of domestic consumption during the same period). More openness to international trade allows for some of the seasonality of supply to be absorbed by world markets through either imports or exports.

The reduced seasonality of production and greater openness to trade combine to result in reduced storage requirements in Thailand (2 months from harvest to wholesale on average in the Philippines versus just 1 month in Thailand). Confirming the reduced storage requirements that we found in our interviews is the fact that farm-gate palay prices exhibit less seasonality in Thailand. Our simulations indicate that the reduced length of storage accounts for ₱0.14 per kilogram of the difference in marketing costs between the two systems.

Lack of openness to rice trade in the Philippines raises storage costs through another channel as well. Government restrictions on imports have raised domestic farm prices to very high levels—in fact, farm prices for palay in Central Luzon from 1994 to 1999 were on average 89% higher than in the Central Plain during the same period, and a similar differential continues to the present day. High farm prices mean that millers and traders in the Philippines have much larger borrowing requirements to finance purchases of the more expensive crop, even apart from the higher interest rates that prevail in the Philippines. Our simulations estimate that the size of this effect amounts to ₱0.11 per kilogram in additional carrying costs.

Land prices, road infrastructure, lack of mechanization, and other factors

Several other factors are important as well. One is land costs for the mill and storage, which are cheaper in Suphan Buri by ₱0.09 per kilogram than in Nueva Ecija. Land is cheaper in the rice-growing areas of Thailand, where the mills are located, for at least two reasons. First, the supply of arable land per capita is three times as large in Thailand as in the Philippines (raw data from FAO 2005). Second, the main use of land in both Suphan Buri and Nueva Ecija is for rice, and, as noted above, palay prices in the Philippines are kept substantially above world prices through import restrictions. These very high levels of domestic prices inflate land prices (for more details on how land prices are affected by rice prices, see section 6).

The Thai marketing system also has a cost advantage of ₱0.14 per kilogram in terms of fuel consumption. This advantage is not due to different fuel prices, which are nearly identical in the two countries. Instead, the difference is due to several factors that allow Thai marketing agents to haul more tons

per liter of gas. First, trucks in the Philippines typically transport only about 70% of a full load of grain, whereas trucks in Thailand travel full most of the time. This underuse appears to be due to an excessive number of marketing agents in the Philippines that makes it difficult to optimally coordinate transportation. Second, Thai trucks that shuttle between rice-growing areas and the capital typically have a capacity of 30 tons, double the capacity of the trucks used in the Philippines. Larger trucks are impractical in the Philippines because the quality of roads is considerably worse than in Thailand. Philippine roads have more potholes, tend to pass through urban areas instead of traversing the outskirts, and have fewer lanes. All of these factors make it difficult to drive large trucks. The poorer quality of Philippine roads is reflected in driving times to the capital from the rice-growing area. Although the distance from Suphan Buri to Bangkok is about 170 km compared with just 130 km from Nueva Ecija to Manila, the driving time in Thailand is about one and a half to two hours, while in the Philippines it is at least an hour more. Third, higher interest rates also make it more difficult for Philippine traders to finance the purchase of larger trucks, which are of course more expensive than smaller trucks. Thus, there is a key interaction between interest rates and the quality of road infrastructure that gives Thai millers and traders an important cost advantage in fuel costs.

Finally, transportation labor costs per kilogram are also much lower in Thailand (by ₱0.11 per kilogram), even though transportation capital costs per kilogram are similar in the two countries. Part of this differential can be traced to the use of smaller trucks that do not travel full in the Philippines as noted above, which generates higher labor costs per kilogram of grain hauled despite lower hourly wages. More important, there is a substantial amount of manual loading and unloading of grain in the Philippines. This process has been mechanized in Thailand because of higher wages and lower interest rates. Of course, the lower wages in the Philippines suggest that less mechanization is optimal, but this does not appear to be the entire explanation. Mechanization would likely lower costs in the Philippines, but manual laborers are often able to resist such changes. In fact, this situation prevails regarding mechanization of harvesting in the Philippines. Use of a combine harvester in the Philippines would lower rice production costs, but we have met several farmers who either had their combine sabotaged by workers worried about loss of employment or were hesitant to purchase one for fear of the same. Faster job growth in the nonfarm sector would provide alternative jobs for these laborers and pave the way for more mechanization in marketing and farming, but the Philippine economy's lack of growth has hindered the creation of such jobs. Measured in constant local currency terms, gross domestic product (GDP) per capita in the Philippines in 1999 was slightly below the level of 1980, while it grew at an average annual rate of 4.7% in Thailand during this same period (raw data from World Bank 2001).

Perhaps surprisingly, higher milling ratios in Thailand (0.66) than in the Philippines (0.64) made no difference to differential costs. The reason for this lies in the relative prices of milled rice to by-products and the greater output of husks (which were considered worthless in both countries) in Thailand (0.25 versus 0.23 kg husk per kg paddy in the Philippines).

Summary of cost differences

The sum of all these effects adds up to a difference in costs of ₱1.01 per kilogram, which is greater than the observed difference of ₱0.72 per kilogram. There are two reasons for this "over" explanation. First, there are interaction effects between different factors that make simple addition of the effects of individual changes misleading. For example, the combined effects of hypothetically lower interest rates and reduced storage time in the Philippines would lead to a reduction in costs of ₱0.43, which is less than the sum of ₱0.42 and ₱0.14 (the effects of the two changes made individually). In this case, the whole is less than the sum of the parts. Second, the Philippines has a cost advantage in some components not mentioned, mainly because of lower wages.

To summarize, a variety of factors accounts for the difference in marketing costs between our Thai and Philippine study sites. Most important is the level of interest rates and the services provided by the financial system. Other fundamental factors that are also important include endowments of water and land (which ultimately affect storage time and land rental costs), rice price and trade policy (which affects carrying costs through land rents, storage time, and working capital costs), road quality, and lack of nonfarm job growth (which hinders mechanization of some tasks).

Too many traders, not a cartel, are the cause of high margins

Different marketing costs explain just one-fourth of the difference in gross margins, however. Is the other three-fourths of the difference in gross margins due to collusion among traders?

We looked very hard to find evidence of collusion among traders, but we could not find any between the farm and the wholesale market. For example, perhaps traders and millers parcel up the market among themselves, and agree not to "invade" each other's territory, thus creating local monopolies. This possibility, however, is not consistent with repeated observations we made in the field that farmers have a wide choice of millers and traders to sell to. For example, Hayami et al (1999) found that, among a sample of 45 farmers in a Laguna village, palay was sold to 37 different buyers, including 13 different rice mills, 12 independent traders, and 12 commission agents! This implies a tremendous amount of competition among traders for buying palay, which makes it easy for a farmer to switch to another trader if she feels she is being cheated. Furthermore, millers and traders often cross provincial boundaries

in search of palay to buy. These cross-provincial "raids" are not just confined to neighboring provinces, but often occur over long distances, for example, Laguna millers buying palay in Bicol. Interestingly, some local governments (at the village and provincial levels) try to hinder such competition by enacting laws that prohibit traders from outside jurisdictions from entering the locality. Nevertheless, farmers are still free to move palay outside of their villages, and not many localities enforce such laws.

Other possible barriers to trade include the *suki* system, whereby farmers preferentially sell to a specific trader because the farmer is familiar with that trader. These arrangements are very informal, however, and confer no strong obligations on the farmer. In fact, farmers with a *suki* often sell to non-*suki* traders. Only a tiny proportion of farmer sales are made to providers of input credit.

Finally, data from a large survey of 768 farmers in Nueva Ecija, Isabela, Iloilo, and Bukidnon conducted by one of the authors showed that more than half actively canvassed multiple offers for their palay. Farmers who did solicit multiple bids in fact received higher prices by 4.6 centavos per kilogram (about 0.6% of the average price), but this price difference is very small.

Many people will find it hard to believe that there is no evidence of collusion in the Philippine rice marketing system. However, we investigated marketing only between the farm and wholesale levels, and this is where we can confidently claim that there is no collusion. We can also be sure that there is no collusion at the retail level: no one claims that rice retailers have monopoly power in selling to consumers. However, we were unable to investigate marketing "inside" the wholesale level itself (i.e., the difference between the wholesale buying and selling prices) because it is too difficult to gather reliable information on costs from the very large traders who operate at this level. Since we could not measure costs at this level, it is difficult to tell whether there is collusion at the "neck of the hourglass" in the marketing system. Nevertheless, by comparing the prices at which millers sell rice to wholesalers and the price at which retailers purchase rice from wholesalers, we can at least calculate the margin between the two prices, even if we are unable to measure the costs involved. We can then compare these margins at the wholesale level between Manila and Bangkok.

It turns out that the margin between wholesale buying and selling prices is indeed higher in Manila than in Bangkok. This is not evidence of collusion, but the possibility remains. However, the difference in margins between Manila and Bangkok at the wholesale level is only about ₱0.33 per kilogram of dry palay. But this entire differential is not due to collusion because Manila wholesalers face higher interest rates than their Bangkok counterparts, and working capital costs are obviously a major business cost for rice wholesalers. For the sake of argument, assume that at most ₱0.20 per kilogram of dry palay of the differential is due to collusion at Manila wholesale markets (and it could be much less). This margin that *might* be due to collusion is much

smaller than the difference between farm and wholesale margins reported in Table 1 of ₱2.82 per kilogram, showing that collusion is not the most important problem facing the Philippine marketing system. Removing this small differential would not make a major contribution to lowering prices for consumers or raising prices for farmers.

Of course, the fact that the per unit margin that *might* be due to collusion is small does not mean that rice wholesalers don't get rich. If one sells many thousands of tons of rice per year, then a small margin per kilogram can quickly generate a large amount of wealth for a trader. On the other hand, the calculation does show, in essence, that it is not possible to take money away from a small number of individual traders and redistribute it to millions of small farmers and consumers so that their incomes improve by more than a very small amount.

If neither marketing costs nor collusion can fully explain the difference in gross margins, then we must examine other possible explanations. One possible explanation is greater risk, but we find this unconvincing. First, prices are slightly more stable in the Philippines, where the government has successfully stabilized prices vis-à-vis the world market, than in Thailand, where free trade means that domestic prices are dictated by world prices and the exchange rate. Second, we are unaware of any millers or traders who have had their assets expropriated by the government, or were even threatened with such. Thus, neither price risk nor risk of expropriation is able to explain the difference in margins.

Another possibility is that Filipino millers and traders are substantially more skilled than their Thai counterparts, and thus earn higher returns. This also seems unlikely, as we estimate that it takes about 18 marketing agents (traders and millers) in the Philippines to process 90,000 tons of dry palay per year, a job managed by just one Thai miller.

To the best of our knowledge, then, it seems as though marketing agents in the Philippines are earning excess profits, with the word "excess" being defined relative to the profits earned in Thailand. If true, how do these "excess" profits persist? If there is no collusion, why don't new traders or millers enter the business and enjoy the high profits?

The most likely reason seems to be capital market constraints. First, high interest rates create financial barriers to entry. Second, moneylenders (who finance working capital requirements in the Philippines) do not typically loan the large amounts of money necessary to buy 90,000 tons of palay per year to individual borrowers. And banks seem unable to perform the service of satisfying the working capital requirements of traders and millers in the Philippines.

Another strong possibility is the existence of too many marketing agents. As mentioned above, it takes about 18 marketing agents (traders and millers) in the Philippines to process 90,000 tons of dry palay per year, a job managed

by just one Thai miller. If there were fewer marketing agents in the system, millers could cut margins and still maintain their standard of living by agreeing to buy and process more palay. Of course, the millers and traders who left the business would have to find other jobs, but this would be consistent with the trend in many parts of the world toward consolidation and merger of agricultural marketing operations.

One way to encourage this consolidation would be for the government to organize wholesale markets for the purchase of palay. This would help to reduce the number of agents involved in the farm to wholesale marketing system, which could lower margins substantially. In Thailand, the first palay wholesale markets were organized by the government, but, later, private investors (often rice millers) came to dominate the market. Such wholesale markets would lower search costs and improve the credibility of traders' weighing scales (assuming effective government regulation). Notice that this runs counter to the recommendation that might be made if it were found that cartels were the source of the problem. If that were the case, the recommendation would be to get more traders into the system. Compared with Thailand, however, the Philippines has too many traders, not too few.

Another possibility would be to lower the barriers to foreign investment. If Thai investors were to enter the milling industry, marketing could be consolidated and costs lowered. The cost of this policy would be to take away business opportunities from Filipinos, but the benefits would accrue to Filipino farmers and rice consumers.

Conclusions and recommendations

If rice marketing margins are so large in the Philippines, what can be done to lower them? First, by far the greatest impact would come from capital markets that provide lower interest rates and better services to investors. Admittedly, however, this is a long and difficult process. Second, margins might be reduced if the government took the initiative to organize wholesale markets for palay. Third, a more open policy regarding rice imports would lower working capital requirements, reduce storage time, and reduce land values, all of which would lower marketing costs. Fourth, improved road infrastructure would also reduce marketing costs.

As a final note, despite looking hard, we could find no evidence that collusion plays an important role in the wider Philippine margins between farm and wholesale levels. We were unable to investigate collusion "inside" the wholesale level, but we were able to show that, if collusion at this level does exist, it does not make a major contribution to wider marketing margins. Thus, enactment of antitrust regulations seems unlikely to create narrower margins. In fact, effective enforcement of such regulations between farm and

wholesale levels would be counterproductive, as it might hinder consolidation in the marketing chain.[2]

Notes

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[2]More details on this subject are available in a longer paper, available upon request from any of the four authors.

4 Farm laborers, not palay farmers, do the bulk of the work producing the nation's rice

David C. Dawe

Perhaps surprisingly, farmers do not perform much labor on rice farms in the Philippines, or in most of South and Southeast Asia. In the Philippines, for example, rice farm families work on average less than 40 days per year on the fundamental tasks of growing rice. If both husband and wife share this labor, each averages about one and a half to two days per month (see Fig. 1). The Philippines is not unique in this regard—the time worked by rice farmers on the Indonesian island of Java is similar.

This is good news for farmers because growing rice is hard work. Plowing 1 hectare with a water buffalo requires a farmer to slog 30 kilometers through shin-deep, clinging mud, all the while muscling the reins and plow—just for one pass. Transplanting 1 hectare of rice by hand means bending over to place up to a quarter million separate hills.

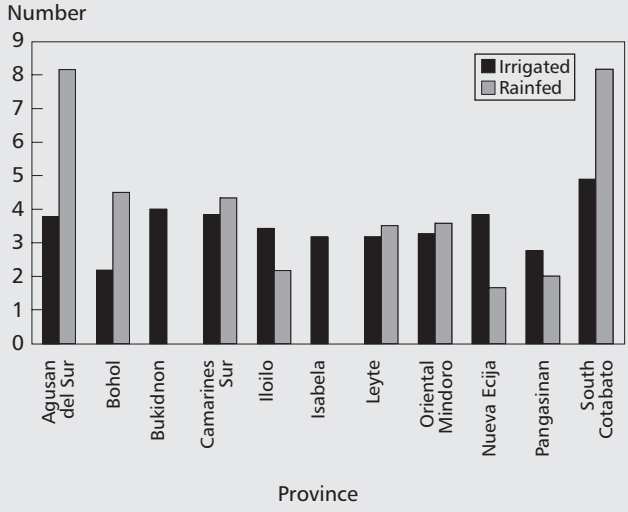

Fig. 1. Number of days worked per month by family laborers at the fundamental tasks of growing rice (all family members combined). Hired labor is excluded from these calculations. Empty columns for rainfed farming in Bukidnon and Isabela indicate that a negligible amount of land is farmed in those provinces under that ecosystem.

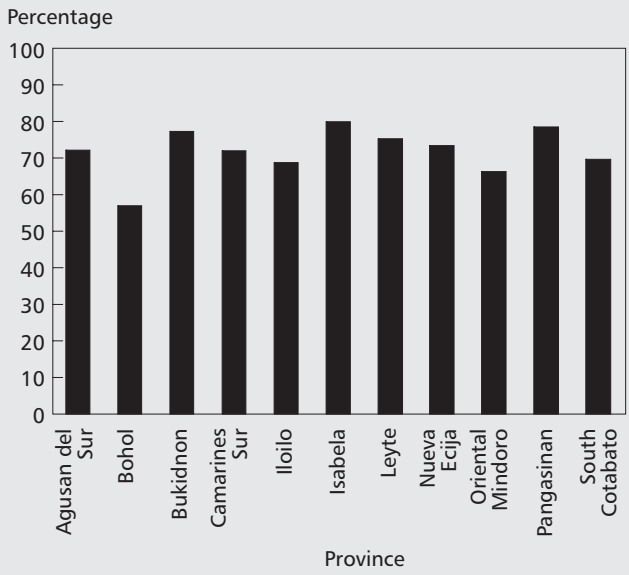

Fig. 2. Percentage of hired labor in total labor use for rice production. Source of data for Figures 1 and 2: PhilRice-BAS (2003).

Except in Thailand, relief from this backbreaking labor has not come from mechanization. Instead, most of the work is done by often-forgotten rural laborers who own only a tiny plot just big enough for a hut. They work land owned by others to make ends meet. China and Vietnam are exceptions, as radical land reforms many years ago mean that there is not a large rural class of laborers without farm land of their own. Thus, in those two countries, farm families satisfy most of their own labor needs. But, in India, Indonesia, Bangladesh, and the Philippines, hired workers provide the vast bulk of labor on rice farms. On average, hired workers perform more than 70% of the labor on rice farms in the Philippines (see Fig. 2). The main tasks they perform are transplanting the crop and harvesting it by hand, although they also contribute to land preparation, weeding, application of insecticides and fertilizers, and assorted other work.

Landless laborers are an important group of people in the Philippine countryside, constituting 13% of the rural labor force. However, these people are often anonymous, without any political voice even at the local level, much less nationally. Besides working on farms, the rural landless catch fish or work in construction or public transportation. Most juggle a combination of jobs to make ends meet.

Even when landless laborers are paid in kind for their work on rice farms, they do not receive enough rice to meet the needs of their family for the whole year. Despite doing most of the labor on the farm, they must still go to the market to purchase more rice to feed their family. Many spend 25–30% of

their annual income just to buy rice—before even considering meat, fish, dairy products, or vegetables. Because of the large percentage of income spent on rice, high rice prices force landless laborer families to cut back on purchases of other foods. For example, a study by Steven Block of Tufts University and colleagues (Block et al 2004) showed that higher rice prices in Indonesia during the Asian financial crisis of the late 1990s caused many poor families to cut spending on food other than rice, leading to a measurable fall in children's blood hemoglobin levels.

Spending on education or health care for their children is a luxury many rural poor cannot afford at all. This condemns one generation after another to a prison of poverty and debt, reinforced by debilitating ignorance and ill health. Measures to lower the price of calories for landless laborers are of critical importance to poverty alleviation, whether it be through agricultural research, trade liberalization, or targeted interventions that deliver food to all of those who are struggling to achieve food security for their family.

Notes

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Note: Much of this section is derived from Dawe (2004b). See page 162 for the complete reference.

Rice trade liberalization, poverty, and food security

5 Rice farmers are better off than many other farmers

Cheryll B. Casiwan, Jesusa M. Cabling, Mary Jane R. Nievera, Alice B. Mataia, and David C. Dawe

Rice farmers are often perceived as among the poorest in the Philippines. Although more open trade and lower domestic rice prices will benefit poor rice consumers, their negative impact on farmers' rice income is of great concern. It is therefore both interesting and important to know how the living standards of Filipino rice farmers compare with those of other groups in society. A report by Hayami et al (1985) using 1980 to 1983 data showed that the mean family income of rice farm households was below the national average, but was the highest among agricultural operators except for sugarcane and livestock and poultry operators (two relatively small groups). Among farming households, rice farmers had the lowest poverty incidence and corn farmers had the highest. The World Bank (2004), using 1985 data on rural profiles, also showed that rice farmers had a lower poverty incidence than corn and coconut farmers and farm laborers, all of which are large groups in rural areas.

This section uses more recent data to compare the living standards of rice farmers vis-à-vis other farmers. In addition, we compare living standards using multiple types of data (income, protein expenditures, housing quality, and asset ownership) to check for consistency. Finally, because many rice farmers are poor, we identify geographic areas where poverty incidence among rice farmers is particularly high.

Data and sources

Our study used data from the 2000 Family Income and Expenditures Survey (FIES), a nationwide survey of about 41,000 households by the National Statistics Office (NSO 2000). The survey employed multistage sampling and covered 77 provinces of the country. Based on the occupation of their heads, households were classified as either farm or nonfarm. Farm households were further classified as crop farmers, landless laborers, fishermen, or animal producers. Landless laborers are distinct from farmers in that their main source of income is from daily wages obtained by working

on other people's farms. Farmers, by contrast, are in charge of production operations and do not receive wage payments when working on the land. Based on a consideration of income sources, crop-farm households were further categorized into rice, corn, coconut, and other farmers. Nonfarm households were classified as urban or rural. All the analyses used a weight-adjusting factor estimated by NSO for the FIES 2000 data to avoid erratic fluctuations caused by sampling variations.

We also used data from the Bureau of Agricultural Statistics (BAS 2001) on hired labor use in 2000 and income data from the 2001-02 PhilRice-BAS random surveys of rice-based farm households conducted in 30 major rice-producing provinces (PhilRice-BAS 2003).

Indicators of living standards

Income is the most commonly used measure to assess poverty. The official methodology in the Philippines compares income with a poverty threshold level (PTL), which is the cost of minimum basic food and nonfood needs. To compare different types of households, we calculated per capita household income by dividing total family income by the total number of family members. Total family income includes salaries and wages from employment, net income from entrepreneurial activities, including value of production, and income receipts from other sources such as remittances from abroad. We compared per capita income across different types of farmers, and also with the rural PTL.

The use of income as the sole criterion in defining poverty or standards of living is inadequate, however, especially in developing countries, where poverty alleviation policies are not primarily policies of income maintenance or cash supplements (Scott 1981). Thus, we also used other rural welfare indicators to compare standards of living among farm households.

For example, per capita protein expenditure, which consists of expenses on meat, dairy, and fish, was used as one parameter because in nearly all societies higher standards of living lead to greater intake of protein. In addition, housing quality indicators such as tenure, type of roofs and floors, as well as presence of electricity and a permanent source of water were used as nonmonetary welfare indicators. Housing is a basic need, and housing quality is a good indicator of the living conditions of a rural family. Household ownership of selected assets such as a television, refrigerator, car, and telephone was also used as a parameter of standards of living.

Finally, we also used the percentage of farm labor that is hired as an indicator of wealth, although it is less convincing than the others. Even though farm work is very physically demanding, very poor farmers prefer to do the work themselves instead of hiring someone to do it for them because they desperately need the money. Thus, a larger use of hired labor probably reflects higher living standards.

Table 1. Mean and quartile distribution of per capita annual household income (pesos per annum) by occupational category.

Category	N	Mean	Quartile				
			Minimum	Lower quartile	Median	Upper quartile	Maximum
Nonfarm urban	17,909	49,698	1,929	19,026	31,586	54,944	3,040,000
Nonfarm rural	5,941	24,821	2,225	10,468	16,944	29,064	1,059,870
Rice farmers	4,177	19,843	1,966	8,638	13,558	22,501	935,467
Corn farmers	1,913	11,909	1,325	6,080	8,580	12,767	178,359
Coconut farmers	204	14,365	2,828	7,343	11,010	18,333	106,153
Other farmers	2,293	16,429	1,108	7,900	11,911	18,416	165,870
Landless laborers	1,640	13,856	1,860	7,488	10,748	15,933	108,644
Fishermen	1,693	14,853	2,172	8,310	11,529	17,063	178,295
Animal producers	509	24,908	2,852	9,718	16,920	28,825	285,950
All	36,279	32,491	1,108	10,765	19,042	36,163	3,040,000

Source of basic data: NSO (2000).

To summarize, the main indicators used were per capita household income, per capita protein expenditure, housing quality, household assets, and percentage of farm labor that is hired.

Results and discussion

Per capita household income (PCHI)

The FIES 2000 data (NSO 2000) showed that the annual per capita household income (PCHI) of rice farm households of nearly ₱20,000 (about $1 a day) was higher than for any other category of farmers/fishermen except animal producers (Table 1). It is 67% higher than the average PCHI received by corn farmers and 20% to 40% higher than the ₱14,000 to ₱16,000 received by coconut farmers, landless laborers, and fishermen. In general, farming households had lower per capita income than nonfarm households in both rural and urban areas. All these observations are true even when using the median income or the income of the poorest quartile.

Around one-third of rice farmers live on less than ₱10,000 PCHI (about $0.50 per day; see Table 2). Using the official poverty threshold level (PTL) of ₱11,125 for rural areas, around 40%, or two out of five, of rice farmers were considered poor. This shows that poverty in the rice-farming sector is still widespread. However, an even greater percentage (50% to 70%) of corn farmers, landless laborers, and fishermen live below the poverty line. For nonfarm rural households, the lower quartile income was also below the PTL.

Table 2. Percent distribution of households by per capita annual income by occupational category.

Income bracket (pesos per annum)	Nonfarm urban	Nonfarm rural	Rice farmers	Corn farmers	Coconut farmers	Other farmers	Landless laborers	Fisher-men	Animal producers	All
Percent	100	100	100	100	100	100	100	100	100	100
Under 10,000	5	23	33	61	45	39	44	40	26	22
10,000–19,999	22	36	37	27	38	39	40	41	34	30
20,000–29,999	20	17	14	7	11	11	9	11	17	16
30,000–39,999	14	9	7	2	2	5	3	4	8	10
40,000–49,999	10	5	3	1	2	2	1	1	6	6
50,000–59,999	7	3	2	0	2	1	1	1	3	4
60,000–79,999	8	3	2	1	0	1	1	1	4	5
80,000–99,999	5	2	1	0	0	0	0	0	1	3
100,000 and over	9	2	1	0	0	1	0	0	2	5
% of households below PTL	10	29	39	65	44	46	52	48	28	25

Source of basic data: NSO (2000).

Rice farmers have higher income than the other farmers' groups, not only because of their higher per capita income from crop farming but also because of higher nonagricultural wages and receipts from abroad (Table 3). The percentage of agricultural income in the total family income of rice-based farm households was around 60%, much lower than for corn- and coconut-based farmers. This shows that those farmers most dependent on agriculture are the poorest, and that rice farm households have more access to other sources of income than other farmers.

A similar picture can be seen using the PhilRice-BAS (2003) survey data of 2,500 rice-based farm households. The average PCHI was ₱21,700, or a little more than $1 per day, which is not very different from the FIES result. Around 60% of this total income comes from rice-farming activities, including off-farm labor income. The rest comes from farming other crops and income from nonfarm activities. The survey also confirmed another result from the FIES data, the percentage of rice farmers who are below the poverty line (42% compared with the FIES result of 39%). The fact that similar results were realized from completely different surveys gives us confidence that these results are correct.

Per capita protein expenditure (PCPE)

As with per capita income, nonfarm households had a higher PCPE (Table 4). Among crop-farming households, rice farmers had a higher PCPE than corn and coconut farmers and landless laborers. As expected, animal producers had the highest PCPE. (Family expenditure in the survey considered the value consumed from own production.) Thus, among different types of crop farmers, rice farmers seem to have the highest-quality diets. The average PCPE of about ₱2,800 for rice farmers was lower, however, than the national average PCPE of ₱4,000.

Housing quality and assets

Tables 5 and 6 show selected housing quality and asset ownership indicators of farmers and nonfarmers in urban and rural areas. A majority of the households in the Philippines (68%) own the house and lot they are living in, with roofs (74%) and outer walls (69%) generally made out of strong materials such as galvanized iron, tiles, concrete, bricks, and stone. Some 73% of all families used a water-seal type of toilet in their homes.

In terms of house and lot ownership, rice farm families are better off than any other group, including nonfarm urban and rural families: 82% own their house and lot compared with ownership percentages for coconut farmers, landless laborers, and fishermen of 68%, 56%, and 56%, respectively. In terms of housing materials, rice farm households are wealthier than any other farm group, with 69% having homes made out of strong material and 64% having outer walls made out of strong material. Coconut farmers were close to rice farmers in these two categories, although corn farmers and landless

Table 3. Percent distribution of household income by source and by household category.

Source of income	Nonfarm urban	Nonfarm rural	Rice farmers	Corn farmers	Coconut farmers	Other farmers	Landless laborers	Fisher-men	Animal producers	All
Percent	100	100	100	100	100	100	100	100	100	100
Wages and salaries										
Agricultural activity	0.42	4.99	6.45	8.52	4.44	9.29	50.19	15.72	23.95	7.02
Nonagricultural activity	54.97	45.86	12.29	8.44	9.36	14.19	11.00	10.08	17.70	37.35
Entrepreneurial activities										
Crop farming and gardening	0.43	2.85	43.94	47.80	54.65	34.57	4.49	2.42	7.81	11.85
Livestock and poultry raising	0.20	1.00	2.22	3.40	1.06	1.82	1.01	0.74	10.89	1.15
Fishing	0.22	1.45	0.52	0.79	1.34	1.51	0.78	42.80	0.50	2.52
Trading and manufacturing	11.85	11.14	4.39	3.58	2.68	5.18	3.16	5.83	6.08	9.00
Other entrepreneurial activities[a]	7.05	7.07	2.04	1.83	3.07	1.69	1.02	1.23	2.49	5.12
Other sources of income										
Net share of crops	0.40	1.32	1.48	1.27	1.26	2.73	0.99	0.71	1.50	0.99
Receipts from abroad	5.38	3.97	4.82	1.46	2.24	3.04	1.90	1.74	5.76	4.28
Family sustenance activities	0.50	3.56	4.72	6.93	4.06	5.13	7.89	4.24	4.30	2.97
Other sources[b]	18.54	16.79	17.11	15.96	15.85	20.85	17.54	14.48	18.91	20.71

[a]Includes community services, transportation, storage services, mining and quarrying, construction, and others. [b]Includes pension and retirement benefits, dividends, cash receipts from domestic sources, family sustenance activities, and others.
Source of basic data: NSO (2000).

Table 4. Per capita protein expenditure (pesos per annum) by household category.

Household category	Household size	Per capita protein expenditure
Nonfarm urban	5.21	5,649
Nonfarm rural	5.24	3,397
Rice farmers	5.25	2,764
Corn farmers	5.21	1,812
Coconut farmers	5.22	2,276
Other farmers	4.93	2,478
Landless laborers	5.17	2,284
Fishermen	5.53	2,779
Animal producers	4.91	3,303
All	5.21	4,038

Source of basic data: NSO (2000).

laborers were much farther behind. The dwellings of rice farm households were also more likely to have a water-seal toilet than any other type of farm producer (67% compared with, for example, just 38% of corn farmers).

Nationwide, about 76% of all families have electricity in their dwellings. Among farm groups, rice farmers rank second at 63% (after the small group of animal producers at 65%). As for the main source of domestic water, 44% of Filipino families draw water from personal faucets connected to a community water system. Rice farmer households, with 42% having personal faucets, ranked higher than any other rural group (only 13% of corn farmers and 18% of fishermen had personal faucets).

Ownership of household assets presents a picture similar to housing quality (Table 6). Rice farmers are more likely to own a television (47%) or a refrigerator (22%) than other types of farmers, except for animal producers. For example, only 20% of corn farmers own a television, while just 8% own a refrigerator. On the other hand, ownership rates of these assets among nonfarm urban and nonfarm rural dwellers are higher than for rice farmers. Although very few households own a car or telephone, rice farmers are better off than other farmers. These nonmonetary indicators are consistent with the data on income and expenditures, and show that rice farmers have better living conditions than other farmers in the Philippines.

Percentage of hired labor

One possible indicator of the economic standing of farmers is their capacity to hire farm labor. Data from BAS (2001) show that, except for sugarcane farmers, rice farmers had the highest percentage of hired labor in total labor use (Table 7). In the Cagayan Valley Region, for example, where rice and corn are

Table 5. **Housing quality indicators (%) by household category, Philippines, 2000.**

Indicator	Nonfarm urban	Nonfarm rural	Rice farmers	Corn farmers	Coconut farmers	Other farmers	Landless laborers	Fisher-men	Animal producers	All
Tenure status of house and lot										
Own or owner-like possession (house & lot)	65	68	82	75	68	72	56	56	69	68
Rent house/room, including lot	13	2	0	0	1	1	1	1	2	6
Own house, rent lot	4	4	2	2	5	3	3	6	2	4
Own house, rent-free lot (owner consent)	9	20	13	19	21	17	30	27	22	15
Own house, rent-free lot (without consent)	3	2	1	2	2	3	2	5	1	3
Rent-free house and lot (owner consent)	5	5	2	2	4	3	8	4	4	5
Roof type										
Strong material[a]	86	72	69	56	66	56	53	48	68	74
Light material[b]	13	27	30	43	33	43	45	50	30	25
Salvaged/makeshift materials	1	1	1	1	1	1	2	2	2	1
Outer wall										
Strong material[a]	84	67	64	48	62	55	42	47	62	69
Light material[b]	15	32	35	50	36	44	55	51	36	29
Salvaged/makeshift materials	2	1	1	2	1	1	3	2	2	2
Toilet										
Water-seal	88	72	67	38	52	53	48	47	66	73
Closed/open pit	7	17	25	42	28	29	31	20	19	17
Other (pail system)	5	11	8	20	20	18	20	33	15	10
Electricity										
With	95	77	63	31	52	52	49	60	65	76
Without	5	23	37	69	48	48	51	40	35	24
Main source of water										
Own use, faucet, community water system	60	38	42	13	22	26	25	18	41	44
Shared, faucet, community water system	28	42	34	33	39	40	50	51	39	35
Others (dug well, rain, spring, peddler)	12	20	24	54	39	34	25	30	20	21

[a]Made of galvanized iron, tiles, concrete, bricks, stone, asbestos. [b]Made of cogon, nipa, anahaw.
Source of basic data: NSO (2000).

Table 6. Ownership of household assets (%) by household category, Philippines, 2000.

Item	Nonfarm urban	Nonfarm rural	Rice farmers	Corn farmers	Coconut farmers	Other farmers	Landless laborers	Fisher-men	Animal producers	All
Television										
Yes	86	59	47	20	28	32	31	35	49	62
No	14	41	53	80	72	68	69	65	51	38
Refrigerator										
Yes	60	33	22	8	15	18	11	11	31	38
No	40	67	78	92	85	82	89	89	69	62
Car										
Yes	10	4	3	0	1	2	0	1	2	6
No	90	96	97	100	99	98	100	99	98	94
Telephone/cellphone										
Yes	29	8	5	1	3	3	1	2	9	15
No	71	92	95	99	97	97	99	98	91	85

Source of basic data: NSO (2000).

Table 7. Average person-days (pd) per hectare by source of labor, Philippines, 2000.

Item	Family (pd per ha)	Hired (pd per ha)	Total (pd per ha)	% Hired labor
Rice	15	46	61	76
Corn	27	30	57	52
Coconut	10	18	28	65
Sugarcane	5	101	106	95

Source of basic data: BAS (2001).

the major farm products, almost 80% of the total person-days in rice farming were hired; for corn, the figure was only a little more than 50%.

Geographic location of poor rice farmers

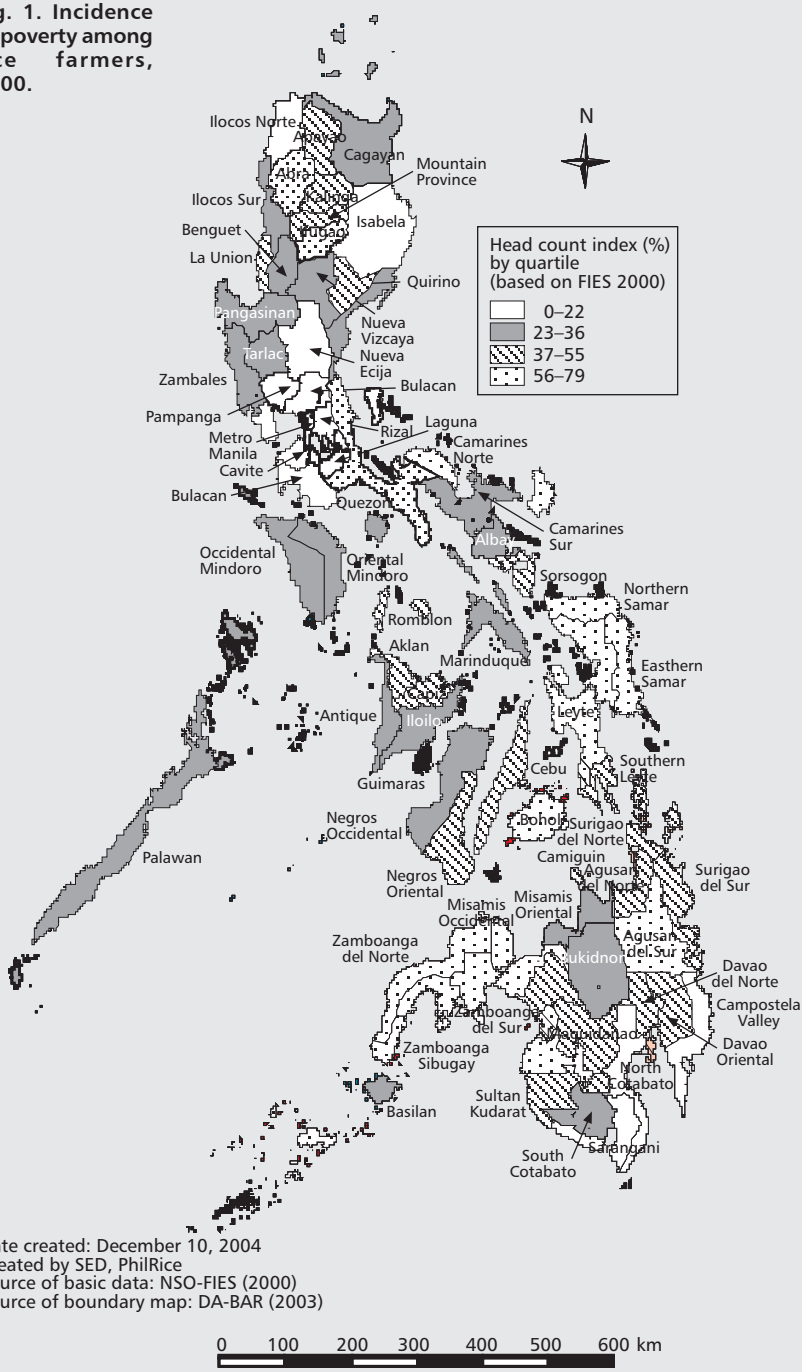
Although rice farmers are better off than other farmers, many rice farmers still live in poverty. Where are most of the poor rice farmers geographically located? Figure 1 shows the percentage of rice farmers living in poverty by province, using the FIES data and the rural PTL. Poverty rates among rice farmers are the highest in the Samar provinces, Sulu, Bohol, Maguindanao, Ifugao, Catanduanes, and the Zamboanga provinces, where more than 60% of rice farmers are living below the poverty line. In the major rice-producing provinces of Nueva Ecija and Isabela, only around 10% and 20%, respectively, were poor.

The PhilRice-BAS (2003) survey, which includes only the major rice-producing provinces, gave similar results. Albay, Bohol, Leyte, Northern Samar, and Sultan Kudarat had the highest percentage of poor rice farmers. Isabela, Nueva Ecija, and the Davao provinces had the lowest percentage.

A full understanding of why rice farmers are poor in these areas is beyond the scope of this study. However, a quick look at selected characteristics of poor rice farmers showed that the poor have a significantly larger family size (6.2 versus 4.5 for nonpoor) and lower levels of educational attainment. These results are similar to those found in Vietnam (van de Walle and Cratty 2004).

Poor rice farmers also have relatively lower income from nonagricultural wages and other sources. Such nonfarm income is important because a small rice farm does not provide sufficient income to escape poverty, owing to the small amount of employment it provides for family members (see section 4). In fact, if the annual family income from rice farming (returns to family labor, land, and net profits) is divided by the number of months actually worked, the imputed monthly salary is quite high (Table 8). Thus, the problem is not so much that rice farming does not provide adequate income—it actually does,

Fig. 1. Incidence of poverty among rice farmers, 2000.



Date created: December 10, 2004
Created by SED, PhilRice
Source of basic data: NSO-FIES (2000)
Source of boundary map: DA-BAR (2003)

Table 8. Imputed monthly rice farm income by province and tenure status.[a]

Province	Irrigated		Rainfed	
	Landowner	Tenant	Landowner	Tenant
Agusan del Sur	21,415	16,044	14,881	11,804
Bohol	25,610	19,480	4,342	3,282
Bukidnon	32,058	21,757	–	–
Camarines Sur	12,708	8,451	3,265	1,285
Iloilo	14,597	10,743	9,860	5,720
Isabela	36,048	27,511	–	–
Leyte	14,750	10,875	4,973	2,610
Nueva Ecija	30,164	21,911	41,909	33,678
Oriental Mindoro	34,327	27,740	12,152	9,412
Pangasinan	24,868	20,400	11,157	8,584
South Cotabato	26,458	19,364	15,350	13,381

[a]Imputed monthly income from rice farming is calculated as total annual income from rice farming divided by the number of months actually worked at the fundamental tasks of growing rice (21.67 working days per month). It is based on the average amount of land operated in each province for each ecosystem. It cannot be multiplied by 12 to obtain annual income, because rice farming does not provide 12 months of full-time employment in a year. Dashes indicate that a negligible amount of land is farmed in those provinces under the respective ecosystem.
Source of basic data: PhilRice-BAS (2003).

given the amount of work that is required (especially on irrigated farms). The larger problem is that a small rice farm does not generate substantial employment for the owner. Without work, it is difficult to escape poverty. The nonfarm economy has an important role to play in providing such employment.

Conclusions

Although a significant percentage of rice farmers are poor as defined by the indicators used in this study, corn and coconut farmers, fishermen, and landless laborers are substantially poorer. These latter groups have less income, spend less money on dietary protein, are able to hire less labor to work their farms, have lower-quality houses, are less likely to have electricity and water faucets in their homes, and are less likely to own a television or refrigerator. This suggests that, although policies to help lift rice farmers out of poverty are very much in order, it is also important to consider the potential impacts on poorer segments of the society and strike a balance that is fair to all.

Notes

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6 Rice trade liberalization will benefit the poor

David C. Dawe

The Philippine rice sector has a long history of protection from import competition, with domestic prices typically being above world market prices for the past 50 to 100 years (Bouis 1982, Dawe 1993). By the late 1970s and early 1980s, however, rice prices in the Philippines were about the same as in Thailand because of increased production from the Green Revolution. Since then, however, prices in the Philippines have increased more rapidly than in Thailand, and Filipino consumers again pay much higher prices for rice than consumers in neighboring Asian countries (see Fig. 2 in the executive summary for a comparison of wholesale rice prices in the Philippines and Thailand). The higher prices paid by consumers are partially due to higher marketing costs and margins (see section 3), but are mainly due to high prices received by Filipino farmers (see section 2), which in turn are due to restrictions on the quantity of rice imports authorized by the government.

The goal of this section is to contribute to an improved understanding of the equity effects of the current high-price policy, that is, how it affects the urban poor, nonrice farmers, rural landless laborers, and different classes of rice farmers in terms of their standard of living. High rice prices at both farm and retail levels transfer income from rice consumers to rice producers, but, since there are both poor consumers and poor rice farmers, do high rice prices help or hurt the poor?

There are two main effects of high rice prices on the well-being of households that are important to understand. First, a family will be helped by high rice prices if it sells more rice than it consumes, that is, if it has a marketable surplus for sale (such families are termed net producers of rice). Conversely, if a family consumes more rice than it produces, it will be hurt by high prices (such families are termed net consumers of rice). The second effect is that high rice prices, by increasing the demand for labor, might cause rice farmers to pay higher wages to landless farm laborers, who are net rice consumers. If these laborers receive a large percentage of their family income from working on rice farms, it is possible that these higher wages are worth more than the

additional money spent on expensive rice. If true, landless laborers would benefit from high rice prices even though they are net consumers of rice.

Net rice consumption of the poor

In the Philippines, rice is a very important commodity in the life of the poor. For the poorest 30% of families, rice constitutes more than 20% of the value of total consumption. This measure of consumption is in gross terms, however, not net. In other words, this 20% of consumption represents a combination of rice purchased at the market by rice consumers and rice consumed by rice farmers out of their own production. To understand which of the two sources is more important for the poor, it is necessary to subtract own-production from consumption to obtain a measure of net consumption.

Using data from the 1997 Family Income and Expenditures Survey (FIES), Balisacan (2000) estimated net rice consumption as a percentage of total consumption for different deciles of the population ranked by income. (The bottom decile is the poorest 10% of the population.) If a given decile produces more rice than it consumes, that group will be net producers or, alternatively, will have negative net rice consumption (with the extra rice being sold on the market). Balisacan found that net rice consumption was highest for the bottom two deciles of the population. For the bottom decile (decile 1), the share was approximately +7.5%, whereas for the second decile it was about +2%. Net consumption was estimated to be negative (i.e., production exceeds consumption) for the middle of the distribution, that is, deciles 4 to 8. These data show that the poorest of the poor in the Philippines are net consumers of rice, not net producers.

Who are these poor net rice consumers? There are at least four major categories, listed here in no particular order. First, perhaps the most obvious category, is the urban poor—they produce no rice and must be net consumers. Approximately 24% of urban dwellers are below the poverty line in the Philippines, accounting for 30% of the poor in the country (NSCB 2002).

The second group is the rural landless, who are often overlooked in many popular discussions of the rural sector. These people own no land themselves (except perhaps for a small homestead), and they are not even able to work as tenants on other people's land. Instead, they work as day laborers on various types of farms, or work in other jobs such as construction or public transportation. A recent survey of agricultural laborer households throughout the Philippines showed that these poor landless people living in rural areas must purchase rice at markets to satisfy their consumption needs, and are net rice consumers. The 2000 FIES shows that the number of agricultural household heads classified as "agricultural, forestry, fishery, and related workers" accounts for 13% of agricultural households. They are not as numerous as farmers, but they constitute a substantial percentage of the rural population. These rural landless are quite poor. Section 5 shows that per capita income for

landless laborer families is 30% below that for rice farmer families.

The third main group is nonrice farmers. Some of these farmers grow a small amount of rice, but most grow no rice at all. Thus, these people are also net rice consumers. Included in this group are corn farmers, farmers of other crops, and fishers. Corn farmers are the poorest group in society, earning 40% less than rice farmers (section 5). Fishers also earn less than rice farmers, as do coconut farmers and farmers who grow other crops. Although rice is the single most important crop, there are many more of these nonrice farmers than there are rice farmers in the Philippines. Collectively, nonrice farmers account for 53% of all agricultural households, while rice farmers account for just 34%.

The fourth and final group is small rice producers who do not produce enough rice to meet even their own family's need. This group is smaller than commonly realized. The poorest 10% of rice farm households market on average 40% of their production (even after subtracting the amount of rice that is sold immediately after harvest and repurchased later in the year because of inadequate on-farm storage facilities). Ultimately, this derives from the fact that it takes much less land than is commonly realized to provide rice for the average family. To feed the average household family of five in the Philippines, usually about one-sixth of a hectare of double-cropped land is needed (assuming national average yields of 3.3 tons per hectare). This is substantially less than average farm sizes of 1.5 to 1.75 hectares. As a result, it is estimated that in any given year only 7% of Philippine rice farmers are net rice consumers.

How would these different groups be affected by a trade liberalization policy that allowed more imports and reduced the high level of rice prices in the Philippines? Unless high rice prices increase labor demand and cause an increase in real wages, the answer is clear: net rice consumers will benefit from lower prices and net rice producers will be hurt. In this situation, trade liberalization will clearly help the poor, since the bottom two deciles of the income distribution are net rice consumers.

Would trade liberalization lead to a decline in real wages for landless laborers?

But what would happen to wages under trade liberalization? With more imports, *palay* (the Filipino word for rice at harvest, before the husk is removed) prices will fall and palay production will be less profitable, requiring rice farmers to make adjustments. These adjustments will be necessary because the costs of rice production in the Philippines are higher than in neighboring countries.

Costs of production are measured by economists as the cash paid out for inputs, for labor, and for machine services, plus the value of any in-kind payments (e.g., a share of the harvest for harvesters), plus the value of any ser-

vices provided by the farmer and his family (family labor and family land). Even though the last of those three categories does not represent costs from the viewpoint of the farmer, it does represent costs to society and thus it is the method used for comparing costs across countries. For example, if farmers did not use their own land and labor to grow rice, the land could be used for some other purpose and they could spend their time engaged in other activities (this is the concept of opportunity cost).

How would rice production costs fall with trade liberalization? There are at least two main ways in which this might happen: lower land values leading to lower land rents, and a lower value of wages for workers who are paid with rice. But these adjustments will ultimately be incomplete—there is no denying that rice farming will be less profitable with trade liberalization. Thus, to regain profitability, some farmers will switch to alternative crops.

One adjustment that would occur is that the value of land in rural areas would fall. This may seem an unlikely outcome because in some rural areas land values are determined by the potential for conversion to housing or commercial use. Land values in these areas are quite high and are not affected by the level of rice prices because this land will ultimately be used for nonagricultural purposes. But these areas are only a small part of the current area occupied by rice farms. Even in the province of Laguna, on the doorstep of Metro Manila, where extensive land conversion has taken place along the main highways, most of the province remains rural, which is obvious to anyone who ventures off the main roads. This is even truer for provinces farther away from Metro Manila.

For most rice farms, land rents are not determined by the conversion value because most rice farms will not be converted to nonagricultural uses. Nearly all farmers who are offered an attractive price for their land so it can be turned into subdivisions or industrial parks opt to sell it because the money is so much more than could ever be made selling rice. Farmers who are still planting rice have not been asked to sell their land at attractive prices, and the value of their land is determined by how much money can be made growing crops. Thus, lower palay prices (lower relative to other crops, not necessarily lower in absolute terms) will lower the value of rice land.

For example, consider tenants who rent land every year from a landlord. The amount of rent they are willing to pay of course depends on how much profit they can make from tilling the land. If palay prices were lower, then they would make less profit and would not be willing to pay as much rent. An empirical study by Jatileksono and Otsuka (1993) found that land rents in Lampung, Indonesia, increased by 500% during the 14 years from 1973 to 1987. This was due to the adoption of modern varieties that led to higher yields and greater profits in rice farming. The principle this demonstrates is clear: more profits in rice farming lead to higher land prices. Thus, lower profits in rice farming will lower land rents, which will in turn lower rice production costs and help to compensate for lower palay prices.

The second adjustment that would occur is that the value of wages to laborers who are paid in kind would also decline. This will lower production costs as measured above, helping to bring Philippine costs in line with those in other countries and bringing profits closer to those in other countries. On the other hand, this decline in the value of wages will not affect the laborers themselves because they are still receiving the same physical quantity of rice to eat.

But, as mentioned above, lower land rents and lower wages paid in kind will not completely restore rice profitability. Thus, the third adjustment that would occur is that many farmers would switch crops in order to restore profits. The effect of this adjustment on demand for labor will depend on the labor intensity of the crops that are grown as alternatives to rice. It is difficult to know which alternative crops farmers will plant as a result of more imports, but it is important to keep several facts in mind. First, as is well known, much land that is planted to rice has little alternative use. In the wet season, when much land is flooded, farmers often have only two choices: grow rice or leave the land fallow. Because the opportunity cost of land is so low in the wet season, most of this land will likely remain in rice production even with a substantial fall in prices. Rice will be the dominant wet-season crop in the Philippines for many years to come, regardless of how much trade liberalization occurs.

In the dry season, however, more choices are available. In 1999-2001, rice area harvested in the first semester of the year (January to June, which is the dry season in most of the country) accounted for 43% of the total annual harvested area. This is a much larger percentage than was the case in the early 1970s, when the first-semester share of area was about 32%. Thus, dry-season rice is an important crop.

Alviola et al (2002) conducted surveys in several Philippine provinces with rice-based farming systems where rice was grown in the wet season in conjunction with any of a wide range of vegetable crops. Almost without exception, they found that these alternative crops were profitable without tariff protection, that is, the Philippines has a comparative advantage in vegetable production. Furthermore, nearly all of these crops are substantially more labor-intensive than rice. Thus, if more rice imports induced farmers to plant more vegetables in the dry season, this would increase the demand for unskilled labor. Of course, growing vegetables is riskier than growing rice, even if it is more profitable, and the government and private sector would need to find ways to reduce this risk.

Farmers might also diversify into other crops besides vegetables. The most likely alternative is corn, for which demand continues to increase more rapidly than for rice. Large parts of Mindanao and the Cagayan Valley already grow both corn and rice, and more rice imports would encourage a shift to corn in these areas. Corn and rice use similar quantities of labor per hectare (BAS 2001), so there is unlikely to be a reduction in labor demand with such

a shift in cropping patterns. The only important crop in the Philippines that is less labor-intensive than rice is coconut, but it is highly unlikely that major rice-growing areas will shift to coconut as a result of more rice imports.

All three of these factors (lower land rents, lower value of in-kind wages, growing alternative crops) will help to restore profitability and reduce the need to cut cash wages paid to landless laborers. Furthermore, although many Filipinos are unemployed, working on rice farms is far from the only job available in most rural areas. If rice farmers try to cut cash wages paid to these laborers, they will have incentives to look elsewhere for other jobs. In some areas, the availability of alternative opportunities will prevent any decline in wages; farmers will not be able to hire anyone to work on their farm if they try to lower wages. In other areas with limited job opportunities, there might be some downward pressure on wages, but this should be mitigated by the adoption of crops other than rice (and the other factors discussed above). In addition, these areas are usually more remote, and the impact of trade liberalization will be much less in these areas because they will be protected from the influence of imports by the very high transportation costs.

In summary, it seems unlikely that more rice imports would lead to a decline in wages because of a lower demand for unskilled labor. First, land markets will absorb some of the impact through lower land rents. Second, a reduction in the value of labor payments in kind will further lower production costs. Third, the main crops alternative to rice in the dry season are vegetables, which are more labor-intensive than rice, and corn, which is of equal labor intensity. Because of these factors, landless laborers will unambiguously benefit from greater imports that lead to lower rice prices. They will benefit directly from lower rice prices because they are net consumers of rice, and indirectly they will benefit to the extent that rice farmers switch to more labor-intensive vegetable farming.

The effects of trade liberalization on different types of rice farmers

Although lower rice prices are likely to help landless laborers, it is almost certain that they will hurt the 34% of agricultural households that are rice farmers. Included in this group of rice farmers are landowners and tenant and leasehold farmers. Tenant and leasehold farmers will be hurt less than landowners because much of the adjustment to rice trade liberalization will come through lower land rents that help tenant and leasehold farmers.

Permanent laborers will also be affected. They are typically landless, but they assume all management responsibilities for the farm, including the hiring of other laborers, and are paid with a percentage of the harvest. They are becoming increasingly common on many rice farms, and are typically net sellers of rice because their percentage of the harvest is more than enough to

Table 1. A comparison of different types of rice farmers in the Philippines, top and bottom quintile, 1996-97.

Item	Top quintile	Bottom quintile
Monthly household income, family of six	31,719 pesos	2,078 pesos
Planted rice area per year	4.2 hectares, irrigated	1.3 hectares, rainfed
Monthly nonfarm household income, family of six	9,991 pesos	307 pesos
Percent of agricultural income from nonrice	11	25
Percent of labor that is hired	90	51
Percent of national marketed surplus	44	6

Source of raw data: PhilRice-BAS survey of rice-based farm households. Data on income are adjusted for inflation to 2004 prices.

meet family consumption needs. To the extent that they sell rice, they will be hurt, although their rice sales are much smaller than for rice farmers. On the other hand, they will also have the option of finding alternative employment, including the possibility of managing farms that switch from growing rice to alternative crops.

As mentioned earlier, rice farmers tend to be wealthier than the more numerous nonrice farmers who will benefit from lower rice prices, but rice farmers are still an important group as there are many poor rice farmers. To understand the effects of lower rice prices on rice farmers, it is important to realize that rice farmers in the Philippines are not a homogeneous group. Some rice farmers are indeed poor but, perhaps surprisingly, many others are quite well-to-do. The analysis in this chapter will compare two groups of rice farmers: the poorest 20% (the bottom quintile) and the wealthiest 20% (the top quintile) (Table 1).

First, the annual per capita income of the wealthiest rice farmers is much greater than that of the poorest. The average income of the top 20% of rice farm households (ranked according to per capita income) is 15 times as large as the average income of the bottom 20%! This indicates great disparities in income among different rice farm households. This top fifth of rice farm households is located in the top half of the national income distribution: they are not poor.

Second, the richest rice farm households tend to have larger landholdings of higher quality (i.e., irrigated as opposed to rainfed) than the poor. The top fifth of rice farm households plants on average 4.2 hectares of rice per year (including double cropping), while the poorest fifth plants just 1.3 hectares (again, including double cropping if any).

Third, the richest rice farm households have much higher levels of nonfarm income than the poor. In per capita terms, the top fifth of rice farm households has nonfarm income that is more than 30 times as large as that of the bottom fifth.

Fourth, cropping patterns on the richest rice farms are more specialized in rice than are the cropping patterns of poor households. While the poorest fifth of rice farm households obtains 25% of its agricultural income from nonrice crops, the richest fifth obtains just 11%. Thus, while lower rice prices will force rice farmers to diversify their cropping patterns, it appears that poor farmers have already made this adjustment to some extent. The burden of learning how to manage new crops will fall disproportionately on the rich.

Fifth, the richest rice farm households (the top quintile) hire in nearly all of their labor. On average, 90% of the labor used on their rice farms is hired (not including any reciprocal exchange labor). For the poorest fifth of rice farm households, just 51% of the labor is hired, with the remainder coming from their own family. Thus, the richest rice farm households operate like businesses, not family farms.

Rice farmers themselves occasionally work on other farms, but today this is rare and accounts for just 5% of total income even for the poorest quintile of rice farmers. In fact, the average rice farm household in the Philippines works just about 36 days in rice farming per year. If each household has two working members who share responsibility for the farm, that amounts to just 18 days per adult per year, or 1.5 days per month on average! Rice farming is clearly not a full-time occupation for either rich or poor farm households.

Sixth, nearly half (44%) of the rice marketed surplus in the Philippines comes from the top quintile of rice farm households. A further 23% comes from the second quintile. Since high rice prices benefit rice farmers only when they have a surplus to sell, this means that the wealthiest 40% of rice farm households receive two-thirds of the benefits of this policy, with relatively little accruing to poor rice farm households.

Conclusions

The main beneficiaries of the current high price policy are, of course, rice farmers. However, the wealthiest rice farm households, which have large amounts of nonfarm income and hire in nearly all the labor necessary to grow the crop, receive most of the benefits. Poor rice farmers do benefit, but they receive very little.

Many groups are harmed by high rice prices. These groups include the urban poor, rural landless laborers, corn and coconut farmers, fishers, and small rice farmers who produce no marketed surplus. All of these groups are poorer than rice farmers who produce a surplus for sale. If more imports had been allowed during the past ten years so that domestic prices were the same

as world prices, this policy would have given every poor family of six an additional 6,000 pesos of income per year, which they could have used to pay school fees or medical fees or buy more nutritious food such as milk and eggs for the children. A study by Block et al (2004) in rural Central Java, Indonesia, found that, when rice prices increased in the late 1990s, mothers in poor families responded by reducing their caloric intake in order to better feed their young children, leading to an increase in maternal wasting. Even worse, purchases of more nutritious foods were reduced in order to afford the more expensive rice. In turn, this led to a measurable decline in blood hemoglobin levels in young children and in their mothers. This malnutrition induced by high rice prices increases "the likelihood of potentially irreparable developmental damage to young children" (Block et al 2004).

It is true that the National Food Authority (NFA) distributes rice at low prices, with a view to subsidizing the consumption of poor rice consumers. However, much of the rice that is actually sold as NFA rice is not subsidized at all—it is well known that much of the rice sold by NFA to traders is relabeled and sold elsewhere, with traders then substituting their own very low quality rice and selling it as NFA rice. This problem arises only because the government restricts rice imports and keeps Philippine prices above world prices—if domestic and world prices were similar, there would be no opportunities for taking cheap rice from the world market and selling it at a high price on the domestic market. Furthermore, even if this problem could be avoided, it is still difficult and administratively costly to target subsidized rice to the poor and make sure that others do not benefit from the subsidies.

The high level of rice prices also impedes diversification into higher-value crops. More rice imports would lead to more crop diversification in the dry season, which could help rice farmers to increase their income (although they will have to manage more risk). It should be noted that much dry-season rice is not a "traditional" crop: the share of dry-season rice in the early 1970s, when Philippine rice farming was not protected, was much lower than it is today. Thus, farmers would not necessarily be abandoning traditional farming systems.

Would more rice imports compromise Philippine food security because of an unstable world rice market? First, it is important to realize that, for poor households, food security is very dependent on the level of rice prices. When rice prices are high, poor households are not food-secure. Thus, strong import restrictions like those in the Philippines directly reduce food security. Second, the world rice market is much more reliable than it was in the past because of more stable world production and more active participation of commercially oriented rice exporters in the market. (For more details, see section 7 in this book.) Malaysia has adopted a strategy of increased reliance on imports, and during the past few years has routinely imported at least 30% of its domestic consumption. Thus, if the Philippines does substantially liberalize its domes-

tic rice market to allow more imports, it will be able to obtain those supplies reliably without endangering its food security.

Notes

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Note: For more details, please consult the following reference: Dawe (2003). See page 162 for the complete reference.

7 The world rice market can be trusted

David C. Dawe

The world food crisis of 1973 to 1975, when the price of imported rice skyrocketed, continues to shape the attitude of Asian policymakers toward food security. Occurring as it did in a period of volatility in the world rice market, the crisis has encouraged policymakers ever since to pursue self-sufficiency in rice with little regard for the costs. Analysis of the changing structure of the post–World War II market, and in particular of sturdy trends over the past two decades, suggests that Asian rice importers can now afford to rely on the world market for assured access to adequate supplies of affordable rice more than was warranted in the past.

Throughout the second half of the 20th century, Asian rice harvests steadily improved in per capita terms and became more stable. Prices and their variability nevertheless exhibited three distinct phases. Rice prices were high and relatively stable in 1950-64, still high but substantially more variable in 1965-81, and low and very stable in 1985-98 (Table 1).

Trends in the level and stability of Asian rice production go a long way toward explaining these trends in world rice prices (Fig. 1). Most strikingly, the plunge in world prices in 1982-84 coincided exactly with a sharp increase in per capita rice production in Asia (Fig. 2). Since this production surge, the magnitude of year-to-year fluctuations in per capita production has been markedly lower than previously, with fluctuations greater than 3% occurring only four times in the past two decades, compared with 22 times in the 29 years from 1952 to 1980. The average absolute value of annual changes in per capita production was 4.4% in 1952-64, 3.7% in 1965-81, and just 1.6% in 1985-98. This improvement in stability is due mainly to the spread of irrigation and improved pest and disease control achieved in part by the development of modern rice varieties that are progressively more resistant to pests and diseases.

But why were world rice prices relatively stable in the earlier 1950-64 period despite very unstable production? For most of the 20th century, the major rice exporters were the nations of mainland Southeast Asia: Thailand, Myanmar, Cambodia, and Vietnam. (The United States is also a major ex-

Table 1. Characteristics of the world rice economy, selected periods.

Period	1950-64 (pre-Green Revolution)	1965-81 (Green Revolution)	1985-98 (post-Green Revolution)
World rice production			
Level (per capita)	Low	Medium	High
Variability	High	Medium	Low
Trade structure			
Number of commercially oriented exporters	Many	Few	Many
Prices			
Level	High	High	Low
Variability	Low	High	Low
Average yield, world (tons per hectare)	1.88	2.42	3.54
Modern variety adoption as percentage of planted area, end of period			
Bangladesh	0	22	61
India	0	48	74
Indonesia	0	61	81
Myanmar	0	53	61
Philippines	0	79	89
Thailand	0	13	16
Vietnam	0	17	89
Irrigated area as percentage of planted area, end of period			
Bangladesh	5	13	32
India	37	42	50
Myanmar	14	18	30
Philippines	30	48	65
Thailand	26	23	20
Vietnam	–[a]	41	52

[a]Data not available. Sources of information or data: production structure, trade structure, prices: discussion in text. Yield: FAO (2005). Modern variety adoption, irrigated area: IRRI (2005).

porter, but the main destination for its exports is within the Americas and it affects the Asian trade relatively little.) During the 1950s, Myanmar and Thailand dominated world rice exports, with Cambodia also an important player (Table 2). More important, exports were a large share of domestic production for these countries (Fig. 3), encouraging them to be commercially oriented reliable suppliers. Thus, whenever a shortfall in Asian rice production occurred, one or more would typically step in to fill the breach and prevent world prices from spiraling out of control.

For example, there were large declines in per capita production in 1954 and 1957 (because of a major La Niña event in 1954-55 and a major El Niño event in 1957-58; NOAA 2000). To meet the shortfall in 1954, Burma stepped

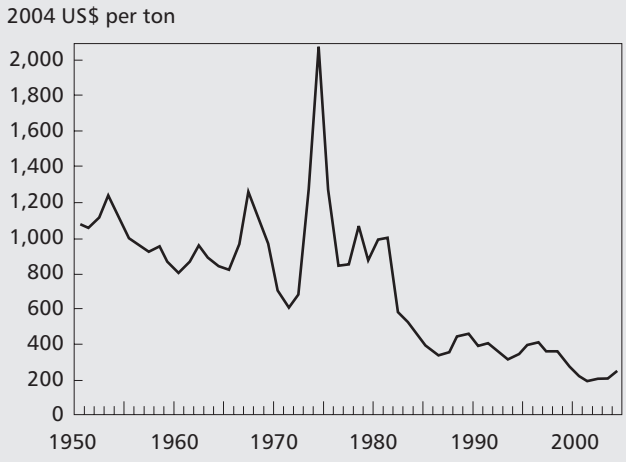

Fig. 1. Inflation-adjusted world market rice prices, 1950-2004, Bangkok. Prices refer to a specific quality of rice (100B), excluding freight and insurance costs (known in the trade as f.o.b. for free on board). Source of raw data: IMF (2005).

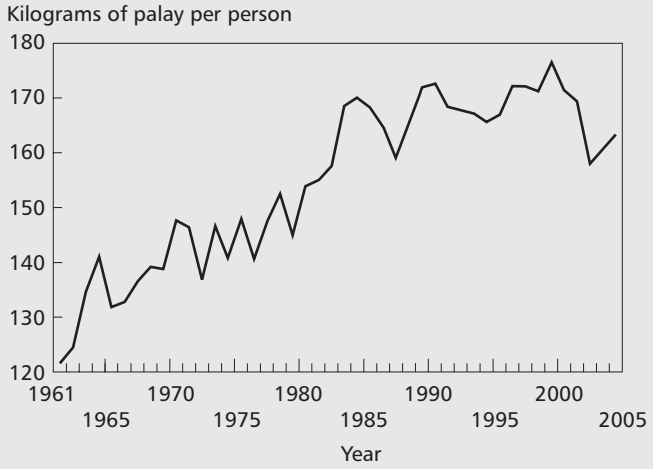

Fig. 2. Per capita Asian rice production, 1961-2004. Note: Asia includes the following 13 countries: Bangladesh, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam. Source of raw data: FAO (2005).

into the market and exported a then-record 1.7 million tons, followed by another record of 2.0 million tons in 1955. In these two years, its share of exports in domestic production surged to 49%, relative to an average of just 33% in the preceding three years. In 1957, Asian per capita production fell by 4%. Aggravating matters, production dropped sharply in the two major exporters, by 15% in Burma and 33% in Thailand. Nevertheless, these two countries responded. Exports from Burma fell compared to the record high of the previous year, but they still reached 43% of domestic production in spite of

Table 2. Leading rice-exporting and -importing countries, selected periods, with average annual level of exports/imports during each period (in millions of tons of milled rice).

Country	1950-64	Country	1965-81	Country	1985-98
			Exports		
Myanmar	1.52	USA	2.03	Thailand	5.12
Thailand	1.38	Thailand	1.75	USA	2.55
USA	0.80	China	1.62	Vietnam	1.60
China	0.69	Myanmar	0.59	India	1.42
Cambodia	0.47	Pakistan	0.58	Pakistan	1.29
Egypt	0.22	Italy	0.34	China	1.10
Italy	0.19	Egypt	0.32	Italy	0.61
Vietnam	0.16	Japan	0.30	Australia	0.47
Pakistan	0.12	Australia	0.18	Uruguay	0.39
Brazil	0.06	N. Korea	0.17	Myanmar	0.29
World	6.05	**World**	9.23	**World**	16.72
As percent of world total:					
Top 5	80		71		72
Top 10	93		85		89
			Imports		
Indonesia	0.70	Indonesia	1.02	Iran	0.77
Japan	0.66	Vietnam	0.62	Indonesia	0.75
India	0.58	South Korea	0.51	Brazil	0.68
Malaysia and Singapore	0.53	India	0.42	Saudi Arabia	0.47
Sri Lanka	0.47	USSR	0.40	China	0.47
Hong Kong	0.31	Hong Kong	0.36	USSR/CIS	0.47
East Pakistan	0.25	Sri Lanka	0.35	Iraq	0.46
Cuba	0.20	Bangladesh	0.31	Philippines	0.42
West Germany	0.13	Malaysia	0.29	Malaysia	0.40
Philippines	0.11	Singapore	0.24	Senegal	0.40
World	6.10	**World**	9.30	**World**	16.05
As percent of world total:					
Top 5	48		32		20
Top 10	65		49		33

Sources of raw data: Palacpac (1977) for 1950-60, FAO (2005) for 1961-98. World exports and imports are not equal in any particular year in original data sources. USSR is not included in 1950-64 imports because of data availability constraints.

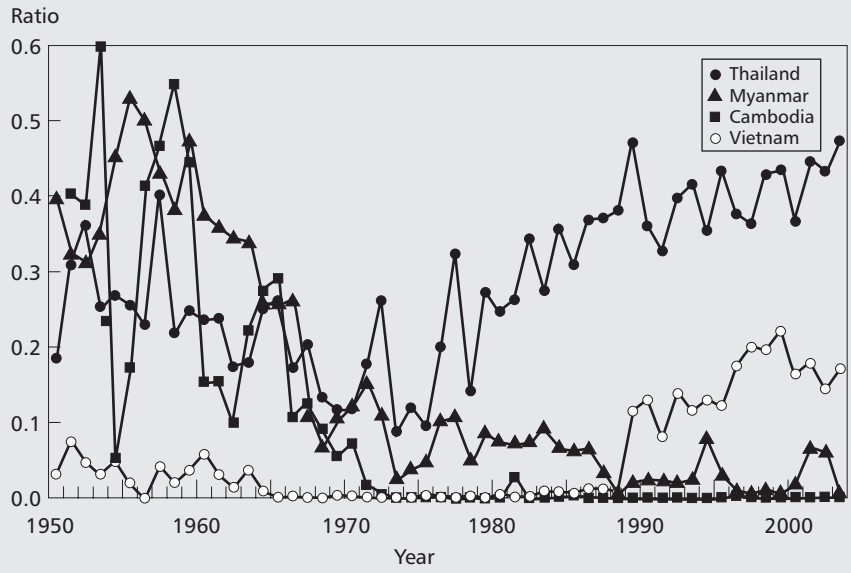

Fig. 3. Ratio of exports to domestic production, 1950-2003: Thailand, Myanmar, Cambodia, and Vietnam. Source of raw data: Palacpac (1977), FAO (2005).

the production shortfall. Thailand enacted quantitative restrictions at this time (Siamwalla 1975), but they were not very severe in their effect as exports hit a near record of 1.5 million tons, with 40% of production being sent to the world market. As a result of exports from these two countries, world prices barely budged during the mid- to late 1950s.

The situation had changed considerably by the mid-1960s, when a major El Niño event led to a sharp fall of 6% in per capita Asian production in 1965. By this time, Burma was well into a period of sharp decline because of restrictive government policies, and the proportion of Cambodia's production that found its way onto world markets was also falling. South Vietnam banned exports in 1965, and even Thailand was becoming less commercially oriented and more willing to constrain exports to stabilize domestic prices.

By the 1970s, the world market was even more unsettled, as production shortfalls caused by severe El Niño and La Niña events were exacerbated by the inaction of traditional commercial rice exporters—the situation that snowballed into the world food crisis of 1973-75. Thailand completely banned rice exports for several months, and supplies were exceedingly difficult to come by.

The world market has changed considerably, however, since then. Because economic development and rising living standards have reduced the amount of rice eaten by Thais compared to the 1970s, 40% of Thailand's

production is now exported. It is no longer feasible to ban exports, as its entire rice economy would collapse if it did so. This reemergence of Thailand (and Vietnam) as commercially oriented rice exporters was an important factor in stabilizing the world market in 1998 in the face of a major El Niño event. Other exporters complement Thailand and Vietnam—notably Pakistan, China, and India—and their willingness to supply world markets lends added stability in times of crisis. World rice prices are now more stable than world wheat or corn prices.

What does the future hold for the world rice market? Prices declined substantially in the last half of the 1990s. The magnitude of this drop recalls the precipitous decline that occurred in the early to mid-1980s, and the reasons behind it were similar: broadly higher production, curtailed Indonesian imports, and a weak Thai baht. In early 2004, however, world prices increased after China's rice production declined for the sixth consecutive year, raising concerns among many about an unstable world market. But, in fact, world prices increased only 20% (comparing averages in 2003 and 2004). Since then, China's production has increased once again and world prices have stabilized. Even this new, higher level of world prices is still below domestic prices in the Philippines and, after adjusting for inflation, it is still much lower than world prices were before 1999.

It seems likely that world prices will remain generally stable for the medium term because of the prevalence of irrigation in rice production, the improved pest and disease resistance of modern varieties, and—a factor that has received little fanfare—the reemergence and strengthening of the commercial orientation of major rice exporters. None of these trends is likely to be reversed, and Myanmar and Cambodia may rejoin the ranks of important stabilizing forces once again within the next decade. Rice consumption per person in China is also declining, meaning there will be less pressure on total Asian supplies despite the very recent (2002 to 2004) decline in per capita Asian production.

As more concrete evidence, the world rice market has recently weathered two major shocks—the 1998 El Niño and the sudden disappearance of China's exports—without a large increase in prices. When the El Niño drought forced Indonesia to suddenly enter the world market for 6 million tons of imports, world prices barely increased.

It is unlikely that, even with complete liberalization and a zero tariff, the Philippines would need to import 6 million tons of milled rice in a single year. Furthermore, the impact of more Philippine imports on world prices will be much less if these imports are made consistently from year to year because consistent demand will encourage exporters to increase rice production beyond current levels. Malaysia has adopted such a strategy of increased reliance on imports, and during the past few years has routinely imported at least 30% of its domestic consumption. Of course, Malaysia is much smaller than the Philippines, but, since 1996, Indonesia has imported nearly double the

quantity of rice imported by the Philippines, showing that the world market can supply large quantities to individual countries. Thus, if the Philippines does substantially liberalize its domestic rice market to allow more imports, it will be able to obtain those supplies reliably without endangering its food security.

Although the world market is more stable than it was in the 1970s, prices will still increase on occasion, as happened in 2004 and 2005 when China ceased being a major net exporter to the world market. The danger of a crisis on the world market is ultimately that high prices will make it difficult for the poor to buy food. But the current policy of restricting imports has raised prices to consistently high levels for the past 20 years, making it difficult for the poor to buy food on a regular basis, not just in the occasional time of crisis. A more open trade policy will allow domestic prices to decline, and make it easier for the poor to afford food security.

Notes

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Note: This section borrows heavily from Dawe (2002b). See page 162 for the complete reference.

Improving productivity in the rice sector: solutions for farmers

8 Use of hybrid rice in suitable areas can improve farmers' yield and income

Cheryll B. Casiwan

To increase local rice production, hybrid rice is being promoted in the Philippines through the national hybrid rice commercialization program (HRCP). Hybrid rice results from a special type of cross-pollination of two distinct superior rice lines, and offers the possibility of increasing farmers' yields and income beyond those that can be achieved with regular modern varieties. The main components of the program are technology improvement and promotion, hybrid seed production, and support to the farmers who are using the new seeds. Six hybrid rice varieties (Mestizo1, Mestizo2, Mestizo3, SL8, Bigante, and Rizalina) are now commercially available for planting. The first three varieties are public-bred hybrids, whereas the latter were developed by private companies. Mestizo1, the most popular, is aromatic and soft and has an eating quality comparable with that of the Philippine-preferred IR64 variety.

Figure 1 shows that, from 5,000 hectares in the 2001 wet season (WS), total area planted to hybrid rice in the country increased gradually to 188,000 hectares in the 2005 dry season (DS). During 2004-05, hybrid rice accounted for about 7% of total rice area planted in the country. Isabela in Region 2 has the largest area planted to hybrid rice, with more than 20,000 hectares in 2004. Isabela also has the largest area devoted to hybrid seed production of any province. Other major sources of hybrid rice seed are Davao Oriental, Davao del Sur, and Nueva Ecija.

Yield advantage of using hybrid rice varies substantially by season and by location

Data gathered from the Department of Agriculture (DA) based on 2001 to 2004 provincial monitoring reports show that, on average, across all provinces, the estimated yield advantage of hybrid rice over inbred rice in the program areas was 27% during the WS and 39% during the DS (DA-FOS 2005). For individual provinces and seasons, however, the average yield advantage of hybrid rice over inbred rice ranged widely, from –33% to

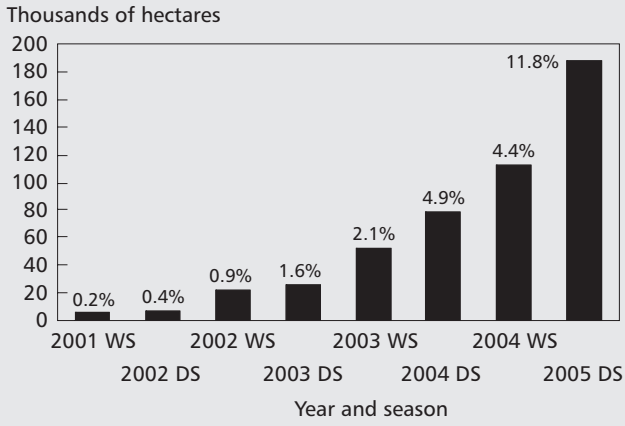

Fig. 1. Area planted to hybrid rice in the Philippines, 2001 WS to 2005 DS (percentage of total rice area harvested above column). Source of basic data: DA-FOS (2005), PhilRice-BAS (2004), BAS (2005).

123%. In the 2004 WS, for example, the highest provincial yield advantage of hybrid rice was 80% (Quirino), while the lowest was 0.9% (Antique). The standard deviation across provinces of hybrid rice yields (0.81 to 1.17) was almost double that of inbreds (0.49 to 0.63), which suggests that yield varies more across locations for hybrid rice.

Two separate random farm surveys covering program and nonprogram areas reached a similar conclusion. Data from a survey of 4,112 hybrid and inbred rice farmers covering 15 provinces (conducted by the Bureau of Agricultural Statistics and the GMA-Rice Program Directorate of the Department of Agriculture; BAS-GMARPDDA 2004) showed that the average yield advantage of hybrid seeds over inbred certified seeds in program areas was 28% during the 2003 DS and 16% during the 2003 WS. The average yield advantage for individual provinces, however, ranged widely, from –70% to 56%. Of the 15 survey provinces, hybrid rice performed well in both seasons in Kalinga, Oriental Mindoro, Albay, Camarines Sur, and Leyte. It performed poorly, however, in Nueva Vizcaya, Iloilo, and Surigao del Norte.

The PhilRice Socioeconomics Division (SED) and STRIVE Foundation also conducted a detailed farm-level survey of around 500 farmers from the five major hybrid rice-growing provinces (Isabela, Nueva Ecija, Iloilo, Davao del Norte, and Davao del Sur), covering the 2002 WS to 2004 DS (Bordey et al 2005). Survey results showed that hybrid rice gave a 13% yield advantage during the DS and 9% during the WS. Again, the standard deviation of hybrid yields (across farmers) was relatively higher (1.5 to 2.4) than with inbred yields (1.2 to 1.7). Hybrid rice, particularly Mestizo1, performed consistently better than inbred rice in Davao del Norte and Isabela. In Iloilo, Nueva Ecija, and Davao del Sur, it performed well on some farms, but not very well on others.

The data from the SED-STRIVE survey show that farmers use a relatively higher level of inputs for hybrids. One can then argue that the yield advantage may not necessarily be due to the use of hybrids, but to greater input use. Regression analysis, however, confirms the yield advantage of hybrids even after accounting for the effects of greater input use. However, this yield advantage was statistically significant only in the DS.

To summarize, multiple farm surveys conducted in many different provinces show that hybrid rice gives higher yields than inbred rice on average. On the other hand, the yield advantage is not consistent: it varies from farmer to farmer and province to province. Focusing promotion and commercialization of hybrid rice in the more suitable areas will help farmers in these areas improve their productivity. In areas where hybrid rice is currently performing poorly, it will be important to conduct research and development activities on new hybrid rice varieties, adaptation trials to determine which hybrid variety is suitable in specific locations, and crop management research.

Hybrid rice production is significantly more profitable than inbred rice during the dry season

Bordey et al (2005) found that, in the 2004 DS, the average gross value of production for hybrid rice, given an average 5.3 tons per hectare yield and ₱9 per kilogram farm-gate palay price, was around ₱48,000 per hectare (see Fig. 2). This is about ₱6,200 per hectare higher than the gross value of production for inbred varieties. The total costs of production, on the other hand, were about ₱28,500 per hectare for hybrid rice compared with around ₱27,000 for inbred rice. Thus, although the production costs of hybrid rice are higher than those of inbred rice, the net profit from hybrid rice production was significantly higher than from inbred rice during the DS. During the WS, especially in provinces with distinct wet and dry seasons, there was higher variability in yield and profit from hybrid rice than from inbred rice. Thus, although the net profit was still higher with hybrid rice in the WS, the profit advantage was less than in the DS and was not statistically significant.

Data show that the higher production costs of hybrid rice are due largely to higher seed and hired labor costs. The subsidized price of hybrid seeds is ₱1,200 per 20-kilogram bag (50% of true seed price), which is good for 1 hectare, while the price of a 40-kilogram bag of certified seeds is ₱650. Hired labor costs are higher for hybrid rice because of the higher crop establishment cost (only one seedling per hill is planted), and the higher harvesting and threshing shares because of higher yields. Hybrid rice farmers also incurred relatively higher fertilizer and pesticide costs. The higher fertilizer cost for hybrids is due to the higher use of organic fertilizers.

Even if the seed price is not government-subsidized, hybrid rice production will still give higher net returns than inbreds given the yield advantage

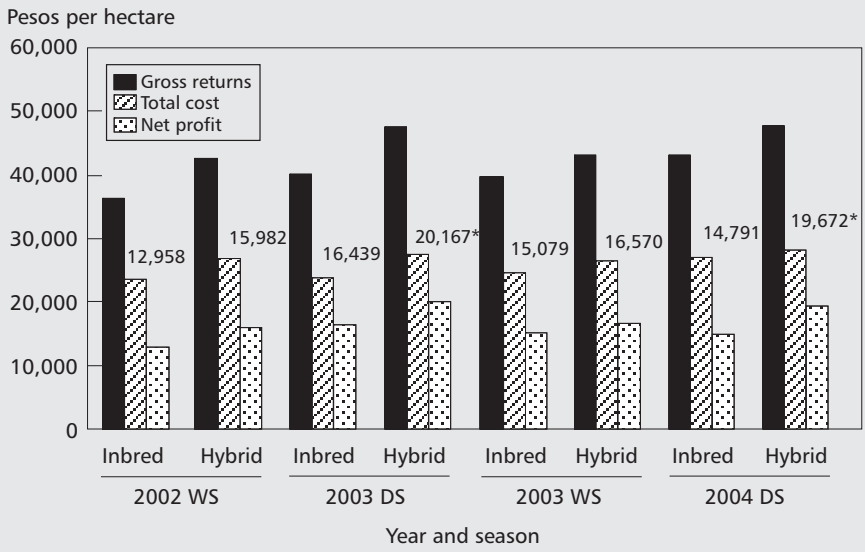

Fig. 2. Mean comparative returns, costs, and net profit of hybrid and inbred rice production, five provinces, 2002-04. * = Significantly different at 1% level of significance. Source of raw data: PhilRice SED-STRIVE survey, 2002-04 (Bordey et al 2005).

calculated from the SED-STRIVE survey of about 0.5 ton per hectare. The profit advantage is greater in the DS than in the WS. The incremental rate of return for using hybrids is 76% in the DS and 20% in the WS even without the seed subsidy. In some locations, however, particularly in the WS, the incremental profit from hybrids was not enough to offset the incremental cost. Efforts to increase the yield advantage and lower the seed cost should be prioritized to ensure a profit advantage to farmers.

Sustained demand for hybrid rice seeds and participation of private seed companies are the keys to making the hybrid rice seed industry sustainable

With average seed yields of individual seed growers now at 700–800 kilograms per hectare, and seed yields among private companies even higher at around 1.0 ton per hectare, lower prices of hybrid rice seeds can be expected in the future. This will increase demand from farmers for hybrid rice by helping to lower seed costs. Even when seed subsidies are eventually phased out, farmers will continue to plant hybrids provided they are better and more profitable than other varieties. Farmers do accept new varieties: for example, PSB Rc82 was released in 2000 and had already

been adopted by 10% of the farmers less than two years later even without a special promotional effort.

Hybrid rice is already increasing productivity among rice farmers in the Philippines. It is difficult to judge just how much impact it will ultimately have, but it was already planted on nearly 12% of dry-season area in 2005, a substantial achievement. This rate of adoption is slower than for the semi-dwarf modern varieties of the Green Revolution, which, just four years after release, had already been adopted on 56% of DS area (and 45% of WS area) by 1970 (raw data from PhilRice-BAS 2004).

But such a comparison, while interesting, can also be misleading because a technology can have substantial benefits without being a "revolution." If the national rice program target adoption area for hybrid and inbred rice (the sum of which is equal to about one-fourth of the country's total rice area) is achieved by 2007, and the average yield in these cluster areas is 6.5 and 5.5 tons per hectare for hybrid and inbred rice, respectively, then the total additional production will be sufficient to completely offset the current level of imports plus the additional rice needed to feed the increased population of the next few years. This could be called self-sufficiency, but it would be self-sufficiency at current levels of domestic prices, not self-sufficiency at the level of world prices. To achieve self-sufficiency at international prices (which is the current situation in Thailand and Vietnam, and is what the Philippines temporarily achieved in the early 1980s), it will be necessary to have the technology adopted even more widely.

To achieve more widespread adoption, it is important to reduce performance variability across locations and seasons. Thus, substantial research and adaptation will still be required for hybrid rice to make a large, widespread impact on productivity, making it crucial to involve private firms not reliant on the government for funding. Thus, efforts at encouraging the participation of private seed companies should continue, not only in hybrid rice seed production and marketing but also in R&D activities for the development of new hybrids. There is much to learn from the promotion and marketing strategies that have led to the success of the Bigante hybrid. Technical support and assistance to smaller hybrid rice seed growers and seed grower cooperatives should also be continued.

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9 Mechanization and saving labor are the keys to making rice more competitive

Piedad F. Moya and David C. Dawe

Rice production costs in the Philippines are higher than in neighboring countries. Lower costs of production per ton would result in higher profits for farmers and lower prices for consumers. The country faces a challenge of developing production technologies that are competitive with those of foreign rice economies.

A study conducted by the International Rice Research Institute in collaboration with PhilRice showed that, in 1999, it cost US$96 to produce a ton of *palay* (the Filipino word for rice at harvest, before the husk is removed) in Central Luzon compared with only $59 in the Central Plain of Thailand and $74 in the Mekong Delta of Vietnam (Table 1). Machinery and labor costs account for most of the difference, with material input costs constituting only a small percentage of the difference.

For example, the costs of fertilizer, seeds, and pesticides in the Philippines are similar to those in Thailand and Vietnam. Although farmers worry

Table 1. Comparative costs of rice production, US$ per ton, 1999.

Cost/items	Central Luzon, Philippines	Central Plain of Thailand	Mekong Delta, Vietnam	Difference	
				Phil-Thai	Phil-Viet
Fertilizer	15	12	10	3	5
Seeds	7	6	6	1	1
Pesticides	5	8	5	–3	0
Other costs	3	0	2	3	2
Material inputs	*30*	*26*	*23*	*4*	*8*
Labor	54	19	47	35	7
Machinery and fuel	12	14	4	–2	8
Labor and machinery	*66*	*33*	*51*	*33*	*15*
Total cost per ton of paddy	**96**	**59**	**74**	**37**	**23**

Source: Moya et al (2004).

Table 2. Labor costs as a percentage of total nonland costs, by province and ecosystem.

Province	Irrigated		Rainfed	
	WS	DS	WS[a]	DS
Agusan del Sur	53	62	55	69
Bohol	69	80	69	80
Bukidnon	51	60	–	–
Camarines Sur	56	64	59	72
Iloilo	58	57	59	62
Isabela	49	59	–	–
Leyte	70	81	75	78
Nueva Ecija	56	58	61	–
Oriental Mindoro	63	61	60	63
Pangasinan	65	62	69	67
South Cotabato	51	54	57	46

[a]WS = wet season, DS = dry season, – = negligible production in that province and ecosystem.
Source of raw data: PhilRice-BAS (2003).

that fertilizer prices are higher in the Philippines, data from 1994-2002 show that the price of urea in Vietnam and Thailand was only about 8% lower than in the Philippines (FADINAP 2005). This difference does not have a substantial effect on production costs. Indeed, in the case of Thailand, the lower expenditures on fertilizer are completely offset by higher expenditures on pesticides because Thai farmers use much higher amounts than Filipino farmers.

More than half of the production costs in Central Luzon are for labor, so large reductions in production costs will be difficult to achieve without reducing labor input. This pattern is true for rice production throughout the Philippines—labor is always by far the most important cost of production (see Table 2 for data on 11 different provinces). In rice farming, the tasks that consume the most labor are harvesting, threshing, and crop establishment (see Fig. 1). Central Luzon rice farmers use manual labor for harvesting and a small portable thresher for threshing, consuming around 30 person-days per hectare for these two activities.

Although Vietnamese farmers used more person-days for harvesting and threshing, labor costs were lower than in the Philippines because of much lower wage rates in Vietnam. Wage rates are higher in Thailand, but Thai farmers use a combine harvester-thresher that finishes harvesting, threshing, and hauling with only 5 person-days of labor per hectare. A typical combine can finish 1 hectare of paddy in 2–4 hours, with a rental fee amounting to

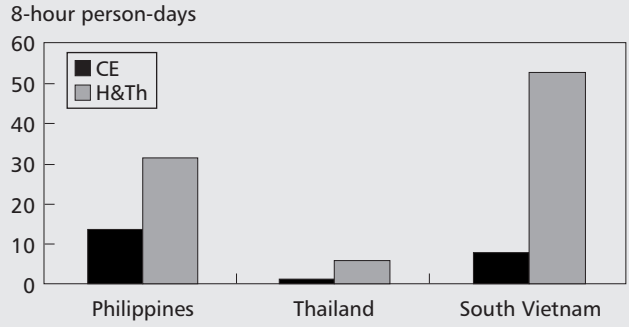

Fig. 1. Labor use for crop establishment (CE) and harvesting and threshing (H&Th).

about one-third of what a Filipino farmer spends for harvesting and threshing.

Thus, one option to bring down the cost of producing rice in the Philippines is the use of a combine harvester-thresher because decreasing the wage rate is neither feasible nor desirable. The combine is being rapidly adopted not only in Thailand, where farms are bigger than in the Philippines, but also in China, where farms are small and fragmented. Combine harvesters from China that can harvest and thresh 1 hectare of paddy in about 4 hours can be purchased at the equivalent of 280,000 to 370,000 pesos before shipping. These types require only two persons to operate. A sophisticated and more powerful combine that works twice as fast will, of course, cost more.

In addition to harvesting and threshing, crop establishment also requires large amounts of labor. Studies on the economics of direct seeding show that the reduction in labor costs can more than offset the additional costs incurred in weed control associated with direct-seeding technology. Data from nationwide surveys by PhilRice-BAS in 1996-97 and 2001-02 (PhilRice-BAS 1998, 2003) show that, on average, 23 person-days per hectare were spent for crop establishment by transplanting but only 2–3 person-days per hectare by direct seeding. There was an insignificant difference in yield between the transplanted and direct-seeded crops, but there may be some need to conduct agronomic research to improve yields in direct-seeded crops in some areas. In areas like Laguna and Bulacan, where farm labor is scarce and wages are high, the adoption of direct-seeding technology has the potential to lower rice production costs per ton.

The adoption of a combine harvester-thresher and direct seeding will lower the cost of producing rice, thereby making rice production in the Philippines more competitive with other rice economies. Promoting the competitiveness of rice production in the Philippines is vital to increasing farmers' income and reducing the consumer price of rice. Adoption of these technologies will also reduce much of the drudgery in rice cultivation. The disadvantage of adopting these technologies is that there will be less employment.

Thus, while rice farmers strive to be more competitive, it is also important that the nonfarm sector create jobs for agricultural laborers.

Notes

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10 Can nitrogen management in Philippine rice production be improved?

David C. Dawe, Piedad F. Moya, Fe Gascon, Ma. Shiela Valencia, and Nelissa Jamora

With the introduction of modern high-yielding rice varieties during the Green Revolution in the 1970s, the use of nitrogen fertilizer on rice increased markedly throughout the Philippines. Nitrogen is a key plant nutrient that increases the growth of the rice plant. Because the modern varieties are shorter, they can absorb the additional nitrogen without falling over, and the additional uptake of nitrogen leads to higher grain yields and profits. Traditional varieties grow so tall when nitrogen fertilizer is added that they easily fall over, especially in the presence of strong winds. When this happens, the harvest is vastly reduced.

Although nitrogen use has increased since the 1960s, data from hundreds of experiments conducted in each of four locations spread throughout the Philippines (Nueva Ecija, Laguna, Camarines Sur, and Iloilo) suggest that Philippine farmers may still be using insufficient amounts, at least in the dry season (Fig. 1).

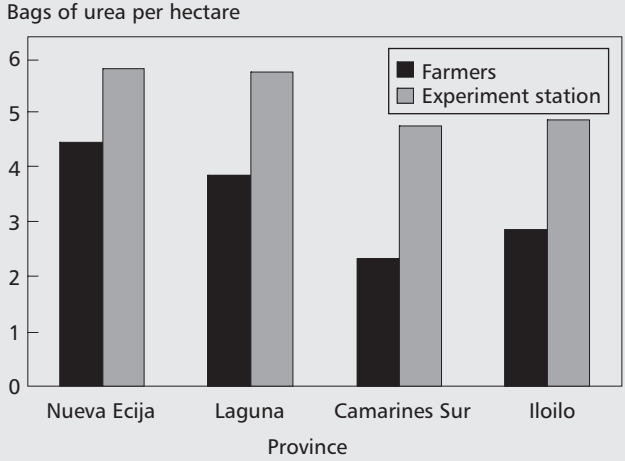

Fig. 1. Dry-season nitrogen use by farmers compared with profit-maximizing use at the experiment station.

Table 1. Quantity of nitrogen (N) applied by farmers and optimal amount calculated from experimental data (kilograms of N per hectare). WS = wet season, DS = dry season.

Province	Optimal N WS(1)	Optimal N DS(2)	Applied N WS(3)	Applied N DS(4)	Applied – optimal WS(5)	Applied – optimal DS(6)
Nueva Ecija	56	133	74	102	+18	–31
Laguna	67	131	79	88	+12	–43
Camarines Sur	52	108	56	53	+4	–55
Iloilo	72	111	69	65	–3	–46

Sources of data: optimal amounts of N were calculated by the authors as described in Dawe and Moya (1999); data on quantity of N applied by farmers are averages for 1988 to 2002, irrigated ecosystem, from PhilRice-BAS (2004).

During the dry season, it is beneficial to use more nitrogen fertilizer than in the wet season because during the dry season there is more sunlight, which provides the energy for plant growth.

The optimal amount of nitrogen is defined as the amount of nitrogen that will give farmers the largest profit. It is easy to calculate this optimal amount using information on the prices of *palay* (the Filipino word for rice at harvest, before the husk is removed) and fertilizer, coupled with experimental data on the yield levels that correspond to different amounts of applied nitrogen. Using such data, it is found that the optimal amount of nitrogen is much greater in the dry season than in the wet season, in accordance with the greater sunlight during that time (columns 1 and 2 of Table 1).

However, farm survey data collected in these major rice-growing provinces show that farmers with irrigated land apply roughly similar amounts of nitrogen in the wet and dry seasons (compare columns 3 and 4 of Table 1). Although the amount used by farmers in the wet season corresponds approximately to the optimal amount suggested by the experiments (column 5), there is a large discrepancy in the dry season (column 6): the experiments suggest that farmers should be using one or two bags of urea more per hectare (one bag of urea contains 23 kg of nitrogen). Even in Nueva Ecija, where substantially more nitrogen is used in the dry season, the quantity used by farmers is still below the optimal amount suggested by the experiments.

This analysis does not necessarily imply that farmers are doing anything wrong because farmers face constraints that experiment station managers do not. For example, the supply of irrigation water may be more reliable at experiment stations than it is on farms, leading farmers to apply less nitrogen in order to minimize risk in the event that irrigation water does not arrive on time. Because irrigation water is more critical in the dry season than in the wet season (when rainfall is more abundant), unreliable delivery of irrigation

water could easily explain why farmers "underapply" nitrogen in the dry season.

We interviewed about 120 farmers in the above four provinces to learn more about their fertilizer management strategies. Some farmers did apply large amounts of nitrogen in the dry season, but many others did not. However, we were unable to find a correlation between how much nitrogen farmers applied in the dry season and their own subjective assessment of irrigation reliability. Thus, it is not clear whether irrigation reliability is an important constraint that reduces the amount of nitrogen farmers apply in the dry season. It might in fact be a constraint, but we could find no clear evidence for it from our surveys.

Another possibility is that farmers apply too little N because of a lack of credit, but the cost of the additional nitrogen is not that large relative to the total expenses of the farm. Furthermore, the analysis in section 12 shows that, in irrigated areas, wealthier farmers do not apply more nitrogen than poorer farmers, suggesting that financial constraints of the poor are not the reason for the low use of nitrogen.

Although the data from the experiments strongly suggest that farmers' nitrogen management could be improved, it is not possible to be sure until such experiments are conducted in farmers' fields. Farmers need to participate actively in these experiments so that proper account is taken of their constraints and so that the farmers will be convinced by the results, whatever those results are. If in fact it is profitable to apply more nitrogen fertilizer in the dry season, this would lead to higher yields, more profit, and greater levels of domestic production. The data suggest that yields could be increased by about 1 ton per hectare in the dry season. If such increases are realized throughout irrigated areas in the Philippines, that would mean an additional 1 million tons of palay per year, a substantial increase in production.

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11 Seed subsidies need to be well targeted and of limited duration

Grace C. Cataquiz, Cheryll B. Casiwan, and David C. Dawe

Since Masagana 99 (a government program to increase rice production through the adoption of high-yielding seeds and associated inputs), a seed subsidy has been a major component of the country's national agricultural program. In fact, in 2003, the government spent 750 million pesos, or around 50% of the total budget of the Ginintuang Masaganang Ani (GMA) rice program, for certified seed (CS) and hybrid rice seed procurement (Table 1). The government buys seeds from local seed growers and sells them to farmers at a 50% subsidy (₱325 per 50 kilograms for inbred seed and ₱1,200 per 50 kilograms for hybrid seed). Policymakers believe that seed subsidies can increase the welfare of farmers and society through increases in yield and the country's rice self-sufficiency ratio at current domestic prices. In addition, researchers and extension workers see subsidies as part of a technology promotion and commercialization strategy.

Table 1. Expenditures on seed procurement under the GMA national rice program (millions of pesos), 2001-05.

Year	Hybrid seeds	Certified seeds	Total GMA budget	Seeds as % of GMA budget
2001	311	146	1,342	34
2002	378	153	1,443	37
2003	438[a]	316[a]	1,475	51
2004	529	114	1,046	62
2005 (preliminary)	801	114	1,327	69

[a]Includes cost of fertilizer given to farmers who received seed subsidy.
Source: DA-FOS (2005).

Table 2. Mean *palay* (the Filipino word for rice at harvest, before the husk is removed) yield by type of seed, by ecosystem and by season (kilograms per hectare), Philippines.

Season	1996-97			2001-02			Average yield difference
	Ordinary seeds	Quality seeds	Diff.	Ordinary seeds	Quality seeds	Diff.	
Irrigated (Jun-Oct)	3,334	3,574	240	2,979	3,676	696	468
Irrigated (Nov-May)	3,563	3,846	283	3,626	3,966	340	311
Rainfed (Jun-Oct)	2,403	3,093	690	2,551	2,901	350	520
Rainfed (Nov-May)	2,021	2,602	581	2,313	3,028	715	648

Source of raw data: PhilRice-BAS (1998, 2003).

Is greater use of quality seeds responsible for recent increases in Philippine rice yields?

Data from the Bureau of Agricultural Statistics (BAS) show that the average national yield increased from 2.99 tons per hectare in 1997 to 3.33 tons per hectare in 2002. How much of this yield change can be attributed to the use of quality seeds? (Quality seed as defined here includes foundation, registered, certified, and good seeds.)[1] Based on a large PhilRice-BAS random survey of rice farmers, the percentage of farmers who used quality seeds in at least one cropping season increased from 38% in 1996-97 to 49% in 2001-02. The same data set showed that the average yield advantage of using quality seeds over farmers' seeds was around 300 to 470 kilograms per hectare in irrigated areas and 500 to 650 kilograms per hectare in rainfed areas (Table 2). Thus, from 1997 to 2002, it was calculated that only around 9% of the yield increase was due to increased use of high-quality seeds. The other 91% of the gain must be due to other factors such as fertilizer or chemical use, improved irrigation, or weather.

Data from experiments conducted in Nueva Ecija showed that the average yield advantage of using certified seed over farmers' seed ranged from 7% to 13%, depending upon variety and season (PhilRice 1997). The yield advantage of using CS of PSB Rc14, for example, was reported to be 0.57 ton per hectare, which is toward the high end of the range of values reported in

[1]Farmers, in general, consider good seeds as quality seeds. If only certified seeds and better are considered quality seeds, the percentage of users was 17% in 1997 and 24% in 2002.

Table 2. Thus, both experimental and farmers' survey data show that there is a yield advantage in using higher-quality seeds. The contribution of the use of quality seeds to higher productivity is thus quite important, although other factors are still responsible for most of the observed increase.

Does the seed subsidy benefit farmers and society?

Partial budget analysis using the yield advantage numbers reported in Table 2 valued at current prices showed that irrigated farmers can obtain a net added benefit of around ₱2,500 per hectare given average seeding rates. From society's point of view, the estimated net benefit of the certified seed subsidy program based on the 1.27 million hectares of 2004 program area is around ₱2,800 million. This gives a social benefit-cost ratio of around 3:1, which is a good government investment, assuming that farmers who receive the subsidy would abandon CS if the subsidy were withdrawn. However, this assumption may not be justified, since if CS are profitable, farmers should continue to use them even in the absence of the subsidy. In that case, the subsidy would be better spent on productivity-enhancing investments such as education, agricultural research, infrastructure, or information dissemination campaigns that promote farmer awareness of the importance of clean, healthy seeds, all of which give farmers more livelihood options. Further simulations also revealed that even with 100% of the country's current total irrigated area planted to certified seeds, the targeted full rice self-sufficiency at current prices aimed at by the government cannot be attained through certified-seed usage alone.

Should we redirect the seed subsidy to new areas?

Increasing national production is not a strong rationale for the current seed subsidy because so few farmers receive it that the effects at the national level are bound to be small. Most users of CS in the Philippines do not receive the subsidy, and have made the decision to adopt without this financial incentive. The main economic rationale for a seed subsidy is to foster farmer experimentation and increase their knowledge of the advantage of quality seeds, thus encouraging them (and their neighbors) to adopt better seeds on their own. Given this rationale, and the fact that government resources are scarce, it makes sense to have CS subsidies in areas where adoption rates of CS are low. The subsidy will have greater knowledge spillover effects in areas with low adoption because there are more people who have not yet adopted and need to be convinced.

At present, the seed subsidy is provided only to farmers covered under the national rice program, which operates primarily in irrigated areas. Less than 8% of the total rice program areas are rainfed, and since the onset of the hybrid rice commercialization program (HRCP), the seed subsidy is provided

only in irrigated areas. The reason is that the package of modern rice technology works best with proper irrigation, suggesting less risk and higher impact of certified seeds in irrigated areas. As shown in Table 2, however, based on the two national surveys, there is also a yield advantage in using higher-quality seeds in rainfed environments. In fact, the average yield advantage in rainfed areas is almost 0.6 ton per hectare, which is higher than the 0.4 ton per hectare calculated for irrigated areas. In addition, analysis of the yield advantage of using quality seeds in irrigated areas vis-à-vis adoption rates showed that there is not much difference in the yield advantage in high- and low-adopting provinces. Thus, a seed subsidy targeted to areas where adoption rates of CS are currently low will not hurt national production in the short term, but will do more to increase farmers' knowledge and yields than the current subsidy scheme, thus increasing national production in the medium term.

Implementation of a subsidy also requires careful thought to how it is distributed in order to maximize the beneficial impact for farmers and encourage the growth of a private-sector seed industry that is accountable and responsive to the needs of farmers, as opposed to the needs of the government. Finally, in the long run, it is important to keep in mind that increased farmer knowledge of advanced production techniques (e.g., the importance of clean and healthy seed) is more likely to be a source of sustainable productivity growth than government subsidies.

Notes

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12 Lack of credit is not a major constraint to improving the productivity of rice farmers

Alice B. Mataia and David C. Dawe

It is often claimed that lack of credit is one of the major constraints in rice production. Thus, most credit policies address the perception that rice farm households lack adequate access to credit. But the PhilRice-BAS (1998, 2003) farm survey data suggest otherwise, with almost half of farmers seen as borrowers (45% and 42%, respectively). This illustrates the widespread availability of loans. However, since many farmers are not borrowing or do not want to borrow, it also illustrates the importance of self-finance.

Some basic facts about rice farm credit

Farmers who borrow come from all income levels. The largest group (38%) of borrowers is from the low-income group, followed by high-income (32%) and middle-income (31%) groups. The importance of borrowing from informal sources increased from 87% in 1996-97 to 94% in 2001-02, indicating low and increasingly limited access to formal or institutional credit. ACPC (2000) survey results indicate that informal sources are more attractive to borrowers because of the fast and timely release of loans, nonrequisite collateral, and flexible terms and conditions.

Of these informal sources, private moneylenders are used by 37% of the total number of borrowers, while rice traders and input dealers are used by 20% of borrowers. One-fourth of the borrowers obtain loans from relatives, co-farmers, friends, and landlords. Among formal sources, cooperatives are the most frequently used, followed by the Land Bank of the Philippines (LBP) and commercial banks, which cater to 4% and 1% of the borrowers, respectively.

Among farmers who borrow, an average of ₱6,423 per hectare was borrowed for rice production in order to pay for raw materials and other costs. Amounts borrowed are 18% higher on irrigated farms than in rainfed areas. Informal sources charge 9–20% interest (average of 16% in nominal terms) for a 4-month period; formal sources impose 4–17% (average of 8%) for the

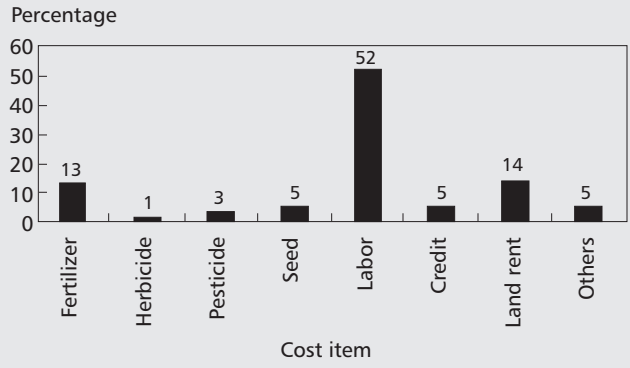

Fig. 1. Percentage contribution of cost items to total costs of rice production, Philippines, 2001-02.

same period. Interestingly, among informal sources, friends and relatives charge the highest interest rate at 20%, higher than the average rate charged by private moneylenders. Among formal sources, rural banks charge the highest rates (17%).

Data from PhilRice-BAS (1998, 2003) suggest that credit is not a constraint to increasing rice production. With the current average amounts loaned and interest paid, the cost of credit from informal loans (₱1,028 per hectare or ₱257 per hectare per month) in proportion to total rice production costs is only 5% (Fig. 1), while for formal loans it is only 2.5% (₱514 per hectare or ₱129 per hectare per month). This means that, even if more institutional credit were available to farmers, production costs would decrease by only 2.5%, a relatively small amount.

Do farmers who borrow use more fertilizer?

Figure 2 shows no evidence that irrigated farms with credit use more N fertilizer than those without credit, regardless of income levels. On rainfed farms, particularly for the low-income group, there is some evidence that farm households with credit use more N fertilizer per hectare than those without credit. However, the increase in N use (11 kilograms per hectare) is not enough to increase production. These results cast doubt on the perception that farm households with good access to credit are better able to adopt new rice technology. A study by Tolentino (1988) on Philippine agricultural credit also saw a negative relationship between rice production and bank credit.

Benefits and costs of credit subsidies

In providing cheap loans to small farmers with limited access to banks, the government has heavily subsidized the cost of credit by providing agricultural loans to cooperatives at rates of 8–10% per annum (0.7–0.8% per

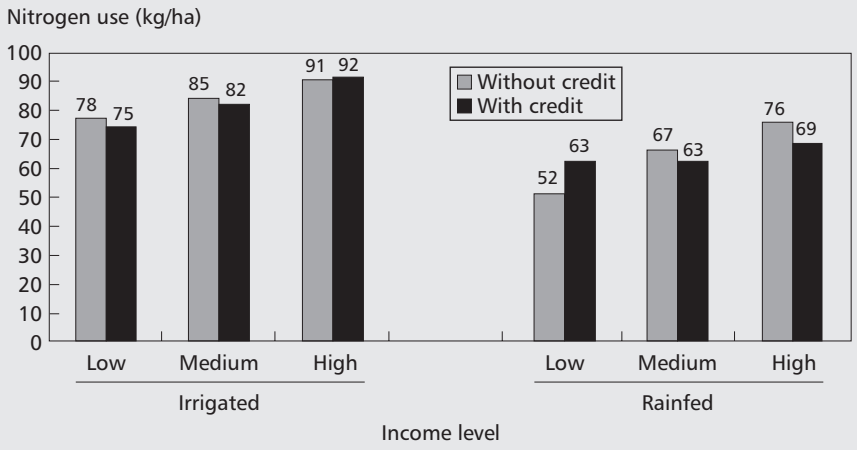

Fig. 2. Nitrogen use (kilograms per hectare) by source of capital and income levels, Philippines, 2001-02.

month). The cooperatives then re-loan money to farmers at 2% per month. However, the contribution of low-cost credit to total net returns in rice farming (for 2 rice crops per year, and average rice farm size of 1.5 hectares) and to total family income is only a minimal 2% and 0.02%, respectively. While the benefits are small, the costs of this credit can be large—previous studies indicate that, of the government loans provided to rural banks at very heavily subsidized rates, 82% were behind in their repayments. Most of these arrears were also uncollectible (Task Force, 1986, as cited by Tolentino 1988). The Department of Agriculture also claims that about 85% of the subsidized agricultural loans were not repaid because of the perception that government loans are doles.

Credit should not be a constraint to increasing rice production because the cost of credit is only a small percentage (5%) of the total costs of rice production relative to other production costs (labor, seed, fertilizer, etc.). Many farmers self-finance, and these farmers use just as much nitrogen fertilizer as farmers who borrow. Thus, if improving the competitiveness of rice farming is the goal, government support should focus on increasing productivity and efficiency instead of giving cheap credit to rice farmers that is often not repaid. These results are in line with research in many other parts of the world, which concluded many years ago that the costs of subsidized agricultural credit are much greater than the benefits (von Pischke et al 1983).

Notes

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13 A second Green Revolution in the Philippines: insecticide use on rice has declined to low levels

David C. Dawe

The first Green Revolution substantially increased rice production in the Philippines, using a package of new seeds, fertilizer, and irrigation. In his book *The Doubly Green Revolution: Food for All in the 21st Century*, Gordon Conway (1999) called for a second Green Revolution that stresses environmental protection. Few realize that this revolution is well underway in the Philippines.

The most damaging environmental consequence of intensive farm production in the past 30 years has been farmers' widespread use of pesticides, especially insecticides. Insecticide use exploded because of both supply and demand factors. On the demand side, farmers worried that their larger and more frequent harvests would attract more insect pests. This fear, along with aggressive marketing by pesticide producers, led farmers to spray ever-increasing quantities of these chemicals on their crops.

On the supply side, advances in the chemical industry produced highly affordable pesticides. Many observers mistakenly view pesticides as expensive inputs that destroy farmers' profit margins. The fact is that pesticide costs, even in intensive production, absorb only a small share of the total value of the rice crop. Farmer surveys conducted for five years in eight rice bowls in China, India, Indonesia, Thailand, Vietnam, and the Philippines found that total pesticide costs accounted for less than 3% of the gross value of production, on average across the sites. In the Philippines, the share was just 2%.

There are, however, many hidden costs. Indiscriminate use of pesticides kills insect pests' natural predators, such as spiders, causing an ecological imbalance that can actually contribute to pest outbreaks instead of preventing them. Probably the most egregious example of this phenomenon occurred on the Indonesian island of Java in the 1980s, when excessive pesticide use decimated the insect populations that preyed on the brown planthopper. The planthopper's short breeding cycle then allowed it to breed unchecked by predators.

Worse, excessive pesticide use has damaged the health of farmers and consumers. Because of poor training and/or lack of money for buying proper

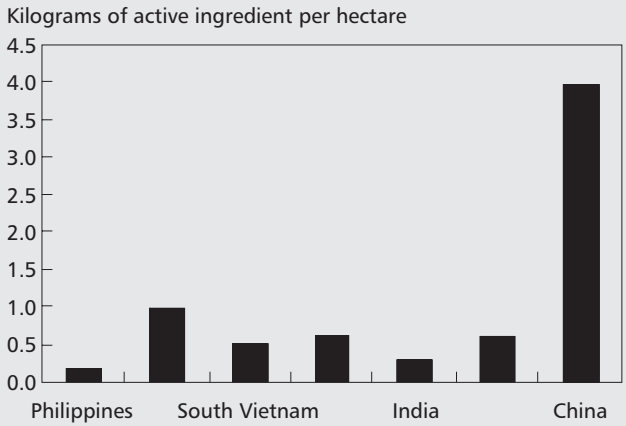

Fig. 1. Insecticide use on rice in major rice-growing areas of Asia, 1994-99.

pesticide application equipment, farmers are directly exposed to chemicals that injure their eyes, skin, respiratory tract, and nervous system. Studies by Agnes Rola of the University of the Philippines Los Baños (UPLB) and others (Rola and Pingali 1993) showed that the costs to farmers' health outweighed the benefits gained from pesticides. Furthermore, farmers sometimes apply pesticides very close to harvest, which endangers the health of consumers.

Yet there are grounds for optimism, especially in the Philippines. The above-mentioned survey found that farmers in Central Luzon applied by far the lowest levels of insecticides in any of the areas surveyed. The next lowest users, farmers in Tamil Nadu (India), used 60% more insecticides than the Filipinos (Fig. 1). The highest users were farmers in Zhejiang, China, who applied more than 20 times as much active ingredient as the Central Luzon farmers.

The low level of insecticide use in the Philippines is the culmination of a declining trend that began slowly in the mid-1980s and accelerated in the 1990s (Fig. 2). Among farmers surveyed in Central Luzon, the quantity of insecticide active ingredient applied per hectare increased tenfold from 1966 to 1979, from less than 0.1 kilogram per hectare to nearly 1.0 kilogram per hectare. But, by the mid-1990s, this figure had been cut in half. Since then, use has declined even more, and levels of insecticide use are now slightly *below* what they were before the first Green Revolution began. In contrast, recent data from China show that per hectare pesticide costs in rice cultivation increased steadily from 1980 to 1998.

Two main factors appear to account for low insecticide use by Filipino rice farmers. First, education campaigns based on research findings from en-

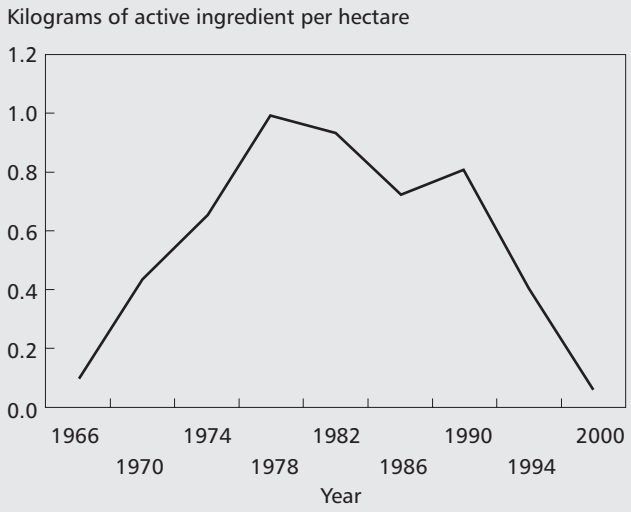

Fig. 2. Insecticide use among rice farmers in Central Luzon, Philippines, 1966-2000.

tomologists at UPLB, PhilRice, the International Rice Research Institute (IRRI), and other organizations appear to have enjoyed some success in convincing farmers of the dangers of insecticide use. Second, insecticide prices are relatively high in the Philippines—double the prices in Thailand, Vietnam, and Tamil Nadu, and six times China's subsidized prices. That said, remember that pesticide costs are just 2 pesos for every 100 pesos in gross farm revenue for irrigated farms in Central Luzon. Thus, Filipino farmers can afford insecticides, but they intelligently choose to use them carefully, if at all.

This is a heartening trend, but much remains to be done. Many farmers still overuse insecticides, which still damage water supplies and the environment. More farmers must learn to differentiate harmful, harmless, and beneficial insects, and learn about the damage pesticides do to the environment and their own personal health. The second Green Revolution against insecticide overuse in the Philippines is not over. But the good fight is under way, and substantial progress is being made. As even more progress is made, it will not substantially improve the profitability of rice farms—even a complete elimination of all use would raise profits by only a small amount since pesticide costs are such a small share of the value of production. On the other hand, reduced use will improve the environment and health of Filipino farmers.

Notes

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Note: This section borrows heavily from Dawe (2002a). See page 162 for the complete reference.

Potential for crop diversification

14 The potential for crop diversification among rice farm households: an overview

David C. Dawe, Piedad F. Moya, and Cheryll B. Casiwan

If rice trade liberalization were to occur, rice farmers would need to improve productivity, plant alternative crops, or leave farming altogether. This book does not discuss the last alternative—its feasibility is dependent on creating jobs in the nonfarm sector, which is beyond the scope of this book. Previous sections have discussed possibilities for improving productivity in the rice sector. This section and the case studies of 11 provinces that follow discuss the possibilities for crop diversification.

Soils, climate, and the degree of economic development vary throughout the different provinces of the Philippines. Because of these differences, rice production systems are different, and so are the alternative crops that could be grown if trade liberalization made rice less profitable for farmers. Some provinces have many options for alternative crops, while others have fewer. Thus, it is important to discuss different provinces individually. We have chosen 11 different important rice-producing provinces from throughout the Philippines (Luzon, Visayas, and Mindanao) to illustrate these points. Before proceeding to the case studies, however, this section provides some general background that is relevant throughout the Philippines and summarizes some data that compare the different provinces.

The most important point about crop diversification is that, even if trade liberalization were rapid and radical, domestic production of rice would still be larger than imports. In other words, most rice farmers who currently grow rice would continue to do so, and the Philippines would not become "completely dependent" on rice grown in other countries. A simple simulation (see Appendix 1 at the end of this section for details) shows that, even with complete liberalization (which would entail a fall in domestic palay prices of about 35% at most), domestic rice production would decline by just 3% to 14%. Thus, only a small minority of rice farmers would need to shift crops.

This conclusion is roughly consistent with microeconomic data on costs and returns in rice production for the 11 provinces that show that most rice production systems are competitive, in the sense that, after accounting for all costs of production, including the value of family labor and land, net profit

Table 1A. Gross value of production and returns to family labor, land, and management, pesos per hectare, for irrigated rice farms in various provinces, 2001-02. WS = wet season, DS = dry season.

Province	Gross value of production		Returns to family labor, land, and management		Returns to management (net profit)	
	WS	DS	WS	DS	WS	DS
Agusan del Sur	24,413	29,340	11,674	14,210	6,741	9,407
Bohol	28,933	28,300	17,920	16,378	11,622	10,935
Bukidnon	33,028	31,954	16,658	15,944	10,019	9,279
Camarines Sur	20,488	23,776	6,100	10,763	1,435	6,114
Iloilo	27,546	25,311	12,302	12,375	6,092	6,907
Isabela	33,620	39,098	15,169	22,250	9,328	16,224
Leyte	27,073	26,693	14,858	13,166	8,806	6,210
Nueva Ecija	32,911	42,224	16,509	23,919	8,597	15,113
Oriental Mindoro	29,693	30,495	17,239	15,954	9,938	10,435
Pangasinan	32,006	36,020	15,305	21,502	10,531	15,044
South Cotabato	30,122	29,773	16,445	17,473	9,998	11,719

still remains (Tables 1A, 1B). Simulations using these data show that rice production would still remain profitable in most production systems in most provinces, even if palay prices declined by 30% and there were no improvements in productivity (Table 2). This is especially true if land rents were to adjust downward, as shown in one of the two simulations (see the discussion in section 6 for more details on why land rents would fall).

Although profits from rice farming would remain positive, profits would clearly decline if rice prices fell and farmers did not improve productivity. These falling profits would give incentives to some farmers (but not to most) to shift out of rice into other crops. In some provinces, rice would no longer be profitable on average if prices fell 30%, especially in rainfed systems. However, this does not mean that all rice production would stop in those provinces. First, many farmers are above average, and they would still be able to earn profits. Second, land rents are likely to fall more in these areas as it is seen that rice is not so profitable and the demand for land declines, which will make it easier for the land to stay in rice production.

A question on a recent PhilRice-BAS survey of 2,573 rice-based farm households in 31 provinces asked whether farmers would continue to grow rice if the price of rice decreased to a much lower level. More than one-fourth of the farmers (26%) said they would plant other crops. While the results from asking such hypothetical questions should be treated with extreme caution, they do show that many farmers are willing to consider alternatives. They also show that the percentage of rice farmers willing to consider alter-

Table 1B. Gross value of production and returns to family labor, land, and management, pesos per hectare, for rainfed rice farms in various provinces, 2001-02.[a]

Province	Gross value of production		Returns to family labor, land, and management		Returns to management (net profit)	
	WS	DS	WS	DS	WS	DS
Agusan del Sur	21,430	22,690	12,333	10,474	7,999	6,023
Bohol	15,660	15,165	6,656	8,544	517	1,756
Bukidnon	–	–	–	–	–	–
Camarines Sur	15,641	16,460	3,508	3,348	–1,405	–1,752
Iloilo	19,340	17,876	6,278	7,008	1,023	2,639
Isabela	–	–	–	–	–	–
Leyte	18,926	17,669	5,858	4,094	–549	–330
Nueva Ecija	26,686	–	16,293	–	11,666	–
Oriental Mindoro	24,395	25,451	12,792	13,267	6,449	6,684
Pangasinan	22,896	26,013	11,388	10,539	5,862	5,085
South Cotabato	30,381	26,697	17,643	18,998	10,980	15,050

[a]The total returns to family labor, land, and management are the income accruing to a farm household that owns its land. Net profit, or returns to management, is the profit from rice farming per se, ignoring the income flowing from ownership of one's own labor and land (i.e., profit would be the amount earned if all labor had to be hired and land rental had to be paid for every crop grown). Total paid-out costs (not shown in the table) can be calculated as gross value of production minus returns to family labor, land, and management. Total costs (also not shown) can be calculated as gross value of production minus net profit. A dash indicates that rainfed area in the province is negligible.
Source of raw data: PhilRice-BAS (2003).

natives greatly exceeds the percentage decline in production that is likely to occur.

Some rice farmers have already diversified their cropping patterns (Fig. 1). For the average rice farm household in some provinces, the percentage of crop harvested area that is devoted to nonrice crops is much greater than in others. For example, rice farm households in Pangasinan and Iloilo devote about 10% of their crop area to nonrice crops, and in Nueva Ecija and South Cotabato the percentage is about 5%. (If the farm were used entirely for rice in the wet season and entirely for other crops in the dry season, the diversification percentage would be 50%.) Elsewhere, however, diversification is essentially nonexistent.

One concern many people have is that, with crop diversification, farmers will no longer have enough rice to feed their family. But only a small amount of rice land is needed to feed an average family of five (which is the average household size in the Philippines today). The amount of land required varies from province to province (Table 3), depending on yields and dietary patterns, but the amount of double-cropped land that is needed is

Table 2. Farming flexibility in response to trade liberalization (percent), by province. WS = wet season, DS = dry season.[a]

Province	Irrigated				Rainfed			
	Rent: no change		Rent: 50% decline		Rent: no change		Rent: 50% decline	
	WS	DS	WS	DS	WS	DS	WS	DS
Agusan del Sur	37	34	43	42	31	45	37	52
Bohol	45	45	53	53	4	14	11	21
Bukidnon	37	37	47	47	–	–	–	–
Camarines Sur	9	31	17	38	*	*	*	*
Iloilo	28	33	35	41	7	20	19	28
Isabela	33	48	41	55	–	–	–	–
Leyte	37	28	44	36	*	*	4	6
Nueva Ecija	31	43	41	51	51	–	58	–
Oriental Mindoro	38	38	45	45	30	30	37	37
Pangasinan	39	48	45	53	25	33	31	40
South Cotabato	39	48	48	57	45	64	50	69

[a]Farming flexibility is defined as the percentage decline in palay prices that could occur and still allow positive net profits from rice farming. See Appendix 2 for details of the underlying simulations. A dash indicates that rainfed area in those provinces and seasons is negligible. An * indicates that net profits are already negative under current prices. Calculations were made using raw data from PhilRice-BAS (2003).

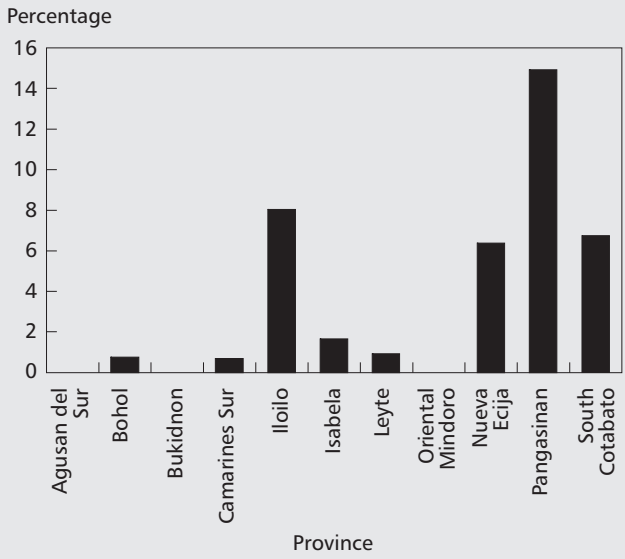

Fig. 1. Diversification of farmland in rice-based farm households, by province. Diversification is defined as the percentage of total cropped area planted to nonrice crops. Raw data are from PhilRice-BAS rice-based farm household surveys. Diversification for rainfed and irrigated areas is weighted by the percentages of rainfed and irrigated area in each province for the July to December semester. Calculations were made using raw data from PhilRice-BAS (2003).

Table 3. Annual rice consumption, the amount of harvested area required to be self-sufficient in rice for the average family of five, and total harvested area, by province and ecosystem.

Province	Rice consumption	Harvested area required to be self-sufficient in rice		Annual harvested area	
		Irrigated	Rainfed	Irrigated	Rainfed
	(kg per person)	(ha)	(ha)	(ha)	(ha)
Agusan del Sur	124	0.32	0.41	3.44	5.90
Bohol	84	0.23	0.42	1.79	1.42
Bukidnon	77	0.17	–[a]	4.35	–
Camarines Sur	115	0.33	0.42	3.20	2.29
Iloilo	117	0.30	0.40	2.24	1.78
Isabela	117	0.23	–	3.38	–
Leyte	105	0.25	0.38	1.84	1.94
Nueva Ecija	120	0.23	0.33	3.16	2.37
Oriental Mindoro	114	0.28	0.32	3.18	1.85
Pangasinan	117	0.26	0.35	2.00	1.13
South Cotabato	127	0.33	0.32	4.21	3.79

[a]Dashes indicate that rainfed rice area is negligible in that province. Calculations made using raw data from PhilRice-BAS (2003).

usually in the range of about one-sixth of a hectare. This is much smaller than average farm sizes of about 1.5 to 1.75 hectares. Even for single-cropped rainfed land, there is nearly always more than enough rice to feed the family. Thus, most rice farmers are not subsistence farmers; they produce a sizable surplus for sale. To the extent that rice farmers worry about crop diversification because it may negatively affect their household rice security, they can still maintain a small portion of land devoted to rice, and use the rest of their land to grow other crops.

While rice security would not be a concern for rice farmers in the event of trade liberalization, farmers will definitely face many difficulties in trying to shift out of rice cultivation, many related to a shortage of various forms of capital. While lack of credit (working capital) is not a major constraint for rice farming (see section 12), it can be a constraint for other crops, where up-front cash costs are greater. Infrastructure for transporting and storing perishable crops is also important, but often lacking. Prices for nonrice crops are often more unstable than for rice, which can create income fluctuations that are difficult for farmers to manage. Thus, while many nonrice crops are more profitable than rice, they are also riskier, creating a risk-return trade-off.

To solve these problems, the private sector will almost certainly need to take an active role—government cannot do it alone. Contract farming with private agri-business firms is often appealing to farmers, as it can solve marketing, cash flow, and income stability problems. Such contracts are starting to take hold in some provinces, as shown in the case studies below, and in many other parts of Asia. The private sector can probably build and operate storage facilities more effectively than the government, as maintenance of such facilities requires active management that can respond quickly to changing market conditions. But government will also need to provide some infrastructure, especially in terms of building rural roads, and a stable investment climate. Both the government and the private sector will each need to contribute based on their respective comparative advantage.

It is important to realize that crop diversification must occur anyway, even without trade liberalization, since consumers are demanding more diversified diets. It is also important to realize that most rice farmers will in fact not diversify—most rice consumption will still come from domestic production, and rice is likely to remain the most important crop in the Philippines for a long time to come. Nevertheless, some diversification would be beneficial, and the case studies of three progressive farmers (section 16) and 11 key rice-producing provinces (section 15) provide many interesting insights into the diversification process at a more local level.

Notes

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Appendix 1. Simulation of how trade liberalization would affect domestic rice production

To simulate the aggregate effects of trade liberalization on rice production, it is necessary to know the values of a parameter known to economists as the price elasticity of supply. This parameter measures the percentage change in the quantity produced as a function of a percentage decline in the price. Much research has been done on measuring the magnitude of this parameter, and for staple crops it is generally in the range of 0.1 to 0.4.

Given that range for the price elasticity of supply, and a difference between current farm prices and farm prices under full liberalization of 35%, it is possible to calculate the expected decline in production by simple multipli-

cation. For an elasticity of 0.1, the decline in production would be just 3.5%. If the elasticity were 0.3, the decline in production would be 10.5%, whereas, if it were 0.4, the decline would be 14%. Even the largest of these estimates suggests that most farmers will continue to produce rice, even after liberalization.

Appendix 2: Simulation details for Table 2

The purpose of the simulations reported in Table 2 was to calculate how much palay prices could decline before specific rice production systems would no longer be competitive, that is, when they would fail to generate a profit. The simulations made several assumptions:

- Seed prices decline by the same percentage amount as palay prices. This is sensible, since seed is just palay. Lower seed costs help to lower production costs.
- Prices for fertilizer and pesticides are not affected by rice trade liberalization.
- Harvesting and threshing costs decline by the same percentage as the decline in palay prices. This is assumed because most harvesting and threshing costs are paid as a percentage of the harvested crop, not as a fixed cash amount.
- Wage rates for farm labor are not affected by rice trade liberalization, except in harvesting and threshing activities.
- Two simulations were considered in regard to land rents. The first simulation assumed that land rents do not change in response to rice trade liberalization. A second simulation assumed that land rents are reduced by half, which would help improve the competitiveness of rice production. The choice of a 50% fall in land rents is illustrative, and is not based on a detailed study of the relationship between palay prices and land rents.

15A | Agusan del Sur

Cheryll B. Casiwan

Rice production

Although two-thirds of the land area of Agusan del Sur is forest land, rice occupies the largest cultivated area. The province produced more than 50% of the CARAGA region's total rice production in 2002, with 45,550 hectares devoted to rice. It is the only province in the region that was self-sufficient in rice during the past ten years, barely achieving it in 2002. All other provinces in the region have been rice-deficit areas since 1970.

The province is characterized as a type II climate where there is no marked dry season but more pronounced rains from December to March, as shown in its rainfall distribution (Fig. 1). The rice crop calendar is thus wet season (WS) from November to April and dry season (DS) from May to October. In most of the years since 1994, the rice area harvested in the DS is bigger than in the WS because the risk of floodwaters is high in the WS.

Before 1994, the rice area harvested in Agusan del Sur was only about 10,000 hectares per cropping season, but this area increased in the latter part

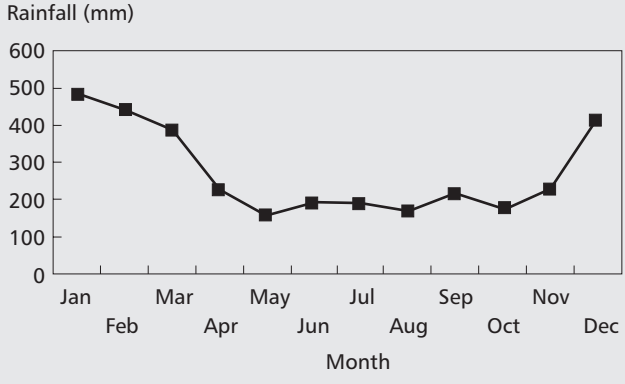

Fig. 1. Average rainfall distribution (■), Agusan del Sur, 1992-2001. Source of raw data: National Irrigation Administration, various offices in Mindanao.

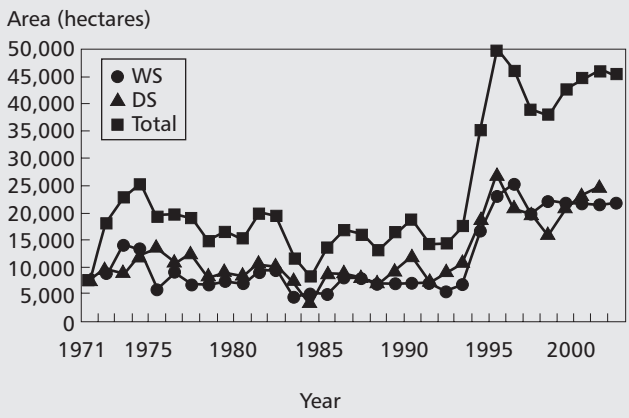

Fig. 2. Trends in rice area, Agusan del Sur, 1971-2002. Source of data: PhilRice-BAS (2004).

of the 1990s and annual rice area harvested in the province has remained at about 40,000 hectares since then (Fig. 2).

In the last few years, more than 60% of the rice area in Agusan del Sur has been irrigated. The major sources of water are National Irrigation Administration (NIA) irrigation systems and communal irrigation systems that mostly pump water from river systems in the province. As rainfall is available the year round, there is almost no distinction between irrigated and rainfed farms in terms of cropping intensity. Based on a PhilRice-BAS survey of rice farmers in the province, farmers in both farm types grew two rice crops per year. Tenant irrigated farms were almost as many as owned farms. On the other hand, most of the rainfed farms were owned.

Average yields in irrigated areas of Agusan del Sur were generally lower than the national average, even though a few years exhibited a higher yield (Fig. 3). Rainfed yields, however, were comparable with or higher than the national rainfed average in most years, partly because rainfall was available throughout the year.

Crops alternative to rice

Other than rice, temporary crops that are important in Agusan del Sur in terms of area planted are corn, *kamote* (sweet potato), cassava, *gabi* (taro), *alogbati* (Malabar spinach), *talong* (eggplant), sugarcane, and pineapple. Corn is currently the second most dominant temporary crop grown in the province in terms of area harvested (Table 1). Permanent crops such as banana, rubber, coconut, abaca, coffee, and cacao are also important, and oil palm is gaining in popularity.

Under trade liberalization, other crops may become more profitable, especially during the dry season. If this happens, rice might not be the most

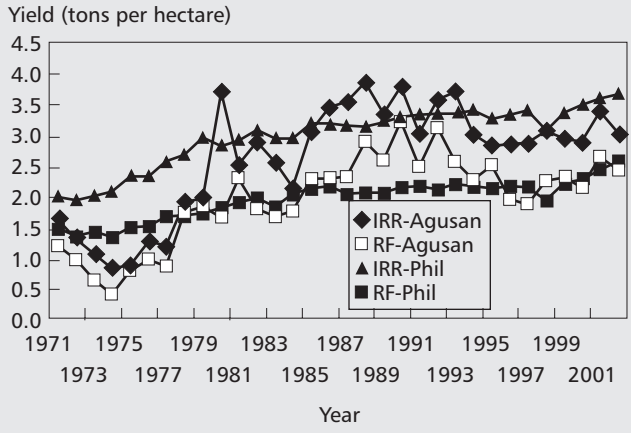

Fig. 3. Trends in rice yield, Agusan del Sur and Philippines. IRR = irrigated, RF = rainfed. Source of data: PhilRice-BAS (2004).

Table 1. Area harvested, production, and yield of selected crops, Agusan del Sur.

Crop	% of agricultural area[a]	Area harvested in 2002[b] (ha)	Production in 2002[b] (tons)	Average yield in 2002[b] (tons/ha)
Palay	29.5	45,550	127,725	2.80
Irrigated		28,955	87,470	3.02
Rainfed		16,595	40,255	2.43
Corn	33.0	37,412	52,810	1.41
White		34,692	43,340	1.25
Yellow		2,720	9,470	3.48
Banana	7.8	13,050	55,199	4.23
Coconut	6.1	12,350	44,725	3.62
Other permanent crops	17.6			
Rubber		5,500	16,901	3.07

[a]Data from IBON (1995), citing National Statistical Office, 1991 Census of Agriculture, as original source. [b]Data from BAS (2004).

competitive crop in Agusan del Sur, and lower prices would threaten family income from rice farming (70% of total household income). Farmers would then continue to grow rice and either get lower profits or increase productivity, or produce rice only on a small portion of their land for home consumption and grow other crops on the rest of the farm that would give them higher profit. Because farmers cannot continue to lose money and still farm, and because they need less than half a hectare to produce enough rice for family consumption, some farmers will be encouraged to diversify out of rice to sustain their family income. In some marsh areas, however, where the physical conditions do not allow production of crops other than rice, rice production

would still be competitive vis-à-vis other crops and farmers would likely continue to produce rice in these areas.

Data from the PhilRice-BAS surveys in 1996-97 and in 2001-02 show that no one among the sample rice farmer-respondents in Agusan del Sur, in either irrigated or rainfed rice areas, planted nonrice crops. Even in rainfed areas, the cropping intensity for rice is almost 2. This shows that rice farmers in Agusan del Sur are especially vulnerable if palay prices go down. Crop diversification in the rice areas might not occur in the short run. In fact, when farmers in the province were asked what they would do if palay prices dropped to a very low level, none of the respondents in the irrigated barangays said they would consider alternative crops. Even in the rainfed areas, only 3% considered planting other crops.

The difficulty of crop diversification in the rice lands of Agusan del Sur, and in the CARAGA region more generally, can be explained by the region's climate. In the irrigated rice areas, rainfall is available year-round, which makes the rice areas saturated most of the year. This situation is good for some crops, but not very encouraging for diversification to temporary crops other than rice. Unlike typical rainfed areas where lack of water is often the problem, the rainfed areas in Agusan del Sur are usually adjacent to converted marshlands where the risk of floodwaters is high.

Nevertheless, several studies have shown the potential for crop diversification in irrigated rice areas, even in regions with uniform rainfall distribution throughout the year. A study by JICA-NIA (1996a) showed that corn and vegetables such as cabbage, eggplant, mustard, okra, peanut, and garlic can be grown after rice in the areas that are well drained; cowpea, sweet potato, and taro can tolerate waterlogged conditions. However, BAS (2004) data show that average corn yield in the region is low at only 1.21 tons per hectare and gives a negative net profit, so corn will be a good choice in only a few selected areas at most. The JICA-NIA study showed that net profits from vegetable production are higher than returns from rice farming. Of course, greater risks are involved in vegetable production. The timing of planting and marketing has to be considered and well studied.

Along the Agusan marsh, a more viable option for rice farmers is to engage in freshwater fish culture activities. Farmers can engage in an integrated system in which part of their rice area is converted to fishponds. Fish cages can also be constructed along the Agusan marsh.

A more forward-looking feasible alternative for rice farmers and landless workers in Agusan del Sur is to develop the region to grow more permanent crops such as banana, durian, oil palm, abaca, rubber, and falcata. According to the Mindanao Economic Development Council (MEDCo 2004), the CARAGA region has a high potential for oil palm owing to good-quality soil type and fair weather. Currently, the region provides 70% of the Philippines' demand for oil palm, and three major milling plants are operating in the CARAGA region. In addition, oil palm has the potential to create value added

and employment in downstream processing industries, in addition to increased farm income. This cannot be achieved in a short period of time, but it can provide additional income for organized groups of rice farmers and landless workers. Malaysia and Indonesia have both vastly expanded their oil palm areas during the past 20–30 years, and are major players in world vegetable oil markets.

Along with crop diversification in areas where it is possible, it is very important to sustain current efforts in increasing the productivity and competitiveness of rice farming in the region. Higher productivity will improve the income of the farmers who will likely stick to rice production, and may even generate a surplus that can be exported to other parts of the Philippines. Research and development, particularly for variety development in direct-seeded and adverse soil environments, should be prioritized. Integrated watershed development activities in the province must be sustained and drainage improvement in existing irrigated areas should also be given priority.

Notes

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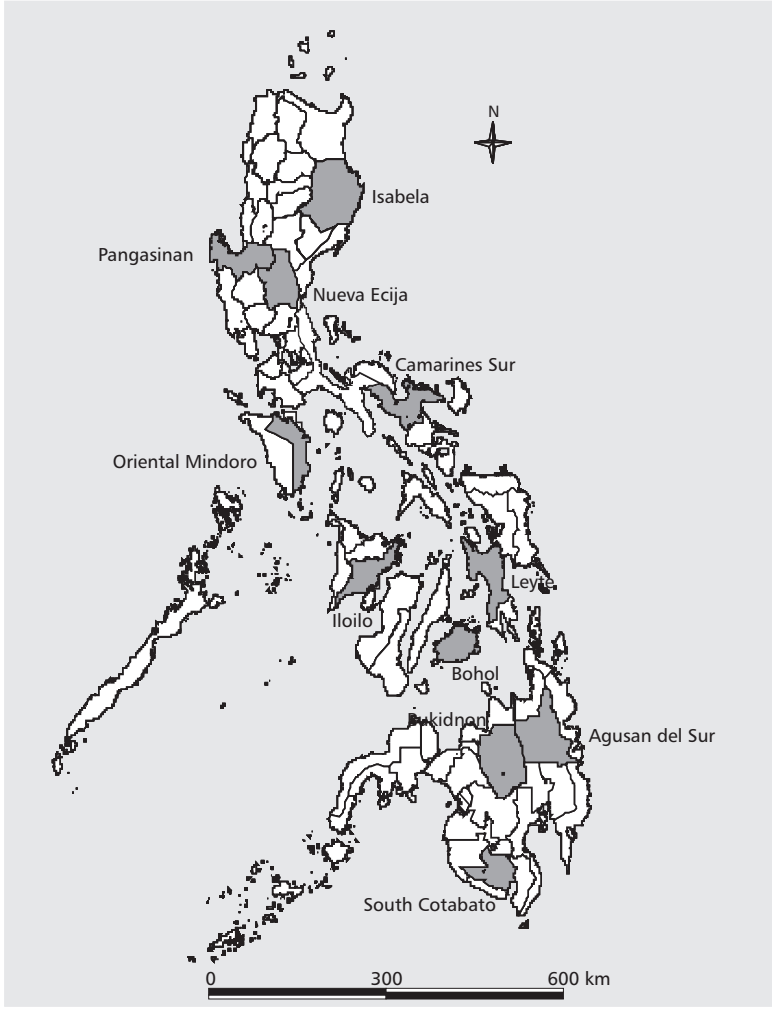
15 The potential for crop diversification in eleven key rice-producing provinces



15B | Bohol

Melchor B. Bautista

Rice production

Bohol Province is the rice bowl of Central Visayas, accounting for about 66% of the total rice production in the region. Rice is also the dominant crop grown in the province. At present, Bohol has a physical rice area of about 45,000 hectares—an irrigated area of about 12,500 hectares and rainfed area of about 32,500 hectares. Before the 1990s, the physical rice area in the province was more than 67,000 hectares, but then it dropped as some landowners changed land use in order to avoid being covered by agrarian reform laws.

The average annual rice area harvested has fluctuated substantially around a relatively flat trend for the past 30 years (Fig. 1A). The large fluctuations occur because about two-thirds of the rice area is without irrigation and entirely dependent on rainfall. In 1998, the province suffered its lowest annual harvested area of about 31,800 hectares because of the El Niño phenomenon. The second lowest annual harvested area happened in 1983, and it was also due to El Niño. Similar trends in production have occurred (Fig. 1B), although in recent years production has been substantially higher than in the past because of higher yields.

Nevertheless, palay farming in the province is relatively underdeveloped, and the average yield in the province remains low. In 2002, the average yield was only 2.06 tons per hectare, compared with the national average of 3.28 tons per hectare. Yields are much higher in the irrigated areas, about 3.16 tons per hectare in 2002, but irrigated rice accounts for only a small proportion of rice area. Even these irrigated yields are lower than those of other Visayan provinces such as Iloilo, and irrigated area has not reached its target cropping intensity. In an effort to further develop rice production, the government has been constructing irrigation systems to increase rice cropping intensity and raise yields. Local government units (LGU) are also investing money to procure and distribute high-yielding seeds to farmers through soft loans.

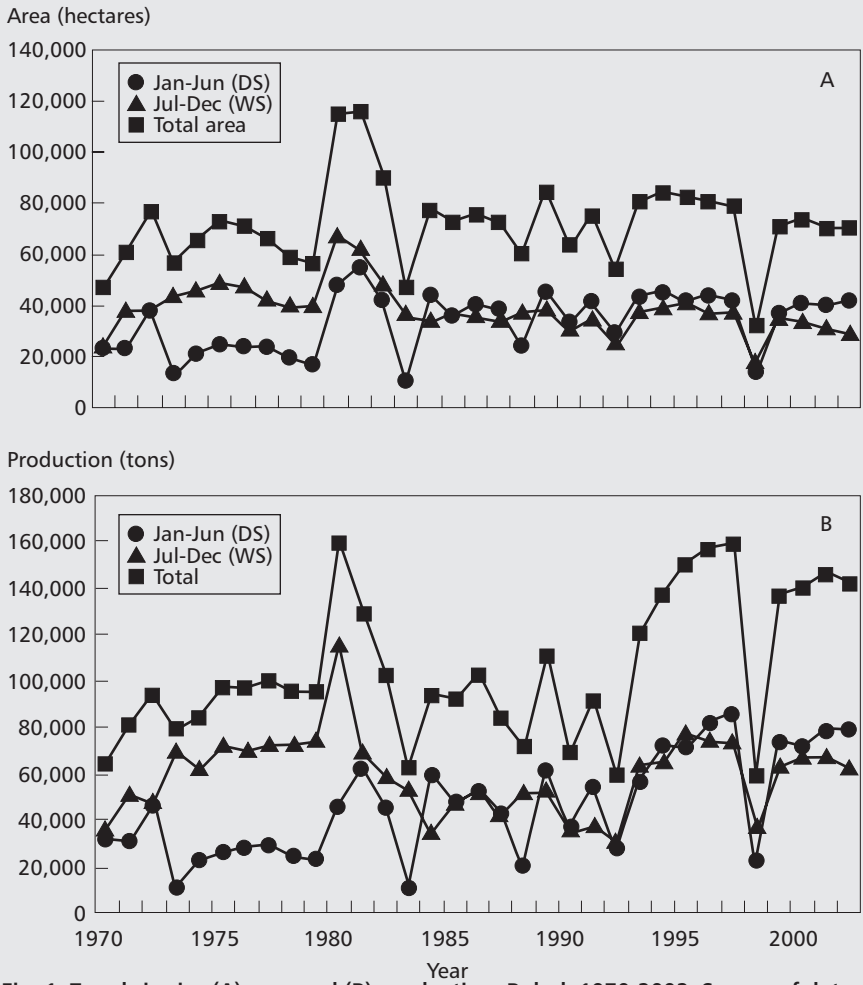


Fig. 1. Trends in rice (A) area and (B) production, Bohol, 1970-2002. Source of data: PhilRice-BAS (2004).

The 2001 data on provincial rice consumption indicate that Bohol, with an average rice consumption of 84 kilograms per capita, is only 86% self-sufficient in rice.

Crops alternative to rice

Aside from rice, corn is the second staple food of the province. However, the second major crop in terms of area planted is coconut, followed by corn, sweet potato, cassava, and *ubi* (violet yam) (Table 1). In fact,

Table 1. Major crops by area planted (hectares), Bohol, 2002.

Crop	Area	%	Rank
Rice	70,417	45	1
Coconut	35,222	22	2
White corn	18,437	12	3
Sweet potato	12,039	8	4
Cassava	4,584	3	5
Ubi	3,622	2	6

Source of data: BAS (2004).

the province is famous for ubi production. These crops tend to be grown mostly outside of rice farms. Some vegetable crops such as *ampalaya* (bitter gourd), eggplant, string beans, and tomato are planted as an alternate source of income after rice is harvested, especially in rainfed areas.

Rice farmers were asked what types of crops they might plant if rice were to become less profitable because of trade liberalization. In irrigated areas, 21% of the farmers said they would consider planting other crops, whereas 26% of the farmers in rainfed areas said the same. The alternative crops that they mentioned were mongo, watermelon, squash, *upo* (bottle gourd), pechay native, string beans, cucumber, and tomato.

The Office of the Provincial Agriculturist (OPA) encourages the planting of high-value commercial crops in rice areas. Eggplant, okra, and ampalaya are already planted in rainfed areas. These crops are planted mostly after the dry-season harvest of rice. Bohol imports many vegetables and fruits from other provinces. These products are already grown in the province, but only in small quantities, which means that there is good market potential for Bohol farmers. For instance, for squash, the total food requirement is about 6,300 tons, but production is only about 800 tons. Ampalaya production is about 500 tons, whereas the food requirement is about 1,000 tons. Eggplant production is about 5,900 tons versus a food requirement of about 9,000 tons (Recide 2003).

Some rice farmers have already diversified to alternative crops. In fact, with the development of crops other than rice, new industries are emerging in the province. Examples of these are Marcela Feed Mills and the Philippines Starch Corporation. Contract growing of corn and cassava is being promoted to sustain industry needs. As of 2002, corn production was about 15,500 tons versus direct food requirements of only about 8,900 tons, whereas, for cassava, total production was about 19,100 tons versus a direct consumption requirement of only about 6,000 tons. The surpluses of the two crops go directly to the industry. For crop diversification to proceed further, farmers will

need to engage in contract farming or be guided by analyses on which crops to produce, when to produce, and where and when to sell based on past and current trading patterns. This will help farmers minimize risk, improve bargaining power, and prevent product gluts in the market that might result in losses.

Aside from other crops, the OPA through the help of the Bureau of Fisheries and Aquatic Resources promotes tilapia culture in areas with impounded water. The Office of the Provincial Veterinarian encourages farmers to raise livestock and poultry through their massive dispersal program. Bohol has approximately 63,000 head of carabao, which is 40% of the total carabao inventory of Central Visayas (BAS 2003a). Thus, dairy production is another option to diversify farm income.

Another sector that will be affected by trade liberalization is rice milling. As of today, 283 rice mills are operating in Bohol despite the small size of the province and the small volume of production. These mills employ laborers that will be displaced once some of the mills close because of the lack of rice supply for milling. However, given the large number of millers relative to the supply of rice production, some consolidation in the milling industry should be encouraged even without trade liberalization in order to improve the efficiency of the milling industry and make it more competitive.

Notes

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15C | Bukidnon

Piedad F. Moya and David C. Dawe

Rice production

Bukidnon is the largest rice-producing province in the Northern Mindanao region. Nevertheless, rice is not a traditional crop in Bukidnon. At present, annual rice harvested area is about 66,000 hectares (Fig. 1). In 1970, however, area harvested was just about 20,000 hectares, less than one-third of present levels. The first increases in planted area were in the wet season (WS) in the early 1970s. By the mid-1970s, WS rice area had nearly reached its current level of about 33,000 hectares. Dry-season (DS) area at that time was much smaller, at a little more than 10,000 hectares, but, by the end of the 1990s, it had tripled to more than 30,000 hectares. Thus, much of the rice

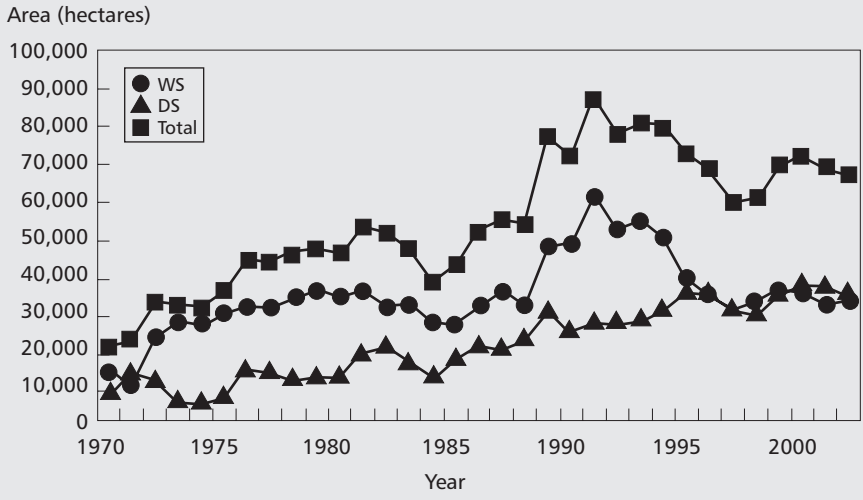

Fig. 1. Trends in rice area, Bukidnon, 1970-2002. WS = wet season, DS = dry season. Source of data: PhilRice-BAS (2004).

farming in the province is of relatively recent origin. (For the Philippines as a whole, rice harvested area increased by about 30% from 1970 until the present compared with the increase in Bukidnon of more than 200%, PhilRice-BAS 2004.)

Nearly all rice area in Bukidnon is irrigated. The share of irrigated rice area in total rice area has increased from about 30% in the 1970s to more than 95% today (PhilRice-BAS 2004). Because of irrigation, nearly all farmers in the province grow two crops of rice per year. In fact, in some parts of the province, rice is triple-cropped. Tenancy and leasing contracts are not uncommon in the province, but in most cases farmers own the land. Yields are higher than the national average, partially because a greater percentage of the land is irrigated. However, even within the irrigated ecosystem, Bukidnon yields of 3.87 tons per hectare in 2002 were higher than the national average of 3.68 tons per hectare.

Crops alternative to rice

Crops other than rice are very important in Bukidnon. In fact, corn is the dominant crop: yellow corn accounted for 34% of the area planted versus just 22% for rice (Table 1). Other major crops are sugarcane, white corn, pineapple, and coffee, while banana, mango, cacao, rubber, coconut, and tomato are less widely grown but still important. These different crops have exhibited contrasting trends in recent years. Area planted to yellow corn is below its peak reached in the mid-1990s, but increased in 2003 to nearly 120,000 hectares. The area planted to sugarcane has increased sharply since 1990, with an increase of about threefold. On the other hand, area planted to coffee and pineapple has remained roughly constant, while the area of white corn has decreased sharply, probably because of reduced demand for white corn as a source of food (Fig. 2).

Rice farmers in the province are quite specialized in rice. Data from the PhilRice-BAS surveys in 1996-97 show that, of 68 households surveyed, only one planted a nonrice crop (tobacco). In the follow-up survey of 2001-02, none of the 77 farmers reported that any nonrice crops were part of their normal cropping patterns. A recent survey conducted among irrigated rice farmers in Bukidnon regarding the possible effect of trade liberalization on their cropping pattern showed that, if the palay price decreased to a very low level, 21% would consider planting other crops such as corn, vegetables, mungbean, and tomato.

Despite this specialization of rice farmers, the potential for shifting cropping patterns on rice farms in Bukidnon appears to be strong, as the profitability of other crops is often much greater than it is for rice. Regional (which includes the provinces of Misamis Oriental, Misamis Occidental, Lanao del Norte, and Camiguin in addition to Bukidnon) data on costs and returns for rice and corn showed that yellow corn in particular produced net profit rang-

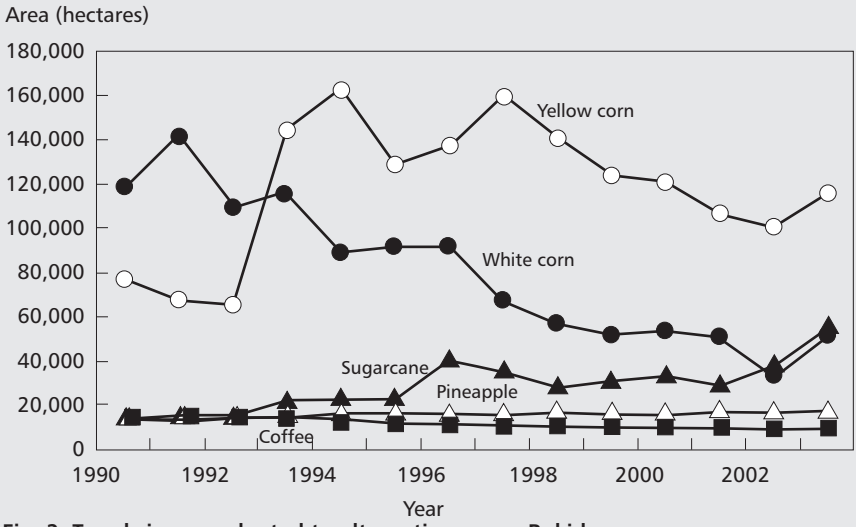

Fig. 2. Trends in area planted to alternative crops, Bukidnon. Source of data: BAS (2004).

Table 1. Area planted to major crops, Bukidnon, 2002.

Crops	Area (hectares)	Percentage
Yellow corn	100,777	34
Rice	66,397	22
Sugarcane	38,355	13
White corn	33,631	11
Pineapple	16,565	6
Coffee	10,522	4

Source of data: BAS (2004).

ing from ₱ 9,000 to ₱ 12,000 per hectare, while irrigated rice produced a net profit of only ₱ 2,000 to ₱ 3,500 per hectare (much lower than the values for Bukidnon alone). In addition, data on supply and use of corn for the Philippines showed that for the past five years imports averaged 300,000 tons per year (BAS 2004). Thus, there is unsatisfied domestic demand that local farmers could meet, especially as consumers increasingly demand meat products in their diets and corn is needed as animal feed.

The provincial government has initiated a High-Value Crops Program that has increased the area planted to vegetables during the past few years.

Under this program, a wide range of vegetables are being promoted, including bulb onion, garlic, sweet pea, carrots, celery, broccoli, cauliflower, lettuce, asparagus, cabbage, tomato, and squash. Data on net returns for these crops show that most of them are much more profitable than rice. Cabbage has net returns of ₱ 41,632 per hectare and carrots (₱ 84,457 per hectare), garlic (₱ 77,000 per hectare), tomato (₱ 21,000 per hectare), and onion (₱ 67,000 per hectare) also have high net returns. In addition, data on the supply and use of vegetable crops (BAS 2004) show that for the past few years the Philippines has been a net importer of garlic, onion, tomato, and cabbage. This suggests that local production cannot meet local demand and that there is market potential for these vegetables as long as the farmers can compete with the imported product in terms of quality and marketing techniques, such as good packaging and product promotion.

Half of the municipalities in the province have poultry farms, which is another possible avenue for diversification. Furthermore, the province is well known for cattle raising. The topography, vegetation, and climate make it ideally suited for rearing cattle by either smallholders or large-scale ranches (Bukidnon 2004).

The climate and soil types of Bukidnon seem to be suited to the cultivation of high-value crops that will bring high net profits to the farmers. However, overproduction of these crops should be avoided for this would greatly affect their market price and thus their profitability. Precaution must always be taken in recommending the crop to plant in a particular time period to avoid this problem. The government and private sector should work together to provide technical assistance, infrastructure support, and good marketing facilities to ensure successful crop diversification. Contract farming with private agri-business firms is one possible way to avoid such problems—it is spreading rapidly in certain parts of Thailand and could provide a helpful solution in the Philippines as well.

Notes

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15D | Camarines Sur

Piedad F. Moya

Rice production

Camarines Sur is at the center of the Bicol Peninsula, located about 300 kilometers southeast of Manila. This province is also the largest in the Bicol region, in terms of both land area and population. It has a land area of 5,267 square kilometers and a population of about 1.6 million. At the center lies the vast Bicol Plain, making it the major producer of rice in the region (Camarines Sur 2004).

On average, the total area harvested to rice during the past 30 years has been about 125,000 hectares, although there have been some major fluctuations. For example, during 1972-76, area harvested reached its peak of more than 150,000 hectares. As in most other regions of the country, harvested area dropped to its lowest level of only 96,000 hectares because of the strong El Niño of 1998 (Fig. 1A). On a seasonal basis, most rice area harvested during the 1970s was in the wet season (WS, July to December). However, since that time, dry-season (DS) area has increased until it is now about the same as the WS area. This is due to the development of irrigation systems in the Bicol River basin area.

Total rice production has increased substantially since 1970, more than doubling from 185,000 tons to about 386,000 tons in 2002. This big increase in production can be attributed to the doubling of yield from an average of 1.42 tons per hectare in 1970 to 2.97 tons per hectare by 2002.

A majority of the rice area in the province is irrigated, accounting for more than 66% of the total rice harvested area since 1990. Similarly, irrigated areas contribute a majority (73%) of total production, not only because of the greater area harvested but also because of higher yields. In the province, the average yield per hectare of irrigated rice is 2.8 tons, compared with only 2.0 tons per hectare for rainfed rice.

Results of a farm household survey jointly conducted by PhilRice and BAS showed that, on average, the mean irrigated rice area planted in a year by a rice farm household in the province is about 3.20 hectares, whereas, in

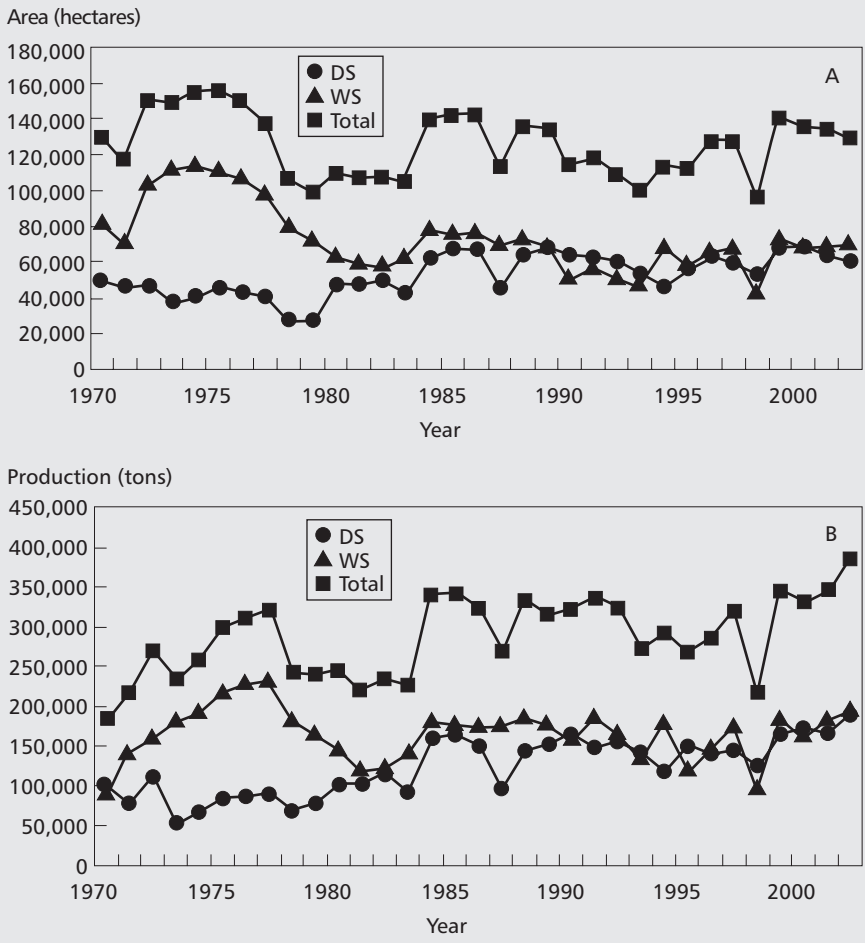

Fig. 1. Trends in rice (A) area and (B) production, Camarines Sur, 1970-2002. WS = wet season, DS = dry season. Source of basic data: PhilRice-BAS (2004).

the rainfed area, the mean planted area is 2.29 hectares. In terms of tenurial status, there is an equal proportion of tenants and owners among irrigated rice farmers. On the other hand, a majority of the rainfed farmers are owners of the land they till (63%).

Crops alternative to rice

The most recent data of the Bureau of Agricultural Statistics (BAS 2004) on area planted to various crops show that, while rice is the dominant crop in the province (about 42% of the total cropped area), there are

other major crops such as coconut, cassava, yellow corn, *kamote* (sweet potato), and banana.

A recent survey of rice farmers' perceptions and possible reactions in the event of a very low price of rice showed that a majority of the rice farmers in the irrigated area intend to continue planting rice because their land is not suitable for other crops and the area is easily flooded. Indeed, the Bicol region receives more rainfall than many other parts of the Philippines. The few farmers in the irrigated areas who did indicate some willingness to diversify out of rice would likely plant corn, mungbean, watermelon, eggplant, and peanut. Since rainfed rice farming produces a very low monthly family income, a significant proportion (48%) of farmers in this ecosystem are willing to diversify to other crops in the event of a much lower rice price.

If irrigated rice farmers do not diversify into other crops, two major steps could be taken to lessen the negative impact of trade liberalization on these households. First, make domestic rice production more competitive by increasing yields. Rice yields in Bicol are lower than in many other rice-producing areas in Southern Tagalog and Central Luzon. For example, the average rice yield in Laguna in the DS is about 4.4 tons per hectare, and in Nueva Ecija it is 5.2 tons per hectare. Both the public and the private sector must try to explore possible means of increasing yields, either through further varietal development, such as hybrid rice and varieties suited for flood-prone ecosystems, or improved fertilizer management (see section 10). Although yields can be increased, it will be difficult to increase them to the same level as in Laguna and Nueva Ecija, especially in the DS, as there is less solar radiation in the DS in Bicol because of the greater rainfall during that season. (Solar radiation is one of the main factors that drives photosynthesis and creates grain yield, and researcher-managed experiments in Bicol during the DS also produce lower yields than in those other areas.)

Second, it is important to reduce the costs of producing rice. Since labor accounts for the largest proportion of costs (40–45%), a reduction in labor costs through mechanization could be one solution to improve profitability, although labor displacement should be taken into account (see section 9). Jobs in other sectors should be created for the farm labor that will be displaced if mechanization is adopted in the rice sector.

Another possibility rice farmers can explore to improve their livelihoods is to diversify at least a portion of their rice land to crops that are suitable to the area and have good economic and market potential. Many rice farmers still want to produce rice for home consumption, but this can be achieved by using only a small portion of the typical farm size (for irrigated farmers in Camarines Sur, this is about one-third of a hectare, compared with an annual harvested area of 3.2 hectares). The remainder of the land can then be used to grow other crops. However, the factors affecting successful diversification, such as technical knowledge in the production of the crop, infrastructure (appropriate irrigation and market facilities for these alternative crops), and tools

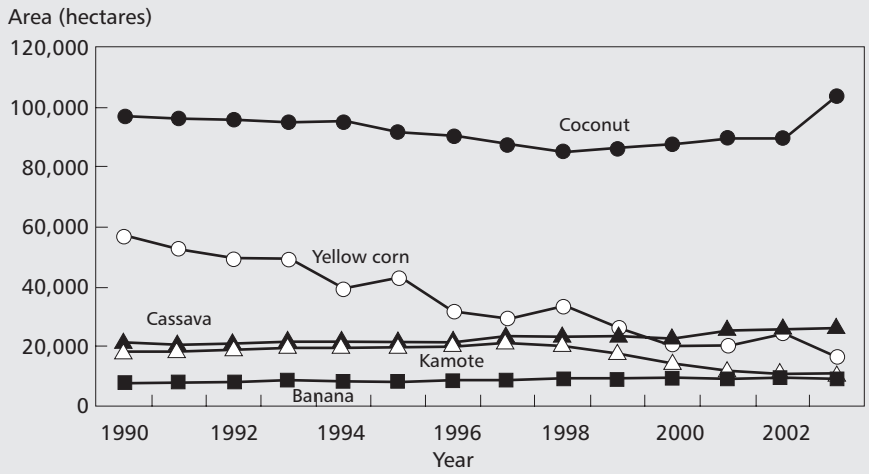

Fig. 2. Trends in area planted for major crops aside from rice, Camarines Sur. Source of basic data: BAS (2004).

for risk management must be carefully considered before any crop diversification is promoted.

As stated earlier, aside from rice, five major crops have been cultivated in the province for many years. Among these, the area planted to banana and cassava has increased slightly in recent years (Fig. 2). These trends suggest that cultivation of these crops might be a viable option for the rice farmers in the area. In fact, the most recent data on costs and returns from BAS show that net profit from cassava has ranged from ₱ 13,000 to ₱ 23,000 per hectare, higher than that for rice. Aside from these crops, other crops suitable to the area are peanut, eggplant, and squash.

Precaution must be taken in increasing the area planted to these crops, however, to avoid oversupply that might result in a very low output price, thus making the production of these crops not profitable. In addition, the irrigation requirements of these crops are different from those of rice. Hence, the irrigation system that was built and designed for the rice crop should be modified somewhat to suit the irrigation needs of these nonrice crops.

Rice farmers should also tap other sources of income such as fishing and cottage industries like basketry, weaving, and other handicrafts, for which raw materials such as nipa, rattan, abaca, and bamboo are abundant in the area.

The government, probably through the provincial agricultural office, should help farmers to choose the best crop that not only is suitable to their land but also has good market potential. In collaboration with the private sector, it should also work to provide an efficient marketing system for agri-

cultural products that are perishable, seasonal, and bulky to transport. Farmers should become more competitive not only in production but also in marketing, including the promotion of their products.

Notes

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15E | Iloilo

Ireneo Olivares

Rice production

The province of Iloilo is considered the "rice bowl" of the Western Visayas Region. Traditionally, rice is widely grown in the province and is considered one of the major crops. Current statistics on rice production show that annual rice harvested area in the province is about 238,000 hectares (Fig. 1). The annual harvest area fluctuates depending on the distribution and amount of rainfall, which is very critical for rice production even though there are many irrigation systems. This is because the irrigation systems in the province are of the surface runoff type.

It is also interesting to know that, in 2002, palay production in Iloilo recorded its highest level ever of 736,123 tons (PhilRice-BAS 2004). This record

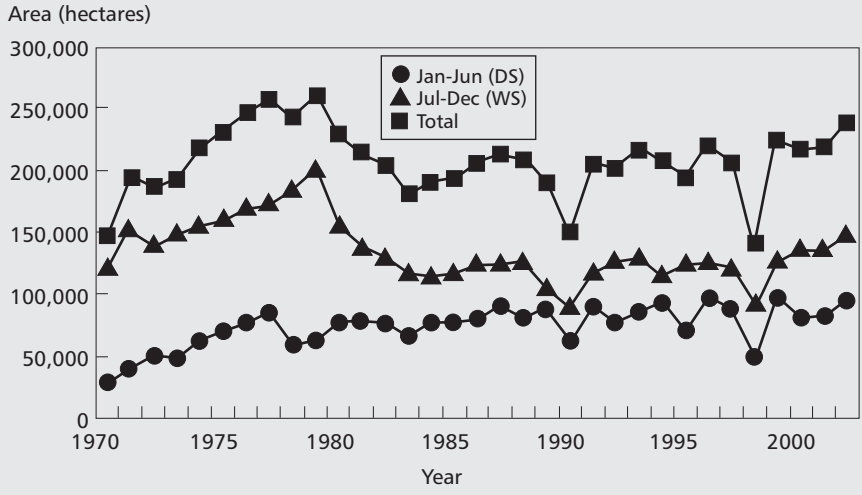

Fig. 1. Trends in rice area, Iloilo, 1970-2002. DS = dry season, WS = wet season. Source of basic data: PhilRice-BAS (2004).

production put the province at a rice self-sufficiency ratio of 1.60, meaning that production exceeded consumption by 60%. The excess rice production of the province is usually shipped to Negros Occidental, Cebu, Leyte, Samar, and even to some areas in Mindanao.

The total physical area used for rice production in Iloilo is about 132,000 hectares, about 56,000 hectares of which are irrigated, whereas the rest are rainfed. Cropping intensity on irrigated farms is about 2.27, which means some irrigated farms are harvesting three crops a year. Cropping intensity on rainfed farms is about 1.46, that is, about half of the rainfed farms are harvested twice per year. Since rice farms in Iloilo are predominantly rainfed, the overall yield of 3.07 tons per hectare (2002) was lower than the national average of 3.28 tons. Even in the irrigated ecosystem, the yield in Iloilo was about 3.34 tons per hectare, which was lower than the national average for irrigated farms of 3.68 tons per hectare (PhilRice-BAS 2004).

Tenants are still very common in the province. In fact, more than half of the rice farmers in the rainfed areas are tenants. In the irrigated areas, more than half of the farmers are owners, although tenants are also common.

Crops alternative to rice

While rice is the major crop of the province, other crops are also important. Data from BAS (2004) showed that other important temporary crops grown in the province are sugarcane, corn, mongo, watermelon, cassava, sweet potato, and pineapple, among others. Important permanent crops in Iloilo are coconut, banana, coffee, and mango.

The decision to change cropping patterns away from rice is not easy. Most of the palay farms in Iloilo have farm structures and facilities that are specifically designed for rice production. During the rainy season, most farms are flooded for some period of time, and no other crops can tolerate this flooded environment except rice.

Despite this situation, the potential for shifting to alternative crops other than rice is strong in the dry season (DS). Data from PhilRice-BAS surveys in 1997 and in 2002 showed an increasing nonrice cropping intensity on irrigated farms in Iloilo. Although the trend is still inconclusive, as it is based on only two time periods just five years apart, planting crops other than rice is becoming a more common practice among rice farmers in Iloilo. Although the survey shows that crop diversification in Iloilo is more common in irrigated rice areas (about 11% of total cropped area on irrigated rice farms is planted to nonrice crops compared with just 5% on rainfed farms), it was more common for farmers in rainfed areas of this province to consider planting other crops if palay prices decreased to a very low level (19% versus 11% in irrigated areas). This increased openness to planting other crops may be due to the much lower net profits from growing rice in rainfed areas (relative to that

in irrigated areas). The crops listed by these farmers as alternatives to rice were corn, mongo, watermelon, eggplant, honeydew melon, tomato, and other vegetables.

Even if all the rainfed rice farms in Iloilo shift out of rice production during the dry season (i.e., adopt a rice-nonrice cropping pattern), the province will still produce more rice than it can consume and have plenty to share with other deficit areas in the country. This is even more so if the performance of hybrid rice varieties is improved in the province. Hybrid rice has the potential to increase yield at minimum incremental cost, although its performance in Iloilo has been less satisfactory than in some other provinces. Data from the past four years show that the average annual irrigated rice harvest area in the province is about 117,000 hectares. If the average yield can be raised to about 5 tons per hectare with the use of hybrid rice and other technologies that will increase yield, the province can produce about 585,000 tons of palay, which is much greater than the annual local requirements of about 440,000 tons. And even if the rainfed farms will pursue a rice-nonrice cropping pattern, they will still generate additional palay production from the first cropping of about 200,000 tons annually even without any increase in yields due to technology transfer from nearby progressive rice farmers in irrigated systems. Thus, Iloilo could substantially diversify its cropping patterns and still remain an exporter of rice to the rest of the country.

Corn is one possible crop alternative to rice. BAS data show that in the past several years corn has increased its prominence in the province (Fig. 2). In the last two to three years, about 26,000 hectares have been planted to either yellow or white corn. Corn yield also increased from 1.28 to 2.59 tons per hectare in the last three years. Farmers in the corn cluster areas in the northeastern part of the province are even boasting of an average yield of 5 to 7 tons per hectare.

Shifting to sugarcane is another possible choice. In addition to two sugar centrals now operating in the province, another one is being constructed in a central town of Iloilo and will soon be in operation to serve local sugarcane farmers. B mascuvate sugar (crude sugar) produced in the province is gaining popularity in Europe and in other countries. It commands a higher price than the centrifugal sugar produced by big sugar mills. Sugarcane farming seems to be producing a higher profit than palay farming though at present no data on the costs and returns of the crop are available.

Other crops that are becoming popular in the area as a second crop are watermelon and other melons (cantaloupe, musk, and honeydew). Farmers from the southern municipalities of the province plant these summer crops on their own land, and even rent land as far away as the central and northern municipalities during the months of October to March to expand the area of these crops. Based on first-hand information from farmers, the potential gross revenue for watermelon could be as high as ₱250,000 per hectare for a 90-

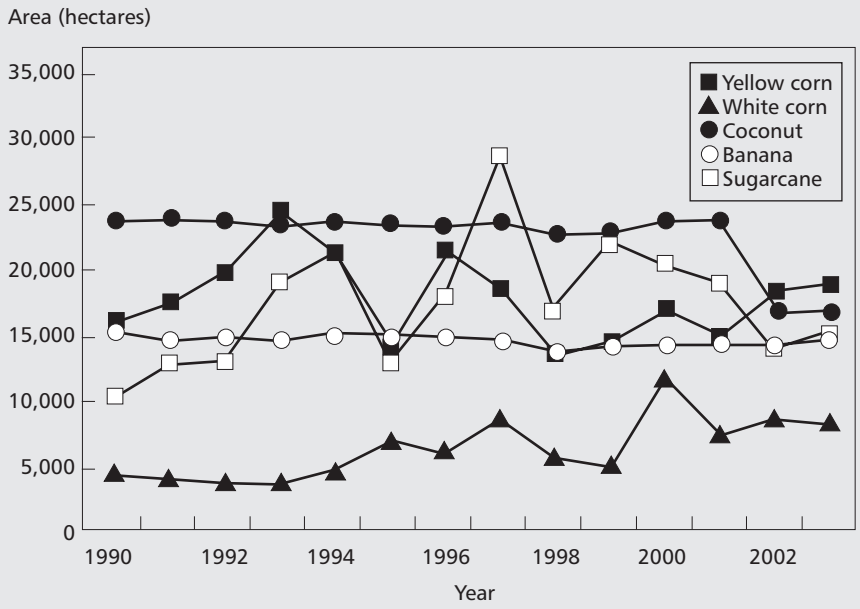

Fig. 2. Trends in area planted to major crops, Iloilo, 1990-2003. Source of basic data: BAS (2004).

day cropping period. The latest costs and returns survey conducted by BAS (2004) showed that the net profit of watermelon production is about ₱70,700 per hectare, substantially higher than for rice.

High-value crops are also being promoted by the local government units and the Department of Agriculture. Other crops with potential for growth that are in demand in the province are temporary crops such as mongo, eggplant, squash, gourd, string beans, pineapple, and other vegetables such as bell and finger pepper, onions, and other condiments. These crops have been grown successfully in the Department of Agrarian Reform–Agrarian Reform Communities (DAR-ARCs) in the province. Permanent crops with recognized potential are lacatan banana, papaya, durian, *lanzones* (a fruit similar to grapes, but larger and with a thicker skin), mango, and coffee.

The most popular crops in Iloilo in terms of area harvested in 2002 are summarized in Table 1. Recent costs and returns studies by BAS for these crops revealed that cultivating them would give a positive net profit. Estimated net profits from producing a hectare of these crops are approximately ₱2,700 for corn, ₱6,300 for coffee, ₱69,200 for mango, ₱12,800 pesos for sweet potato, ₱13,100 for cassava, ₱6,900 for mongo, ₱70,700 for watermelon, ₱28,700 for eggplant, ₱10,250 for tomato, and ₱71,900 for *kalamansi* (a small citrus fruit). These amounts will of course vary depending upon location.

Table 1. Harvested area of major crops planted in Iloilo, 2002.

Crop	Harvested area (hectares)
Rice	239,718
Corn	26,767
Coconut	16,655
Banana	14,052
Sugarcane	13,783
Coffee	5,903
Mango	3,090
Sweet potato	1,833
Cassava	1,305
Mongo	1,268
Peanut	1,173
Watermelon	876
Eggplant	799
Tomato	626
Kalamansi	270

Source of basic data: BAS (2003b).

Compared to local consumption, there are many commodities for which local production is not enough to meet local demand, and some commodities are not even produced in the province. The approximate annual supply gaps (in tons) between local production and local consumption for some of these major commodities, based on the BAS Provincial Annual Production Report (BAS 2003b) and the BAS Food Consumption Study (BAS 1998), are as follows: mongo (2,900), peanut (600), cabbage (2,900), garlic (750), Bermuda onion (3,200), Irish potato (1,300), *ampalaya* (bitter gourd) (400), carrots (1,000), *pechay* (Chinese cabbage) (500), string beans (2,900), and *kalamansi* (2,100). Thus, there should be a local market for these crops.

However, some risks need to be considered in planting these alternative crops. Prices might go down because of increased supply, hence affecting profitability (although this is true in any business, not just agriculture). In addition, infrastructure must be put in place to ensure efficient marketing. The government has already started building some of this infrastructure in certain areas. For example, the "Strong Republic Nautical Highway," which links Luzon to Visayas and Mindanao, is already operational. Farmers from the Visayas and Mindanao can now transport their produce directly to Metro Manila through transport trucks. On the return trip, they can transport farm inputs or other merchandise. More and more "farm-to-market roads" are being constructed. Also under construction are market facilities (known as *bagsakan*) where farm produce is brought for sale direct to retailers or to consumers.

Other support facilities are included in the recently launched Diversified Farm Income and Market Development Project (DFIMDP) funded by the World Bank.

Notes

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15F | Isabela

Jesusa M. Cabling

Rice production

Isabela has the largest physical rice area (about 160,000 hectares) in the Cagayan Valley, making it the rice granary of the region. In 2002, it produced more than 55% of the region's total palay production. From 1999 to 2001, it also ranked as the top palay-producing province in the country. It had an output share of about 7% of total national palay production in 2002.

Since 1970, palay production in Isabela increased at an average rate of almost 4% per year, from about 278,600 tons in 1970 to almost 955,000 tons in 2002 (Fig. 1A). This very rapid growth in production was primarily due to improvements in yields, although the area harvested also expanded substantially at an annual rate of about 1.3%. Presently, the province's annual area harvested is about 235,000 hectares (Fig. 1B), 44% bigger than that of the total area harvested in the 1970s (harvested area is greater than physical area if land is planted to more than one crop during the year). Area harvested in the dry season is slightly higher than in the wet season because of the ample irrigation in the province.

Since 1970, most of Isabela's rice area has been irrigated, although the percentage irrigated increased from about 75% in 1970 to more than 90% today. The major sources of irrigation water for farmers are national irrigation systems and communal irrigation systems, with the latter primarily pumping water from river systems in the province. Because of the substantial investment in irrigation in the province, almost all farmers are able to grow two crops of rice per year (PhilRice-BAS 2003). In some parts of the province, farmers are even planting three crops of rice in a year. While tenancy and leasing contracts are still observed in the province, most of the farmers own the land that they cultivate. Because of irrigation and the widespread adoption of modern varieties (nearly all farmers in Isabela have adopted modern varieties because of their greater profitability), yield has more than doubled from 1.71 tons per hectare in 1970 to 4.08 tons per hectare in 2002. Average yield in this province is higher than the national average of 3.28 tons per

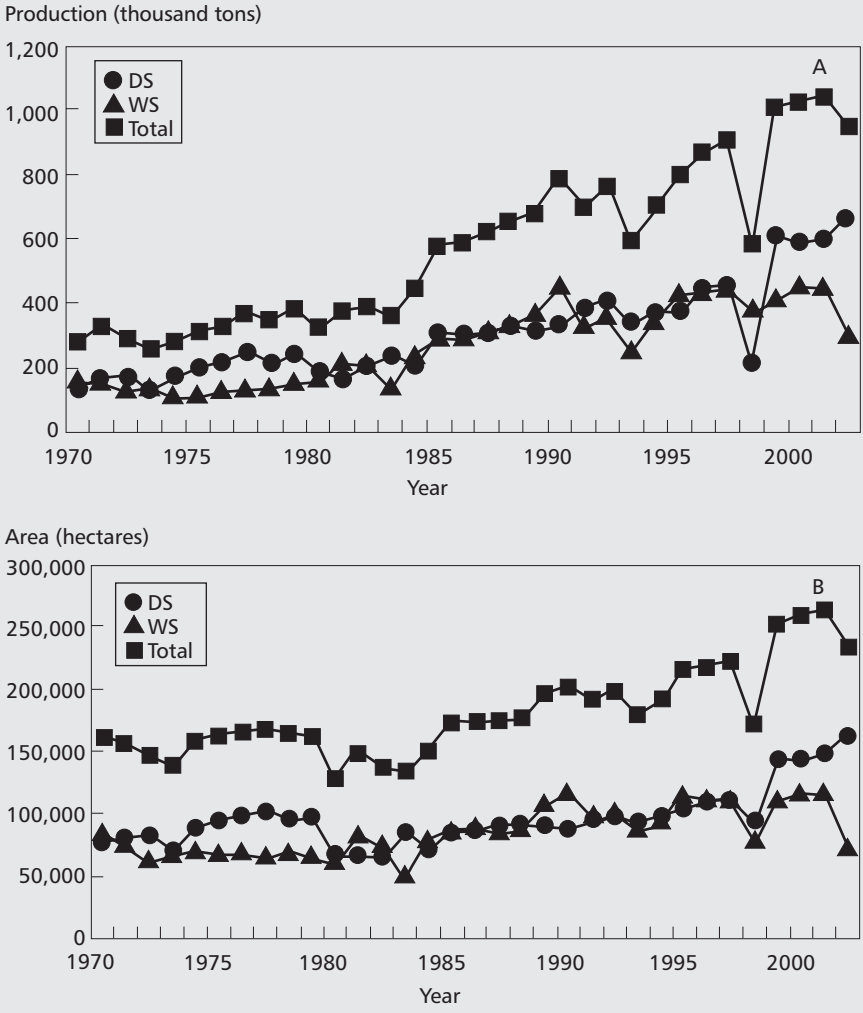

Fig. 1. Trends in rice (A) production and (B) area, Isabela, 1970-2002. DS = dry season, WS = wet season. Source: PhilRice-BAS (2004).

Table 1. Area harvested and production of major crops, Isabela, 2002.

Crop	2002 area harvested (hectares)	2002 production (tons)	2002 yield (tons per hectare)
Palay	234,240	954,585	4.08
Irrigated	214,258	904,556	4.22
Nonirrigated	19,982	50,029	2.50
Corn	172,717	554,176	3.21
Yellow	160,682	532,362	3.31
White	12,035	21,814	1.81
Banana	12,351	106,939	8.66
Coconut	1,534	11,159	7.27
Vegetables	4,215	3,029	0.72

Source of data: BAS (2004).

hectare, partly because a majority of the land is irrigated. Nonetheless, even within the irrigated ecosystem, Isabela's yield is about 15% higher than the national average irrigated yield.

Crops alternative to rice

Because of the province's Type I climate (with two pronounced seasons, dry from November to April and wet during the rest of the year), coupled with the vast area of fertile lands, the land is suited to growing a wide variety of agricultural crops. However, of the total agricultural cropped area, 92% is allocated for grain (rice and corn) production. Surveys of farmers by BAS and PhilRice show that most rice farmers specialize in rice alone, with only some farmers planting a small area to nonrice crops such as vegetables. Farmers without irrigation are more likely to plant alternative crops, as they do not have access to irrigation during the dry season. The concentration on grains leaves only about 8% of the total area to other temporary and permanent crops as well as livestock and poultry production. Table 1 shows that about 53% of the total agricultural cropped area is devoted to rice production, whereas corn production accounts for almost 40%. In terms of area planted, other important crops in the province include permanent crops such as banana and coconut and temporary crops such as vegetables (e.g., cabbage, *ampalaya* [bitter gourd], eggplant), legumes (mongo, mungbeans, and peanuts), sugarcane, tobacco, roots and tubers, *kalamansi* (a small citrus fruit), and pineapple.

Espino and Atienza (2001) and Gonzales (1989) show that both physical and economic factors affect the choice of crops to plant. Physical factors include the type of land and soil, rainfall patterns, water quality, and available technology, among others, while economic factors include the prices of

competing crops, input costs, and the availability of markets. Rice-based farming systems, in which rice is grown in the wet season and other crops in the dry season, promise higher profitability per unit area but will also lead to greater income instability. Alternatively, a small part of the farm could be devoted to rice in both wet and dry seasons, with the majority of the area planted to other crops. Because only about a quarter of a hectare is necessary to supply rice to a family of five, such a system would not entail any worries over family supplies of rice.

When asked about the potential for shifting into other crops if rice prices were to decline to a very low level, a large majority of farmers in Isabela responded that they would leave the land fallow instead. However, this is a hypothetical question and it seems unlikely that their response reflects what the true outcome would be, given the commercial nature of farming in this province and the highly fertile soils. For example, 48% of the farmers in Nueva Ecija, another province with good soils where farming is highly commercial, said that they would consider shifting to other crops if rice prices declined.

Despite the challenges faced in diversified farming, the potential for crop diversification on rice farms in Isabela appears to be strong, particularly during the dry season. In a study conducted by JICA-NIA (1996a), the results showed that, for a Type I climate like that in Isabela, several crops are suited to cultivation during the DS. These potential alternative crops are vegetables such as cabbage, mungbean, eggplant, okra, radish, mustard, squash, tomato, and cabbage, legumes such as peanut, bulbs such as garlic, and root crops such as sweet potato and cassava. These crops are being planted in Isabela, but only in small areas.

At present, corn is the main alternative to rice. In 2002, the area devoted to corn production reached more than 172,000 hectares, with 93% being planted to yellow corn and 7% to white corn. The average yield of corn increased from 1.60 tons per hectare in 1990 to 3.21 tons per hectare in 2002, a doubling in little more than a decade. The yield of yellow corn, which is used primarily for feed, is much higher, at 3.30 tons per hectare, than that of white corn, which is less than 1 ton per hectare. Regional data on costs and returns from corn (BAS 2004) show that, in terms of profitability, the net profit from yellow corn (₱12,900 per hectare) is higher than that derived from rice farming in irrigated areas of Cagayan Valley (₱11,600 pesos per hectare). It will be important for farmers to market their corn if they shift out of rice farming, and it will thus be important to increase the number of corn and feed mills in the province or expand capacity at existing mills. Of course, greater corn production would encourage corn and feed mills to expand operations, especially given the rapid growth in consumer demand for livestock and poultry products. Greater corn production in Isabela could also help to displace imports.

Another possible avenue for crop diversification is to engage in planting of more cash crops such as vegetables, legumes, and root and bulb crops.

Based on BAS (2004) costs and returns data on selected crops, these cash crops give reasonable net profits to farmers. Nevertheless, greater risks are involved, particularly in the timing of production and marketing of these outputs. As of now, no large-scale processors are operating in the province. Owners of high-value crop plantations still sell their produce to traders in raw form or serve only as suppliers to Manila-based processors.

The province has a large area suitable for livestock and poultry production. It has two animal breeding centers located at Gamu and Cabagan that produce the animal strains needed in the province. Currently, there are several contract-growing companies for poultry and livestock in the province such as JAKA, Vitarich, B-Meg, and RFM. These companies also supply their own feed requirements to the agri-business ventures. Such contract farming provides assured farm inputs and a good market, reducing many of the risks associated with higher-value production. This could provide a good agri-business activity for farmers.

With substantial fishery and aquatic resources, another possible option for farmers is to engage in fish production activities. Several studies showed that fish production is also a profitable endeavor. Farmers can either choose to convert all rice farm area into fishponds or just adopt a rice-fish cropping pattern. This activity will help the province to meet its total fish requirements and to reduce importation from Manila, Pangasinan, and other nearby provinces.

Planting of more permanent crops such as banana, coconut, mango, and other fruit trees is perhaps a viable alternative in the future for rice farmers in the province. Increased production of these crops, as well as the cash crops mentioned above, will help the province to attain its goal of becoming a regional agro-industrial center. If this happens, more industries will be created, which will provide more jobs to landless workers in the agricultural sector. This will not happen immediately, but it could provide an important source of future job growth as the Philippine labor force continues to grow.

Finally, the province is also known for furniture making and handicrafts activities, which provide a source of income for many individuals. Hence, the government should continue to encourage sustainable forest management and encourage people to plant more trees such as narra, mahogany, gmelina, lauan, and rattan. These industries are also a potential source of income for both farmers and landless laborers.

Notes

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15G | Leyte

Rufina F. Capuno and Frisco B. Canoy

Rice production

Leyte is the biggest rice-producing province in Eastern Visayas, accounting for 50% of the total rice production in the region, with about 347,000 tons produced in 2002. At present, annual rice harvested area is more than 100,000 hectares, similar to its level 30 years ago (Fig. 1A). Rice production more than doubled from 1970 to 2002 because of rising yields. Yields in Leyte in both irrigated and rainfed systems are similar to the national average for each of these ecosystems.

Leyte has the highest percentage of irrigated rice land in Region VIII. The share of irrigated area in total rice area has increased from a little less than 40% in the 1970s to more than 60% today. Area harvested in irrigated systems increased from about 39,000 hectares in 1970 to more than 66,000 hectares in 2002 because of the construction of irrigation facilities by the National Irrigation Administration (NIA) that converted rainfed areas to irrigated areas. Because of the expansion in irrigation, most farmers in the province plant two crops of rice per year. In some parts of the province, rice is even triple-cropped.

The area harvested to rice is similar in the dry season (DS) and wet season (WS) (Fig. 1B). This is primarily because Leyte has no distinct wet and dry season. Thus, an adequate supply of water is assured at all times of the year, enabling even rainfed rice farmers to plant during the first half of the year, when it is relatively dry, but still wet. In addition, excess water that flows out from the ends of irrigation canals benefits some rainfed rice farmers during the DS.

Tenancy and leasing contracts are very common in the province, so in most cases the farmers are tenants. This is true for both irrigated and rainfed farms.

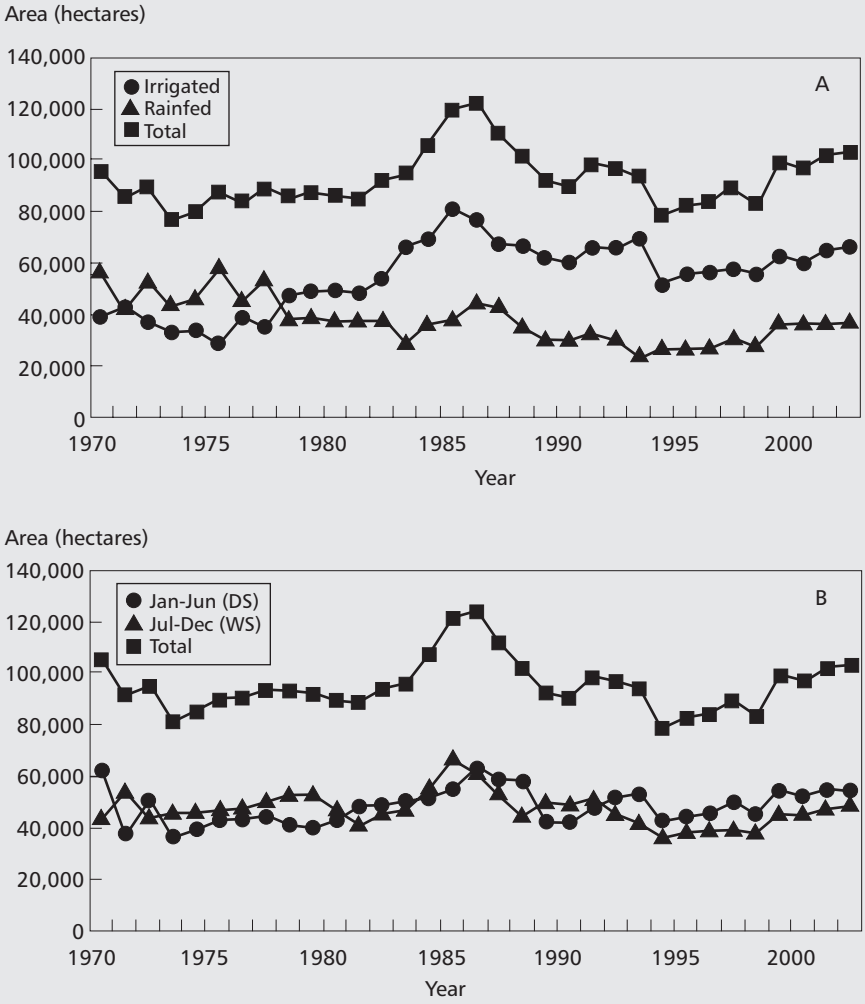

Fig. 1. Trends in rice area (A) by ecosystem and (B) by season, Leyte, 1970-2002. Source of data: PhilRice-BAS (2004).

Table 1. Area planted, production, and yield of major crops planted in Leyte, 2002.

Crops	Area (hectares)	Production (tons)	Yield (kilograms per hectare)
Coconut	150,100	702,461	3,359
Rice	103,265	346,821	4,680
White corn	37,960	32,481	860
Abaca	15,994	7,646	478
Sugarcane	10,220	443,366	43,382
Cassava	7,324	28,344	3,870

Source of data: BAS (2004).

Crops alternative to rice

Crops other than rice are very important in Leyte. In fact, coconut is the dominant crop in this province (Table 1). In 2002, coconut accounted for 44% of agricultural crop area, compared with just 30% for rice. Other important crops are white corn (11%), abaca (5%), sugarcane (3%), and cassava (2%) (BAS 2004).

Leyte is a major source of coco-based export products. With 150,100 hectares planted to coconut, it contributes 85% of the region's exports of coconut and 6% of the national total. After rice, white corn ranks third with 38,000 hectares of harvested area. Ranking fourth among the major crops planted in Leyte is abaca, with about 16,000 hectares (42% of the region's total abaca area). Total production is about 7,600 tons. Leyte is one of the top producers of high-quality abaca fibers and contributes substantially to the nation's exports. Sugarcane and cassava are also important crops planted in Leyte Province.

Although a wide variety of crops are grown at present in Leyte, rice farmers in the province are quite specialized in rice. Data from the PhilRice-BAS surveys in 1996-97 show that none of the 68 households surveyed reported any nonrice crop to be part of their normal cropping patterns. The follow-up survey of 2001-02 showed that, of the 77 farmers, only a few planted a nonrice crop.

When asked what crops they would plant were the price of palay to fall to a low level, 20% of the rice farmers in irrigated areas in Leyte said they would consider planting other crops. A higher percentage of farmers in rainfed areas (29%) said they would diversify into nonrice crops. In irrigated areas, the main alternative crops suggested by farmers were vegetables, root crops, and corn. For rainfed areas, the same crops were considered, plus mungbean, peanuts, and tobacco. However, farmers anticipated problems in marketing these alternative crops. One possible solution to this problem is through the

Nautical Highway Program in which a roll-on-roll-off vessel links Luzon to the Visayas and Mindanao. Agricultural products could then be taken to other parts of the country more easily. In fact, traders from other provinces and islands purchase rice from Leyte, suggesting it should be possible to also market nonrice crops to the rest of the Philippines.

Coconut could also be a potential alternative crop in the province. If farmers shift to planting coconut, they can still plant rice under coconut trees provided the density between trees is wider than usual.

Other than diversification, programs spearheaded by the provincial government and the Department of Agriculture (DA) and its attached bureaus and line agencies could keep farmers in rice farming even with rice trade liberalization. One example is hybrid rice, which has performed relatively well in the province. To ensure an adequate supply of hybrid rice seed for farmers to plant in the province, the DA provincial office is now fine-tuning technologies that will increase hybrid rice seed yield. In addition, the Leyte provincial government is intensifying its support in order to reduce postharvest losses and increase the production of good-quality rice to obtain a better market price. Thus, the province distributed 12 units of mechanical mobile flash dryers to some municipalities in Leyte under its farm mechanization program. With such equipment, farmers in the recipient areas can dry palay more easily even during rainy days, thus improving the quality of rice. For such programs to be sustainable, however, it will be essential that farmers or cooperatives find the equipment profitable enough to purchase it on their own, without subsidies from the government. Attempts are also being made to increase awareness among farmers regarding balanced fertilization strategies.

Notes

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15H | Nueva Ecija

Nelissa V. Jamora

Rice production

Nueva Ecija is the largest province in Central Luzon and one of the primary rice-growing provinces in the Philippines. It has a land area of 550,718 hectares, 60% of which is alienable and disposable land. Rice production doubled from 1970 to 2002, although the area devoted to rice was generally stable during that period. A distinct drop was observed in wet-season (WS) rainfed rice area, as more than 62,000 hectares were converted either to irrigated farms or to nonrice farming. During this same period, irrigated dry-season (DS) area more than tripled from 22,460 hectares in 1970 (Fig. 1). This scenario appears to reflect three things: intensification of rice farming, particularly on irrigated farms; conversion of rainfed lands to irrigated rice farms in the wet season; and diversification to alternative nonrice crops on rainfed farms.

Irrigated rice area accounts for 83% of the total rice area in the province. Rainfed rice farming in the DS is nonexistent with 100% of DS area under irrigation. More than three-fourths of the irrigated lands are farmer-owned while about half of the rainfed lands are under tenancy and leasing contracts. Yields are among the highest in the Philippines, with DS yield averaging 4.6 tons per hectare and WS yield at about 3.8 tons per hectare on irrigated farms (2002).

Rice is the major crop in Nueva Ecija, as more than 90% of agricultural area is in rice production. This is consistent with BAS-PhilRice survey data showing that an irrigated rice farmer typically plants 94% of land to rice (3.16 hectares) and 6% to other crops (0.19 hectare). Rainfed farms are slightly more diversified, with 92% of the land being planted to rice. To feed a family of five at the provincial average consumption level of 120 kilograms of rice per year, a typical irrigated rice farm needs only 0.23 hectare (cropped once a year) to produce enough rice, while a rainfed farm needs 0.33 hectare because of lower yields. This means that 93% of the irrigated rice area and 86% of the rainfed rice area are surplus to family rice consumption needs.

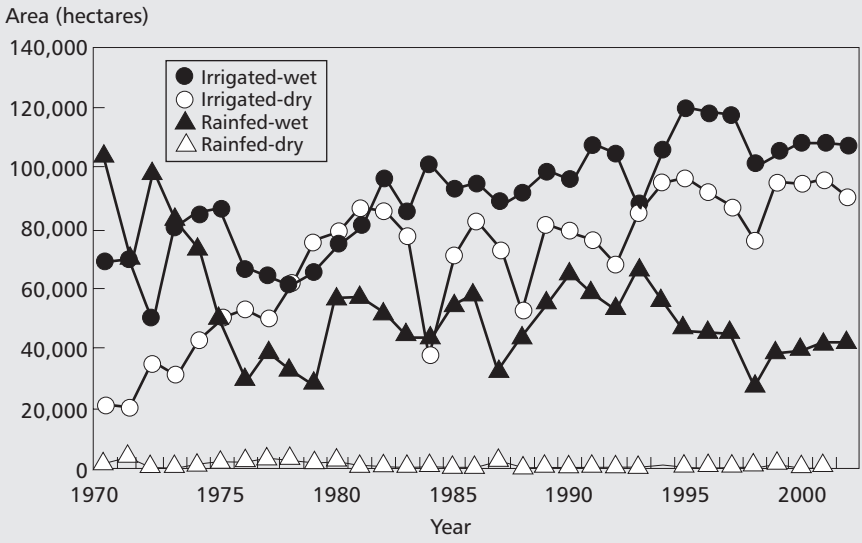

Fig. 1. Trends in rice area by season and by ecosystem, Nueva Ecija, 1970-2002. Source of data: PhilRice-BAS (2004).

Table 1. Major crops in Nueva Ecija, 2002.

Crop	Area (hectares)	Production (tons)	Yield (kilograms per hectare)
Rice	239,127	968,754	4,051
Mango	10,540	20,579	1,952
Onion	4,765	55,357	11,617
White corn	2,860	3,490	1,220
Eggplant	1,865	7,642	4,098
Tomato	1,390	9,411	6,771

Source: BAS (2004).

Crops alternative to rice

Although most rice farmers in the province are specialized in rice, a wide variety of crops are grown in Nueva Ecija at present (see Table 1). Other than rice, mango and onion are common as alternative crops in many parts of the province because of the suitable climate and soil type. The potential for diversification in Nueva Ecija is strong because of the extensive irrigation system and good soil for general agricultural purposes. In fact, many studies on crop diversification have focused on this province.

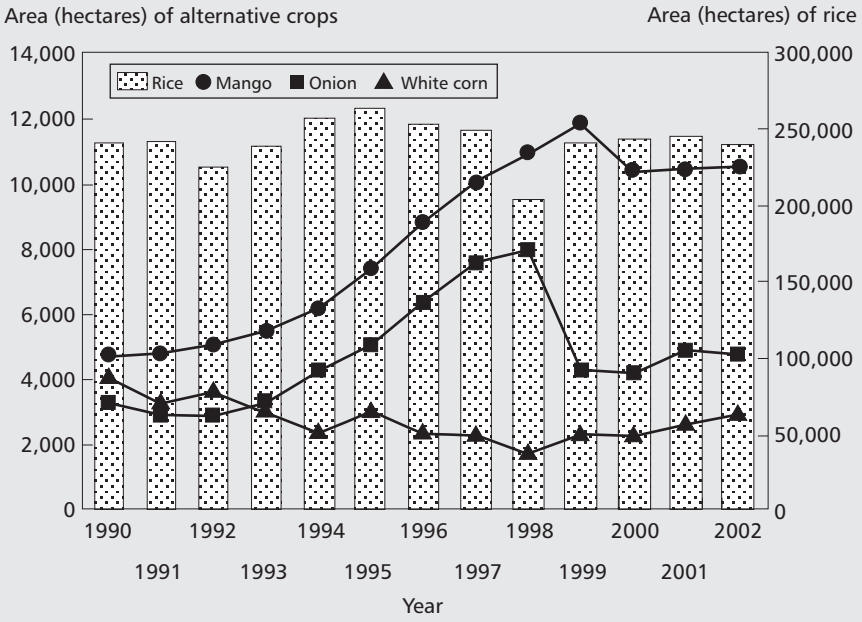

Fig. 2. Area planted to major crops in Nueva Ecija, 1990-2002. Source of data: BAS (2004).

One of the emerging crops in Nueva Ecija is mango, and the province ranks among the highest producers of mangoes in the country. The area planted to mango trees has doubled and production has tripled from 1993 to the present. Although Nueva Ecija produces almost 100% of the onions harvested in Central Luzon, and 57% for the entire Philippines, Figure 2 shows the increasing popularity of mangoes over onion as an alternative crop.

A variety of other crops such as vegetables and tomatoes are also being grown on irrigated farms. Nueva Ecija accounted for 55% of the total tomato production in Central Luzon and 41% of eggplant production in the region (BAS 2004). Rainfed rice farmers also plant watermelons, tobacco, and vegetables as alternatives to rice.

Diversification from a rice monoculture system to a system that includes nonrice crops could lead to increased variability in household income because of yield or price instability. Although many studies have shown greater profits from the rice-onion cropping pattern than from the rice-rice cropping pattern, risk aversion remains a significant impediment to what would seem to be rational diversification on the basis of average profitability of alternative crops. In this circumstance, the tenancy arrangements observed in rainfed ecosystems are one possible solution to diffusing the risk associated with nonrice

crop production (Pingali et al 1997). These farms often divide their farms into two, cultivating one part and leasing out the other. In this way, the landowner gets a sure income from one part of his land and gambles on the remainder. This arrangement is reflected in the province as about half of the rainfed rice farms, where diversification is more common, are rented, as opposed to only 20% of the irrigated farms.

For Nueva Ecija, as in many other provinces, the ability to profitably convert rice lands to the growing of nonrice crops can be constrained by either drainage requirements in the WS or limited water supply during the DS. This is particularly true for rice-based farm households in Nueva Ecija, where there is a distinct dry season with minimal rainfall. This problem has been overcome on some farms in the province with the introduction of deep tubewells, which has led to the adoption of maize followed by mungbean in the DS after a wet-season rice crop (Gines et al 1989).

With the recent trend in mango popularity, the potential of mango production as a major source of income has been further boosted in Nueva Ecija with an administrative directive from the local government to plant mango seedlings along roads and in vacant areas (Nueva Ecija Journal 2003). Because of the distinct dry season in the province, mangoes are very suited to the climate. There is even no need for restructuring of land since mango trees can be intercropped with rice, planted along the dikes. Moreover, mango has an established export market and has shown greater profits than onion. Data from BAS (2004) showed net profits of ₱69,000 per hectare for mango and ₱55,000 per hectare for onion. These numbers are about triple the net profits from rice farming.

Another area that can be exploited is cattle and small ruminant production. Cattle and carabao in the province account for 25% of the total inventory in Central Luzon, placing Nueva Ecija second in rank in the region. Nueva Ecija also leads in duck and chicken production, and is second in the region for hog raising.

Currently, the profitability of rice farming in Nueva Ecija is high enough that most farmers do not want to diversify their cropping patterns. If rice trade liberalization were to occur, a PhilRice-BAS survey showed that 54% of the rice farmers stated that they would opt to plant vegetables if the price of palay decreased to a low level, a much higher percentage than in other provinces. However, to improve the prospects for diversification, several problems need to be anticipated.

First, vegetable crops tend to have greater price fluctuations than rice, which may lead to uncertain returns on investment. A recent article cites disgruntled onion farmers recurrently experiencing bumper harvests that cause a dip in prices (Felix 2004). Contract farming, infrastructure, and financial capital in terms of more postharvest facilities could help to alleviate this problem.

Second, if too many farms convert to the same crop all at once, there will be a local oversupply and production will no longer be profitable. Again, infrastructure and better roads will help to move these crops to other areas of the country. Nueva Ecija has a good endowment in this regard, perhaps because of its past history of supplying rice to Manila.

Third, investment capital in terms of improving water control and human capital in the form of acquired knowledge regarding appropriate crops and management practices cost money and time. In Nueva Ecija, a pump needed to irrigate farms may cost a farmer at least ₱35,000. On the other hand, farmers in Bangladesh, who are much poorer than those in the Philippines, have enthusiastically adopted irrigation pumps without government support in the form of subsidies.

Fourth, working capital requirements for alternative crops are higher than for rice, and farmers may not have adequate access to the necessary capital. Vegetable farming, for instance, has higher labor needs than rice farming.

Given all of these constraints, particularly with respect to capital (financial capital, investment capital, human capital, and working capital), it is not surprising that nonrice crops on irrigated lands are grown on extremely small plots (Moya and Miranda 1989). Thus, future trends are likely to entail an intercropping system or an allocation of a small fraction of landholdings in well-drained soils to nonrice crops, or else the use of contract farming where large agri-business firms can alleviate the capital constraints faced by small farmers.

Notes

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15I | Oriental Mindoro

Piedad F. Moya and Agustia Castillo

Rice production

Oriental Mindoro is primarily an agricultural area with many types of soil, varying from clay loam to beach sand. It has coastal and river valley plains that offer extensive and fertile irrigated lands for agriculture (NSO 1990). It is known as the rice granary of the Southern Tagalog Region (DA, no date). At present, it has a total harvested rice area of about 80,000 hectares, which are almost equally divided between the wet and dry season (49% and 51%, respectively). However, harvested area was only 54,000 hectares in 1970 and even dropped to as low as 37,000 hectares in the late 1970s (Fig. 1A). From then, it increased more or less steadily to its current level, with a peak of almost 87,000 hectares in 1991. These fluctuations in harvested area across the years are similar in magnitude for both the wet (WS) and dry (DS) seasons. As a whole, harvested rice area increased by 47% from 1970 to 2002, higher than the 30% increase for the Philippines as a whole during the same period.

The share of irrigated area to total rice area was 66% in 1970. It dropped to 42% during the 1980s, but has since rebounded back to 66% in 2002. Irrigated areas contribute about 69% of total production because of higher yields than in rainfed areas. Irrigated areas grow two crops of rice per year, whereas rainfed areas cultivate 1.7 crops of rice per year (PhilRice-BAS 2004). Rice production in Oriental Mindoro more than tripled from 1970 to 2002 (Fig. 1B), increasing from only 84,000 tons in 1970 to 265,000 tons in 2002. This increase was due to the increase in harvested area as well as a more than doubling of yield per hectare from 1.54 tons per hectare in 1970 to 3.32 tons per hectare in 2002.

Based on data from surveys conducted by PhilRice and BAS, the average annual harvested rice area for rice-farming households in the province is 3.18 hectares in irrigated areas, with an average yield of 3.5 tons per hectare. For rainfed areas, average annual harvested area is 1.85 hectares, with 3.2 tons per hectare average yield.

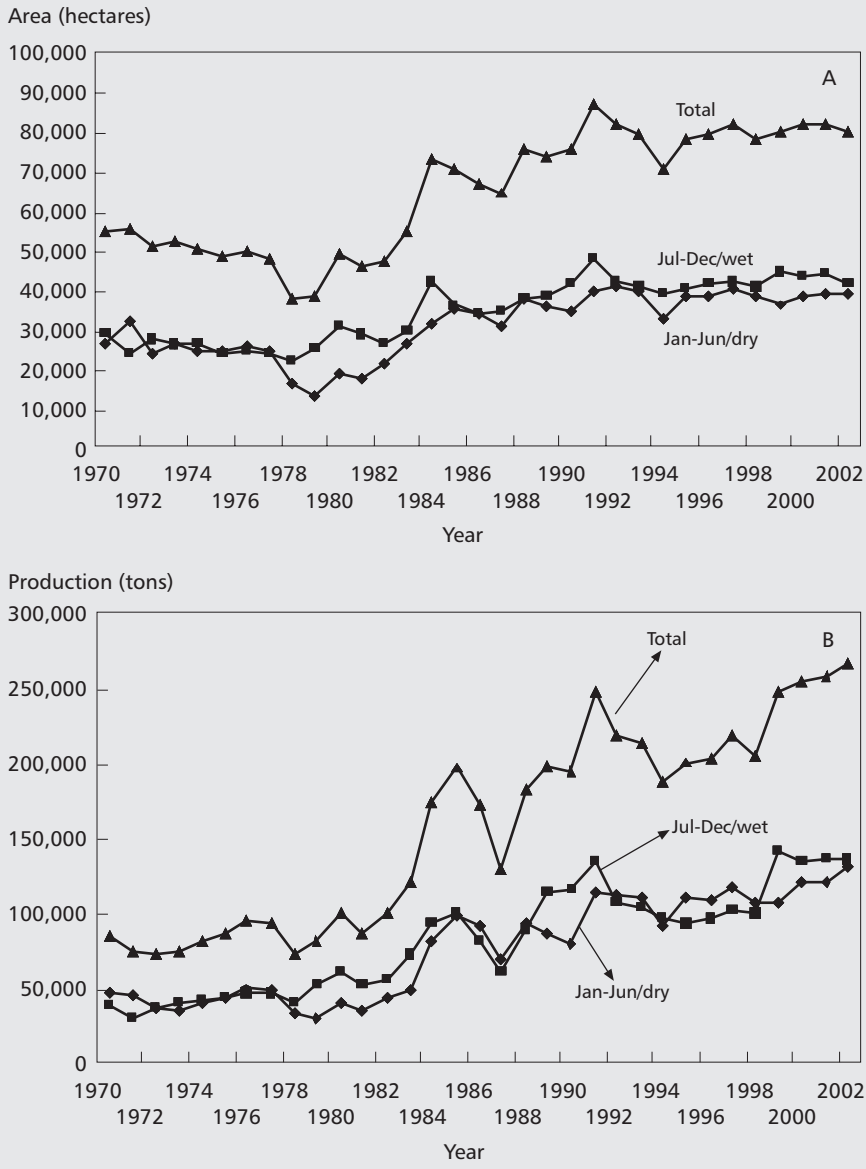

Fig. 1. Trends in rice (A) area and (B) production, Oriental Mindoro, 1970-2002. Source: PhilRice-BAS (2004).

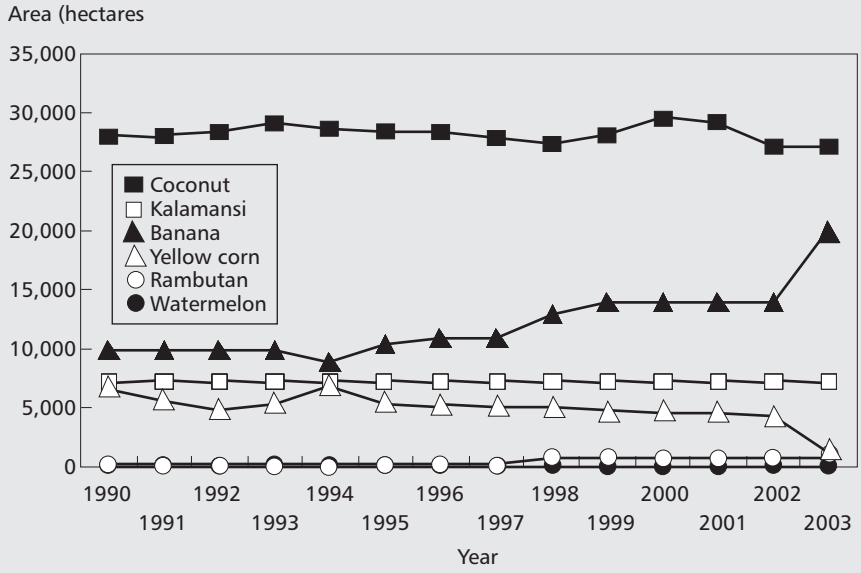

Fig. 2. Trends in area planted to major crops, Oriental Mindoro, 1990-2003. Source of basic data: BAS (2004)

Crops alternative to rice

Rice occupies 59% of the cultivated area in the province, making it the dominant crop (BAS 2004). However, other crops also occupy a significant proportion of the total cropped area, such as coconut, banana, *kalamansi* (a small citrus fruit), yellow corn, *rambutan* (type of Malayan fruit similar in appearance to lychee, but with a bright red spiky skin), and watermelon. After rice, coconut is the next most important crop in terms of area, and it has consistently occupied around 27,000 hectares since 1990 (Fig. 2). Among these alternative crops, banana and rambutan show signs of an increasing trend in area planted. On the contrary, area planted to yellow corn has almost completely disappeared. Other minor crops cultivated in the area are legumes and root crops such as sweet potato, cassava, and yam.

Results of a recent survey among rice farmers in Oriental Mindoro showed that, if the price of rice were to decrease to a very low level, a vast majority of the farmers in irrigated areas would still be willing to plant rice. In the rainfed areas, however, more than half (56%) would consider planting other crops. These farmers would consider planting corn, mungbean, and watermelon, which are already being grown as alternatives to rice in the dry season by some of the farmers in the locality. However, as shown in a study by JICA-NIA (1996a), several crops could be grown aside from the three crops mentioned

above in Type IV climate areas such as Mindoro. These crops are cabbage, sweet potato, squash, tomato, garlic, eggplant, okra, and peanut. Based on data collected by the Bureau of Agricultural Statistics (BAS 2004), these crops have already been cultivated in the province (although in only a small area) since at least 1990, which probably attests to their suitability to the area.

Corn is a possible alternative to rice in Oriental Mindoro, as in other parts of the country. In terms of market, the Philippines still has a very strong potential for this crop because it has been a consistent importer of corn for the last 40 years (FAO 2005). However, regional data (Southern Tagalog) on costs and returns for rice and corn show that, in terms of profitability, corn is inferior to rice. This can be attributed to the very low yield of corn relative to rice. On average, corn yield is only 1.4 tons per hectare compared with about 3.4 tons for rice. Corn yields in Southern Tagalog are much lower than in other parts of the country, and could be improved.

Data on costs and returns (BAS 2004) for various crops showed that tomato, garlic, watermelon, eggplant, kalamansi, and sweet potato are profitable crops that could be grown as alternatives to rice. In fact, the net profits from the production of eggplant, kalamansi, watermelon, and garlic are much higher than for rice. For the last five years, net profits for these crops were in the range of about ₱20,000 to ₱80,000 per hectare. In addition, the demand for crops such as garlic, watermelon, tomato, and peanut is higher than the supply such that the Philippines is still importing these crops to meet the demand. On the other hand, kalamansi, which grows well in Mindoro, is becoming an export crop. It is also becoming a popular local juice among Filipino consumers, which could further increase its demand.

Specific studies on crop diversification for high-value crops such as garlic, eggplant, tomato, and watermelon, which are adoptable and already planted in small areas in Oriental Mindoro, indicated positive economic benefits to farmers in areas where the studies were conducted (JICA-NIA 1996b, Gonzales 1989, Caluya and Acosta 1989). These studies are of course location and time specific but they provide encouraging results to support crop diversification in case the price of rice drops to a level where rice production is no longer profitable or competitive.

There appears to be strong potential for the rice areas in Oriental Mindoro to diversify to other crops. But, aside from economics, important technical, institutional, and social issues should be considered in crop diversification in rice-based irrigation systems, as discussed by Moya and Miranda (1989). In irrigated areas, physical and operational control capacity of rice-based irrigation systems are basic technical considerations. Some institutional and social issues might arise from changes in irrigation service fee payment and farmers' ability to change their behavior in terms of crop management, product marketing, and water management.

Espino and Atienza (2001) also discussed and summarized the challenges and prospects of crop diversification in both irrigated and rainfed lowland

areas. In the rainfed areas, the factors they found that influenced farmers in their diversification decisions were income stability, increasing demand for vegetables and nonrice crops, and, of course, higher profitability per unit area.

Steps should be taken by both the public and private sectors to meet all of these challenges regarding crop diversification in order to help rice farmers overcome the effects of any rice trade liberalization that might occur.

Notes

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15J Pangasinan

Grace Cataquiz

Rice production

Pangasinan has a vast area devoted to rice farming, with about 215,000 hectares of harvested area for *palay* (the Filipino word for rice at harvest, before the husk is removed). Sixty-six percent is irrigated while the rest is rainfed. The province used to be mostly rainfed, but its percentage of total rice area declined from 65% in 1971 to 34% in 2002 (Fig. 1A).

From around 250,000 tons per year from 1972 to 1976, production increased to about 740,000 tons in 2002 (Fig. 1B). Rice production is much lower during the dry season (DS) than in the wet season (WS) because farmers plant other crops during the DS or leave their rice areas fallow for lack of irrigation water. Farmers without access to irrigation plant rice once a year only, but about half of the farmers in irrigated areas grow two crops of rice per year. Some farmers own their land, but a majority are under tenancy or leasing contracts.

Crops alternative to rice

Although palay is the most dominant crop in the province, many farmers also plant other crops such as corn, mango, coconut, and tobacco. Other than rice, the top five major crops planted in the province are yellow corn, mango, white corn, coconut, and tobacco (Table 1). Based on available costs and returns data from the Bureau of Agricultural Statistics, mango is highly profitable (Table 2). However, it also requires higher investments per hectare than rice farming, and a long gestation period before realizing a profit.

Most farmers cannot easily shift to permanent crops such as mango because they do not have the capital to invest and they cannot afford to wait for a long period to realize returns. One possibility is mixed farming, for example, intercropping mango with rice while waiting for the trees to bear fruit. Another alternative is to plant cash crops such as vegetables, legumes, and root

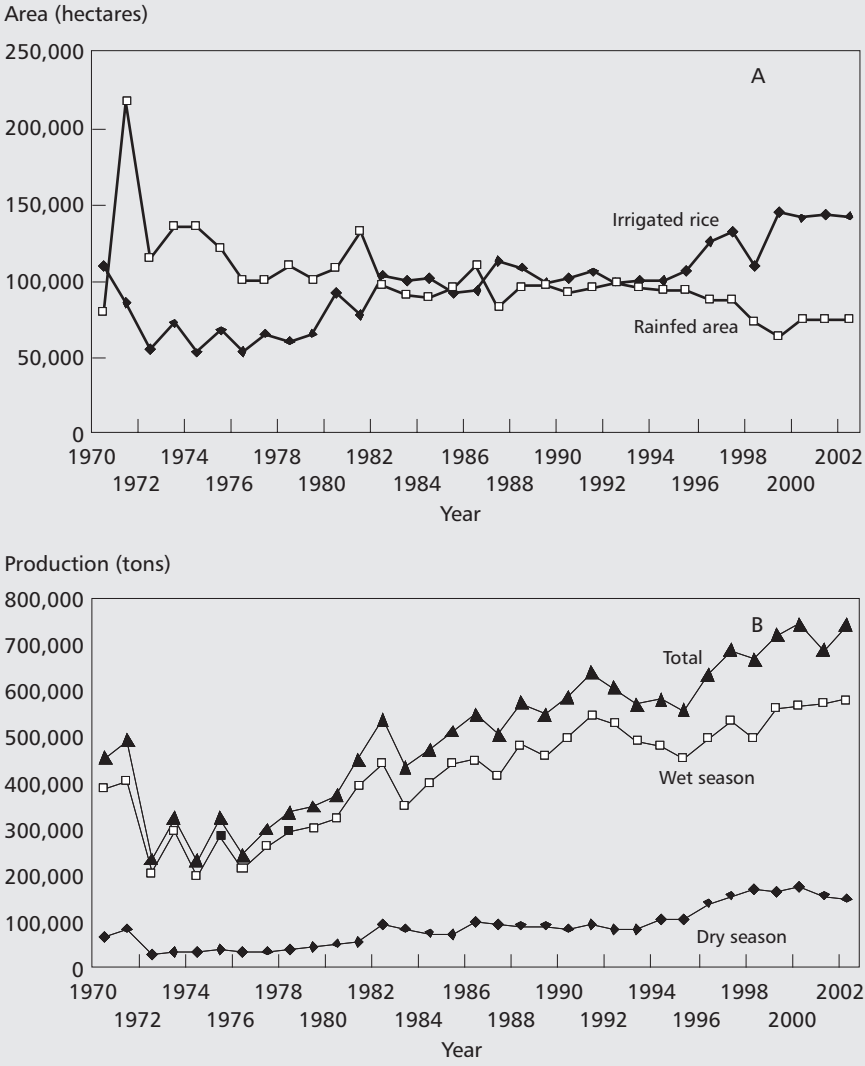

Fig. 1. Trends in rice (A) area and (B) production, Pangasinan, 1970-2002. Source of data: PhilRice-BAS (2004).

Table 1. Area planted to the top five nonrice crops, Pangasinan.

Crop	Area planted (hectares)	Percentage of total cropped area
Yellow corn	22,386	7
Mango	14,663	5
White corn	7,897	3
Coconut	7,169	2
Tobacco	6,617	2
Total cropped area	300,763	100

Source of data: BAS (2004).

Table 2. Comparative costs (pesos per hectare) and returns of nonrice crops that are planted in Pangasinan.

Crop	% Area planted	Net returns	Cash cost	All costs
Yellow corn	7	14,832	6,623	15,336
Mango	5	70,129	24,048	38,460
White corn	3	15,148	4,205	11,587
Tomato	1	35,829	39,896	53,665
Eggplant	1	23,677	50,229	77,434
Peanut	1	1,413	10,043	17,618
Onion	0.4	102,427	36,678	58,880

Source: BAS (2004).

crops while maintaining rice farming. To the extent that rice farmers are worried about household food security, they can still maintain a small portion of their land in rice to feed their family while diversifying the rest of the land into other crops, because only a small portion of farmers' total area is necessary to supply the family with rice. Some cash crops that are suitable in Pangasinan are tomato, eggplant, peanut, onion, and *ampalaya* (bitter gourd). The most profitable among them is onion, followed by tomato. Tomato requires less investment cost.

Both tomato and onion are highly perishable. They require good storage to be able to prolong shelf life and maintain supply year-round. Their production is also highly seasonal. They can be planted only during the dry season because both are quite sensitive to waterlogging but can tolerate drought conditions to some degree.

Aside from land suitability and climate, another factor that can affect crop diversification is market supply and demand. Both onions and tomatoes have high market potential. Since the 1970s, the Philippines has exported

onions, but in recent years exports have declined and imports now often exceed exports. Farmers can cover this trade deficit or recapture old export markets. Tomato also has market potential as the Philippines has been an importer in recent years.

Diversification need not be confined to crops only. Rice farmers can learn to integrate livestock production into their farming system to augment income and reduce income risk. Moreover, it is also a source of immediate cash and has enabled the use of family resources, particularly labor, more efficiently (Sombilla et al 2004).

Notes

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15K | South Cotabato

Alice B. Mataia and Henry Soriano

Rice production

South Cotabato is the major rice-producing province in the Southern Mindanao region. At present, the province has a total rice harvested area of about 78,700 hectares, which accounts for 38% of the region's total rice harvested area and 2% of the national total (PhilRice-BAS 2004). Since 1970, annual rice harvested area has increased by 154%, from 30,900 hectares to the current level (see Fig. 1), compared with an increase for the Philippines as a whole of about 30%. Dry-season (DS) area increased espe-

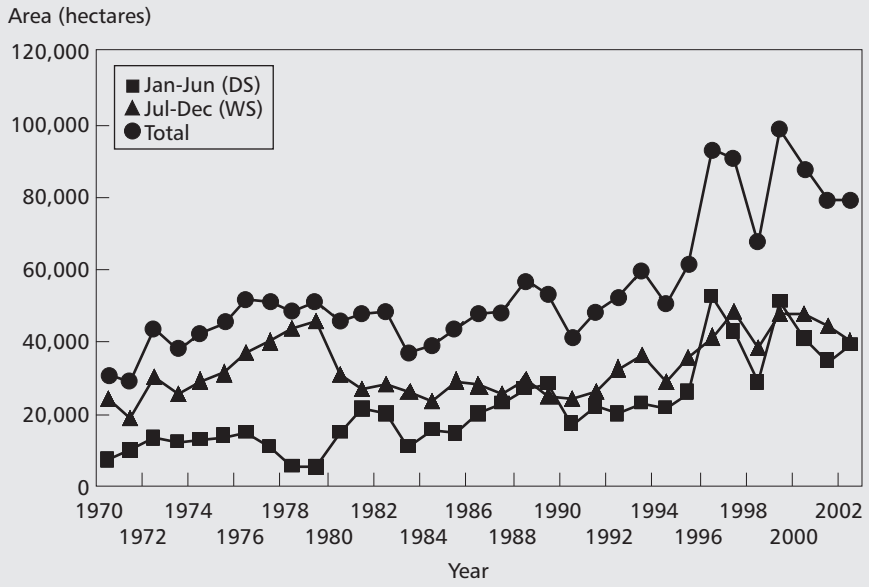

Fig. 1. Trends in rice area, South Cotabato, 1970-2002. DS = dry season, WS = wet season. Source of data: PhilRice-BAS (2004).

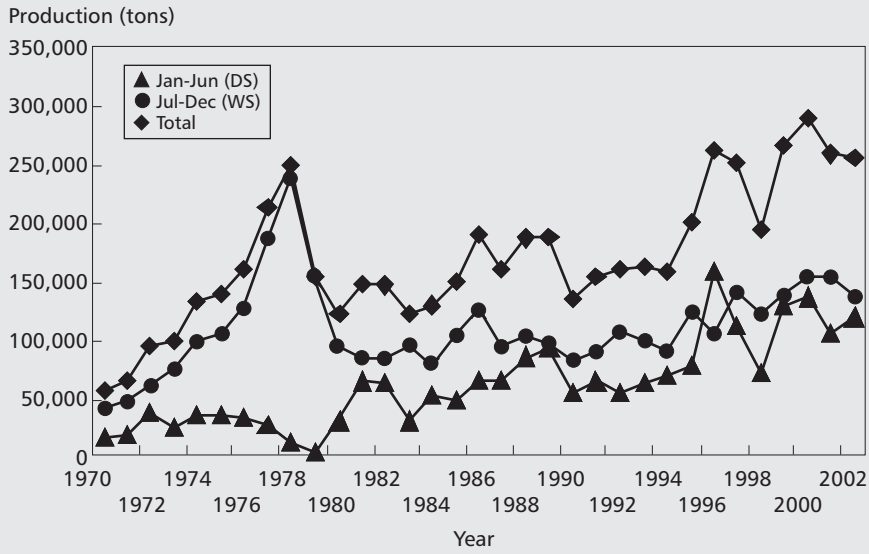

Fig. 2. Trends in rice production, South Cotabato, 1970-2002. DS = dry season, WS = wet season. Source of data: PhilRice-BAS (2004).

cially rapidly, which can be attributed partly to irrigation investment. From 1983 to the present, the physical rice area served by the National Irrigation Administration (NIA) in the province has increased from about 9,300 to 20,300 hectares.

Rice production has increased substantially since 1970, growing by nearly five times, from 55,500 tons in 1970 to about 255,000 tons in 2002 (Fig. 2). This enormous increase was partially due to the increase in the irrigated area as a result of irrigation investment. In contrast, harvested area in the rainfed ecosystem declined drastically (at present, about 90% of the rice area in the province is irrigated, double the level of 45% in 1970). In addition, average yields in the province have increased sharply, partially because a greater proportion of land is now irrigated, but also because of large increases in yields within the irrigated system. Rice production in the province accounts for 35% of the region's total.

Although a large majority of the rice area is irrigated in South Cotabato, the overall mean yield (3.23 tons per hectare in 2002) was slightly below the national average (3.28 tons per hectare). For irrigated rice, mean yield of 3.25 tons per hectare is 12% lower than the national average. The province is barely self-sufficient in rice at a self-sufficiency ratio of 1.02, and the small surplus is exported to neighboring deficit provinces.

The average annual rice area harvested per farm household is higher in South Cotabato than in the rest of the country, with a mean cropped area of

Table 1. Top major crops in South Cotabato, 2002.

Crop	Area planted (hectares)	% of total area	Rank
White corn	79,498	27	1
Yellow corn	79,157	26	2
Rice	78,665	26	3
Coconut	32,228	11	4
Pineapple	14,150	5	5
Banana	6,491	2	6

Source of data: BAS (2004).

4.21 and 3.79 hectares in irrigated and rainfed areas, respectively. Slightly less than half of the farmers in irrigated areas, and about 80% in rainfed areas, have full or amortizing owner tenure status, whereas the rest are tenants.

Crops alternative to rice

South Cotabato is principally agriculture-based. Aside from rice, a wide range of temporary and permanent crops are also cultivated. Corn is the dominant crop in the province, and is planted as a commercial crop on more than half (counting both yellow and white corn) of the province's total cropped area, in contrast to rice, which accounts for only 26% (Table 1). Another traditional crop of major importance is coconut, which accounts for 11% of the total cropped area. The province also produces high-value crops with export potential such as pineapple, asparagus, banana, and okra. Other major crops cultivated are coffee, sugarcane, and cacao. In irrigated areas, mongo and watermelon are also planted after rice, although they are confined to specific areas.

Rice farmers in South Cotabato are somewhat specialized in rice. In both irrigated and rainfed ecosystems, rice is double-cropped, and even triple-cropped in some areas with sufficient irrigation water. It is worth noting, however, that some rice farmers include nonrice crops such as corn, mongo, and watermelon in their cropping pattern. Data from BAS-PhilRice surveys in 1997 and 2002 show that the percentage of nonrice crop area in total crop area increased from 2.5% to 5.5% between these two years in irrigated areas. The extent of diversification also increased in rainfed areas, reaching a much higher level of 22% in 2002.

Although diversification is more pronounced in rainfed areas, one-third of the sampled farmers in irrigated areas in South Cotabato indicated willingness to plant crops other than rice if rice prices were to fall to low levels. Many of these farmers thought that corn was a good alternative. In fact, BAS

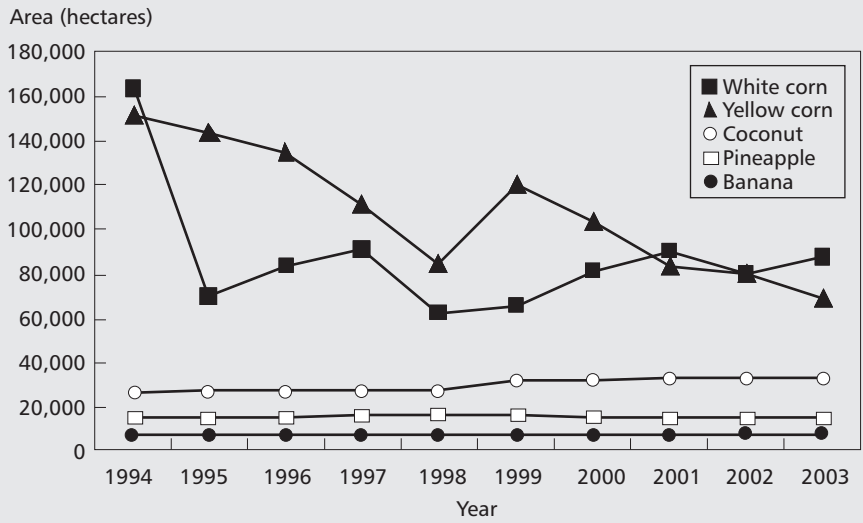

Fig. 3. Trends in area planted, other major crops, South Cotabato, 1994-2003. Source of data: BAS (2004)

(2004) data for the Southern Mindanao region show that the net profit for yellow corn is ₱6,800 per hectare, compared with about ₱4,400 pesos per hectare for irrigated rice. White corn is not a promising alternative because of its negative net profit.

Although corn is the dominant crop in the province, and was mentioned as a promising alternative to rice, the area planted to this crop has declined substantially since 1994 (see Fig. 3). From an area harvested of about 310,000 hectares in 1994 (white plus yellow corn), area harvested decreased to less than half that amount in 2003. During this time, many farmers abandoned corn and planted gmelina trees instead (especially in the rolling hills), owing to their greater income potential in these areas.

Another major crop in the province is coconut, which ranks next after corn and rice (Table 1). Annual area has been increasing, from about 25,000 hectares in 1994 to about 32,000 hectares in 2003 (Fig. 3), resulting in increased coconut production. The Philippines is the world's largest exporter of coconut products, but coconut is a long-gestating crop and it takes several years to yield returns to farmers. Thus, shifting to coconut production will not generate income for farmers in the short run.

The third major crop that is potentially important in the area is pineapple. It covers about 17,300 hectares, with Dole Philippines being the largest producer. Pineapple production is highly profitable. The latest BAS estimates show the net profit at around ₱125,000 per hectare for a one-year cropping

period. The crop also has strong export market potential, and there is less danger of saturating the market. Pineapple generated more than 200 million dollars in foreign exchange in 2003, including associated products such as juice and canned pineapples that provide additional employment. This crop is an example for which strong partnership with the private sector could yield benefits for farmers.

Owing to the province's fertile agricultural lands, good rainfall, and typhoon-free climate, other crops are produced in the area and represent possibilities for diversification, including banana, asparagus, and mongo. Foremost among these is banana, which is gaining popularity in the area. In fact, some farmers in the region are already shifting from rice to banana contract growing. According to these farmers, banana is more profitable than rice because it is an export crop. The use of contract growing can reduce some of the risks faced by farmers when they diversify.

The province also has a comparative advantage in asparagus cultivation. Indeed, South Cotabato is the country's largest producer of asparagus. Production in the SOCCSKSARGEN region (composed of the provinces of South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos City) increased from less than 2,000 tons in 1990 to more than 20,000 tons in 2004. Asparagus is exported by Marsman-Drysdale Agri-Ventures and produced under a contract-growing scheme that provides good money for farmers. Supply and use data from BAS (2004) show an increasing trend in per capita consumption of asparagus, suggesting that there is demand even in the local market.

Aside from the above crops, farmers may also grow mongo, which is one of the crops cited by farmers as an alternative to rice if rice prices were to fall. Compared with rice, mongo is profitable, yielding a net profit of ₱7,000 per hectare per cropping (BAS 2004).

Diversification into noncrop activities is another viable option. The province is well known for cattle fattening and is the second largest producer of livestock in the country. With its proximity and accessibility to cattle importation from Australia, farmers might choose to organize and engage in the importation and fattening of cattle. The topography, vegetation, and climate make it ideally suited for rearing cattle, on either a small or large scale. South Cotabato is also known for its delicious cultured tilapia. Some rice areas in the municipality of Tantangan, which is known for its waterlogged area, may be considered for conversion to freshwater fishponds, similar to the current experience of Dujali in Davao del Norte.

Despite the potential for diversification away from rice, there are obstacles as well. Farmers might need more technical knowledge to grow other crops, and typically need more capital to finance higher production expenses. They would also have to bear more risk, as many alternative crops have larger price fluctuations than rice. Improved infrastructure from the government and increased collaboration with the private sector (for example, through

contract farming) are important in order to give farmers more options for crop diversification. Farmers may also consider cultivating a small rice area that provides enough for the family's annual rice consumption, and use the major portion of the land for producing more highly competitive crops to maximize household income rather than generating a rice surplus for the market. This will not only improve family income but will also meet the needs of the family.

Notes

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16A | Opportunities beyond rice farming: a Luzon farmer's perspective on diversification

Nelissa Jamora, Cheryll B. Casiwan, and Margil Funtanilla

Growing up on a farm, Florentino M. Santiago, Jr. has always known the language of agriculture. As a young boy, he watched his father toil on the farm so he could send his nine children to school. The only child who studied agriculture in school, Santiago now works as a farmer-consultant at the Philippine Rice Research Institute (PhilRice). This 36-year-old native of Talavera, Nueva Ecija, is committed to proving that there is indeed money in farming, millions in fact.

Santiago's ambition has always been to become a professional farmer and a role model to the farming community. He felt a need to influence traditional farmers when he realized their dire need for modern technologies. He practices land-use planning and uses every space on his farm to obtain higher income. Since income from rice is not enough to meet the basic needs of his family, he intercrops *gabi* (taro), vegetables, and mango trees on his 3.25-hectare farm and has also ventured into fish culture. To minimize his expenses on chemical fertilizers, he uses indigenous materials available on the farm—animal waste, rice straw, and other organic materials. He attends training and seminars conducted by different government and nongovernment agencies to augment his practical experience in farming. For instance, seminars sponsored by PhilRice such as "Hybrid Rice Production and Commercialization" and the "Season-Long Farmer Field School" gave him the opportunity to work closely with agriculturists to learn about and better understand modern farming technologies.

The rice yield on his farm normally reaches 5.8 tons per hectare. Planting only rice will give him an annual gross income of about ₱150,000. With 300 mango trees planted along the dikes around his rice farm, he is earning an additional income of ₱90,000 per year. Annual profit from gabi is higher at ₱150,000. Fish harvests give him an extra ₱30,000, while his vegetable produce adds ₱20,000 to his household income. Adopting an integrated farming system, by devoting 2.25 hectares for rice cultivation and allocating small portions of his land to fish and other crops, more than doubled his annual gross income to at least ₱340,000. Diversifying his farm increased his family

income and reduced the risk in relying solely on rice farming. Moreover, diversification benefits the environment as it helps improve soil conditions and forces farmers to reduce their chemical applications on the farm. However, Santiago is cautious to say that diversification does not mean abandoning rice, but simply using prudent land-use planning. He boasts of his father being an engineer and being able to use his technical skills in maximizing land use on their farm.

For rice farmers, Santiago sees diversification as one safety net for rice trade liberalization. Unfortunately, our farmers have not been prepared well for this possibility. He sees capital, or lack of it, as one deterrent to diversification for most farmers. Usually, it is simply because they are not aware of where to get additional money or they are afraid to take risks. It is important to add that the capital requirement depends on the level of diversification the farmer will venture into. In Nueva Ecija, where a distinct dry season exists, pumps—which may cost a farmer at least ₱35,000—are needed to irrigate farms after the wet season. Restructuring of land to suit other crops also seems to be a stumbling block for farmers. Santiago is quick to point out, however, that municipal government offices have heavy equipment that can be rented at a minimal fee to restructure lots. Farmers also need to invest some time to learn about the crops suited for cultivation considering the soil type and climate. Because his farm soil is mostly heavy clay, Santiago is mindful that he cannot plant onion, so he opted for other vegetables such as *sitao* (cowpea), *talong* (eggplant), and gabi. Another important issue is the high labor requirement for planting vegetables vis-à-vis monocropping rice.

In cases in which farmers do not diversify, Santiago asserts that farmers are either indolent or ignorant. He stresses the importance of farmers' initiative in increasing their household income through diversification. He firmly believes that farmers themselves should make the first move in obtaining their inputs and capital needs and not depend on the government to supply them with those needs. The role of the government and the extension service in particular is very crucial in making sure technologies and opportunities reach farmers.

His competence as a farm manager and a skilled farmer started to be recognized in 1998. From then on, Santiago has consistently been honored as one of the outstanding rice farmers in Central Luzon. Although focused on farming, he is active in community affairs and development, serving as chairman of a cooperative and of an agrarian reform council in his *barangay* (district). He still dreams of expanding his farm because he sees opportunities in farming that would eventually make him a millionaire (in pesos).

Notes

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16B Crop diversification experience of an irrigated rice farmer in Iloilo

Cheryll B. Casiwan, Ireneo Olivares, Alice B. Mataia, and Jesusa M. Cabling

"With higher additional income and more people busy because of crop diversification, there will be less criminality in the country," says Teresita Tubbolleza-Marmalejo, a native of Iloilo City who has been diversifying her rice farm since 1974. She faced and hurdled the usual challenges of crop diversification—market, lack of capital, poor farm-to-market roads, unstable irrigation, and pests. Now, at 56, she still plants rice and 8 to 10 different types of vegetables each year on her 2 hectares of land. She earns more than ₱30,000 per year from rice, and ₱1,000 per week during the peak season and ₱500 per week during lean months from vegetables. With only her diversified farm, she claims to have financed 6 children through college graduation, and is currently sending two more children to school.

Her motivation to diversify and plant vegetables was to have monthly cash income to support daily household expenses, and support the education of her children. She had no capital to start with, except family labor and a dedication to hard work. Thus, she acquired vegetable seeds for free from her neighbors and started growing vegetables that required less cash capital along the dikes of her rice farm. Gradually, she expanded to include other suitable areas on her land. Now her farm consists of 2 hectares planted to two rice crops and mungbean/watermelon/corn as a third crop, plus 0.3 hectare for mixed vegetables and other spaces planted to papaya and other fruits and vegetables. To further augment her income, she is also engaged in small-scale livestock production, particularly swine and cattle. She attributes her success in diversified farming to hard work, patience, and an acquired sense of what to plant when.

Ms. Marmalejo claims that the success rate for crop diversification is higher for owned farms operated by a full-time farmer than for tenant farms. She stresses that her success in venturing to other crops is largely due to her dedicated efforts in tending her own farm, in contrast to being thinly spread across many farms and hiring alienated hired labor in the process. Although she hires farm labor for some activities, she closely monitors activities and

developments on her farm. She claims that labor quality is better and labor intensity is higher when you manage your own farm because you are personally committed to making it successful.

At first, Ms. Marmalejo encountered problems in marketing her produce. Her farm is around 8 kilometers from the town market proper and road conditions are poor. Low price is usually a problem, especially during the peak harvest season for specific vegetables. She solved this problem by direct selling on her own farm, within the *barangay* (district), and in the town market proper. She is able to directly sell her products in the retail market because she plants many diverse vegetables in small volumes. Specifically, she plants squash, bitter gourd, Malabar spinach, *saluyot* (a green leafy vegetable from the jute plant), ladies' finger (okra), pole stringbeans, pepper, *pechay* (Chinese cabbage), eggplant, and *kamote* (sweet potato, for its leaves) on her farm. In cases in which the volume is relatively large, she sells wholesale to traders who pick up her produce from the farm.

Ms. Marmalejo says that crop diversification is possible even on irrigated rice land as long as the soil is suitable for other crops, drainage is good, and irrigation is controllable. In her case, rice was previously the only crop that could be grown during the wet season. But then she developed a 0.5-hectare area by improving drainage and constructing raised plots. She now plants rice in the main field during the wet season with selected vegetables such as string beans planted on the dikes and in the raised plots. Given the unstable water supply during the dry season, she claims that the use of a shallow tubewell pump allows her to plant a large mix of vegetables.

Ms. Marmalejo does not favor the idea of trade liberalization yet because she thinks that Filipino products are not yet competitive enough. She thinks it is all right for imported products to enter the market as long as the price will not be affected. In her opinion, to be able to compete, productivity and profitability of producing rice and other crops should be improved. Ensuring a good irrigation supply and using quality seeds are the major factors to attain this. She mentioned that one priority of research should be the production of short-duration hybrid rice so that farmers can plant vegetables between the rice crop seasons. She said that increasing cropping intensity is the surest way to increase farmers' income. Finally, she mentioned that the government could help farmers become competitive by putting up infrastructure such as storage facilities, local wholesale market facilities, and a more efficient price monitoring system. When possible, keeping prices of farm inputs such as fertilizer and chemicals at a low level will also help.

Notes

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16C | A Mindanao farmer's perspective on crop diversification

Alice B. Mataia and Henry Soriano

Seventy-four-year-old Mr. Bernardo Bullas of Esperanza, Sto. Tomas, Davao del Norte, was a recipient of the GAWAD SAKA award in 2003 as an outstanding rice farmer. Mang Dodong, as he is fondly called in his community, started farming at the age of 20. A hardworking farmer, he practices integrated pest management (IPM) and hybrid rice technology on his farmlot. From his 5.0-hectare irrigated rice farm, he devotes 3.75 hectares to rice cultivation. He has achieved very high yields with variety PSB Rc72 since his 2001 dry-season crop yielded 9.5 tons per hectare. His record yield was 9.6 tons per hectare (or a total of 36 tons) in the 2002 wet season, which gave him a net profit of 190,405 pesos after incurring production costs of 81,000 pesos. Mang Dodong prepares his land for rice cultivation all by himself using his carabao.

With a wife and 12 children, Mang Dodong had to work extra hard. To further increase his income from farming, he started to diversify a portion of his rice land in 1982. To make diversification possible in his irrigated rice areas, he constructed good irrigation and drainage and added some soil on 1.25 hectares to make it elevated. This area is planted to coconut and banana, which give him a yearly net profit of 40,000 and 3,000 pesos, respectively. He also plants various vegetables such as *alogbati* (Malabar spinach), okra, squash, and cassava on an area of 200 square meters, the produce of which is marketed to retailers, from which he gets a net profit of 2,000 pesos per month. He also has a backyard piggery and poultry farm. These have provided additional income to the family of about 12,000 and 25,500 pesos per year, respectively. Mang Dodong also raises tilapia, whose produce is used for home consumption and to give away to friends and neighbors.

Given the nonsustainability of a monocropping production system, Mang Dodong was motivated to diversify in order to increase the family's income as well as to reduce the risk of planting only rice. According to him, the diversity of his farm enterprises improved the family income significantly, provided a steady flow of cash, and allowed him to send his children to college (they are now professionals). Moreover, he stressed that crop diversification is crucial

with the trade liberalization of rice. The low price of rice in the world markets will put rice farms at risk, particularly the uncompetitive ones. Thus, he recommends that other farmers diversify part of their rice lands to more financially attractive commodities. According to him, banana is one good alternative because it grows even in irrigated areas with good drainage and it is profitable because of its export potential. In irrigated areas where diversification is not possible, he suggests planting hybrid rice, for which he gets a net profit per hectare of about 50,775 pesos per cropping, owing to its yield advantage over the best inbred rice.

Vegetable production helps provide a secure, steady flow of both food and cash. According to Mang Dodong, vegetables can be planted even on dikes. Nevertheless, he points out that the seasonality of vegetable production and the fluctuation of prices impede crop diversification. Other disincentives for farmers are high labor costs and farmers' lack of technical knowledge to grow other crops. In addition, the negative attitude (leisure seeker) of some farmers might impede diversification. According to him, the government should institute various measures such as technical and support services to promote diversification.

Mang Dodong's success factors are his ambitions for his family coupled with his ethic for hard work and his dedicated attitude. These traits have made him an outstanding farmer.

Notes

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