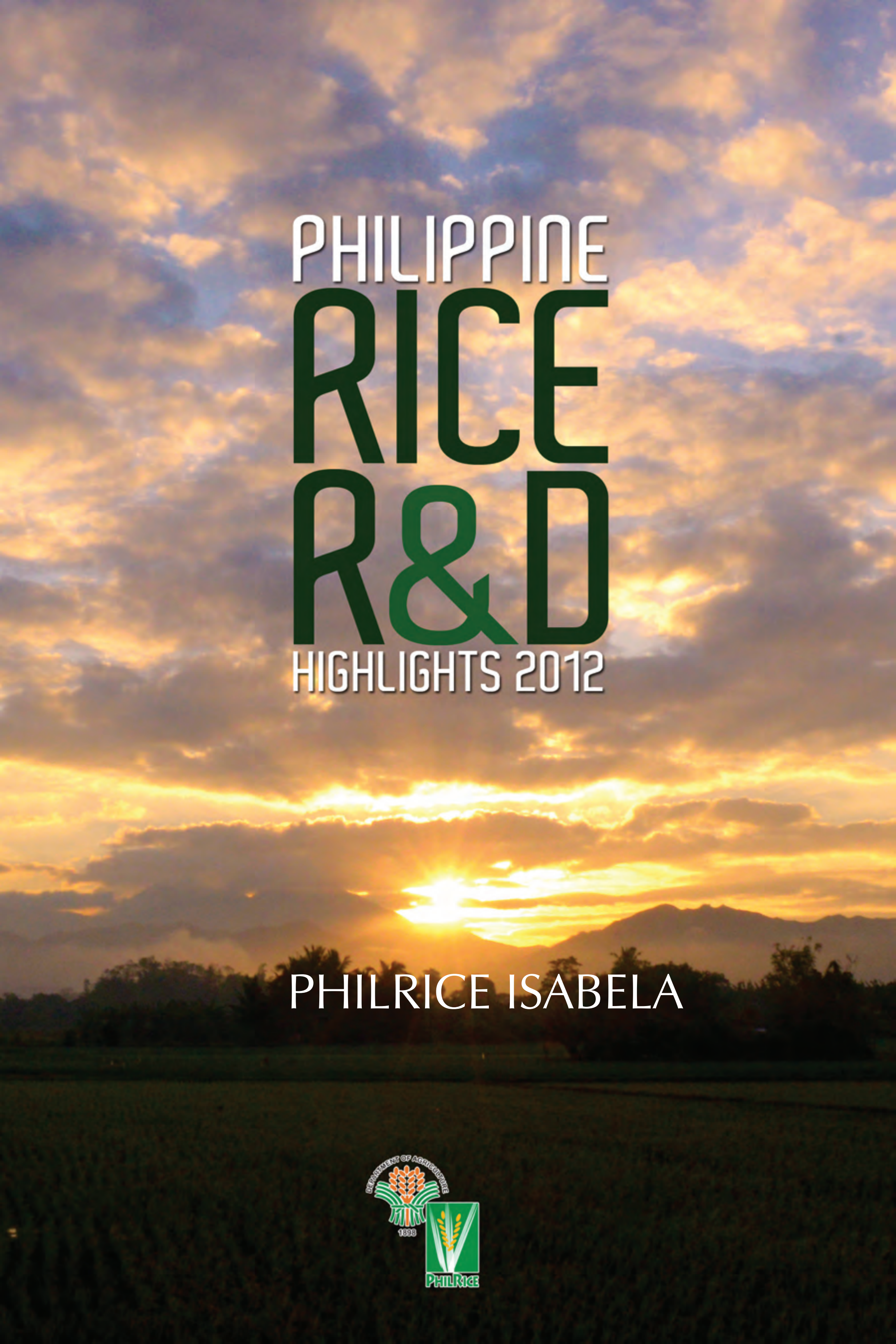

PHILIPPINE RICE R&D HIGHLIGHTS 2012

PHILRICE ISABELA

TABLE OF CONTENTS

PhilRice Isabela

Branch Manager: DB Rebong II

PhilRice Isabela, as the Hybrid Rice Center of PhilRice, focuses its projects, studies, and activities on hybrid rice breeding, research, and seed production. The basic hybrid researches are all lodged under the SYP and BYB programs. However, studies on site characterization of low yielding areas, pest and disease management, seed production research, impact and socio-economic assessment analysis, and utilization of ICT in farming are also implemented to cater the needs of the different ecosystems in Northeast Luzon. Projects specific for the areas of the two DA-Regional offices in Northeast Luzon include the following: use of organic or biopesticides on pest and disease management; location-specific technology development with promotion of Palayamanan; development of different technologies for upland and rainfed ecosystems; and documentation of indigenous practices in the upland, rainfed, and cool-elevated areas.

A fertility map/guide of the low-yielding rice areas in Isabela and Cagayan was generated and is expected to improve yield of farmers through cost-effective input utilization. On pest and disease management, it was found that the population of whitebacked planthoppers on irrigated fields planted with hybrids and inbred remained manageable and that no imminent pest outbreak occurred.

The use of drumseeder in the upland rice areas gave a significant yield difference compared to broadcast and drill methods. A higher return of investment is expected with the continuous use of drumseeder compared to broadcast seeding at 80kg/ha rate.

A differential seeding of five to seven days (with the P-line to be planted ahead of the S-line) of NSIC Rc204H (M20) was identified as best synchronization with an 8:2 S x P ratio in Isabela condition.

PhilRice Isabela conducted a total of 29 projects and studies in 2012. Seven studies were completed while 22 projects and studies will still be implemented. Of these, eight (8) projects are being funded by DA-RFO 02 and DA-CARFO while 14 are under the station's R&D program.

Site Characterization of Low Yield Rice Areas in Region 02
JRF Mirandilla and AM Flores

Farmers often lack an identification system which could be used for nutrient management purposes. Thus, identification and transfer of information on soils is impaired. Numerous nutrient management strategies have been developed through the years. However, not all may be suited to all rice areas in the country. Farmers can choose the strategy to use but should be guided in decision-making. One solution is to scale up the development of location-specific technologies customized to the needs of the farmers' fields. Characterization is an important tool to localize the developed technologies especially in areas where yield is below 3.8t/ha and 2.5t/ha for irrigated and rainfed, respectively. Characterizing these areas would help identify and understand the yield constraints and strategies to overcome them. The project was designed primarily to develop a nutrient management field guide applicable not only for the evaluated site but also for sites with similar characteristics to improve farmers' yield through proper and cost-effective input utilization.

Highlights:

- In collaboration with the RSOs assigned in the area, 132 sites were validated through existing maps. Municipalities in Isabela (Delfin Albano, Jones, Tumauini, Quezon, Angadanan), Cagayan (Allacapan, Alcala, Amulung, Solana), Nueva Vizcaya (Bambang), and Quirino (Saguday) were the sites in Region 02.

- Before the establishment of field trials in LSTD sites, RSOs assigned in the area conducted Minus One Element Technique (MOET) test in each site (barangay) they covered. MOET results showed increasing multiple deficiencies in irrigated rice field areas. Nitrogen and phosphorus deficiencies were present in 33 sites while41 sites were nitrogen, phosphorus and potassium-deficient. These are the primary nutrients that the rice plant needs.

- High percentages of deficiency in nitrogen (N), phosphorus (P), potassium (K), and sulfur (S) were observed. Lack of the said nutrients ultimately leads to low rice yields. Moreover, large consumption of these macro-nutrients can deplete the nutrient levels in the soil. In terms of N levels, 98.4 % of all the sites were nitrogen deficient. Nitrogen deficiency is more likely to occur since in all stages of rice production, rice requires nitrogen in large amount. It is the most important nutrient for sustaining high yield production.

- Most of the sites were also phosphorus deficient (83.5%). Increasing P deficiency in rice fields can be attributed to farmers' practice of burning rice straw. Fewer sites had deficiencies in copper (Cu) and zinc (Zn). The rice plant only uses these micronutrients in little amount. It was observed that farmers in deficient sites burn their rice straw. In the process of crop removal, some of the nutrients contained in the straw may be lost and can lead to decreasing nutrient levels in the soil.

- There were three irrigation systems in the LSTD sites: NIA system, well (deep and shallow), and rainfed. A percentage of 58.3 sites are serviced by NIA system while 27.27% are using well (shallow and deep) for irrigation. The rest of the sites are considered as rainfed. These sites suffered drought in 2010. Water deficit is a major problem in rice. It affects plant growth and development and results in a considerable yield reduction or crop failure. Reduction of yield was observed in the area due to drought.

- Results showed that 76.09% of the farmers burn their rice straw. Based on the study of Launo et.al. (2010), burning the straw is said the quickest and least laborious way to clean the field but this may result in complete N loss, 25% P loss, 20% K loss, and 5 to 60% S loss. According to Dobermann (2002), it can also lead to accumulation of nutrients (K, Si, Ca, Mg) in the spots where the straw was burned and depletion in other parts leading to unequal soil fertility. However, it can help in the reduction of pest and disease populations' source (Dobermann and Fairhurst, 2002). The remaining sites (27.27%) piled and composted the straw. Remaining stubbles and rice straw were decomposed which can conserve soil nutrient in the long term.

- Different nutrient managements were noted in 114 farmers who answered the site characterization questionnaire form. Farmers were applying 16 to220kg/ha nitrogen, zero to 105kg/ha phosphorus and zero to 105kg/ha potassium. Most of the sites were inadequately applied with nitrogen, phosphorus and potassium (Graph 3a, 3b, 3c) . As shown in Graph 3a, 72 sites were applying less than 90kg/ha. All of these sites were also nitrogen-deficient. It should be noted that applying insufficient nitrogen, whether inorganic or organic, can lead to nitrogen deficiency.

Seasonal Abundance of Whitebacked Planthoppers Sogatella furcifera in Northeastern Luzon

GB Amar and DA Gomez

Intensification of irrigated rice production worsens pest problems (Sujeetha, 2008). The insects are still considered the most destructive in terms of damage. It accounts for 20-50% yield losses in rice production. One of the insects which have potential threat is the whitebacked planthoppers

(WBPH) and brown planthoppers (BPH). The WBPH and BPH are harmful insects which carry the rice tungro virus. To explore the damage potential of WBPH and BPH in rice production areas in Isabela, this project was proposed. The data obtained in the light trapping showed that the weekly population of WBPH is inversely proportional with the BPH. The peak period of the population of WBPH and BPH started during third week of February to March. In the tapping method, the BPH had the highest population until the ripening stage of the rice plant. The WBPH paralleled the population of the beneficial insects. With this observation, it is inferred that BPH reproduces faster than the WBPH and that the population of beneficial insects could not level down the BPH. BPH's activity was high on PSB Rc18 during the mid-tillering and dough grain to ripening stages of the rice plant while NSIC Rc132H was highly preferred during the panicle initiation stage.

Highlights:

2012 Dry Season

- Among the hybrid entries, NSIC Rc132H recorded the highest number of BPH and WBPH, followed by PSB Rc72H (M1), NSIC Rc204H (M20) and NSIC Rc202H (M19). On the other hand, among the inbred, PSB Rc18 was noted to be the most insect-preferred.

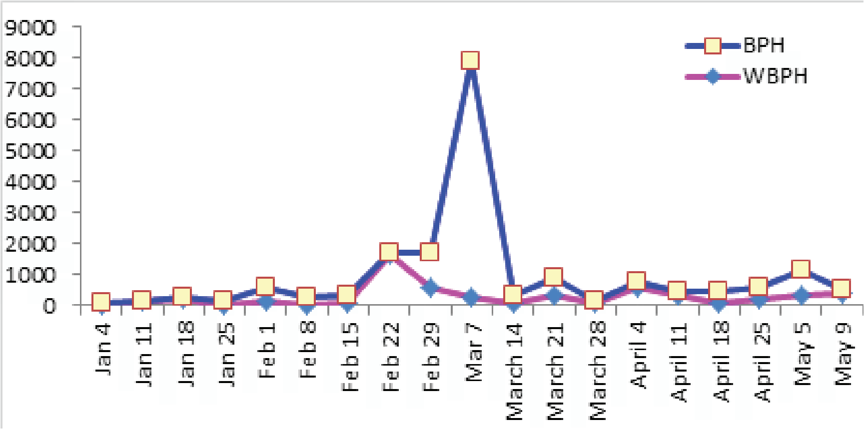

Figure 1. Mean number of WBPH and BPH collected by light trap. 2012 DS. PhilRice Isabela

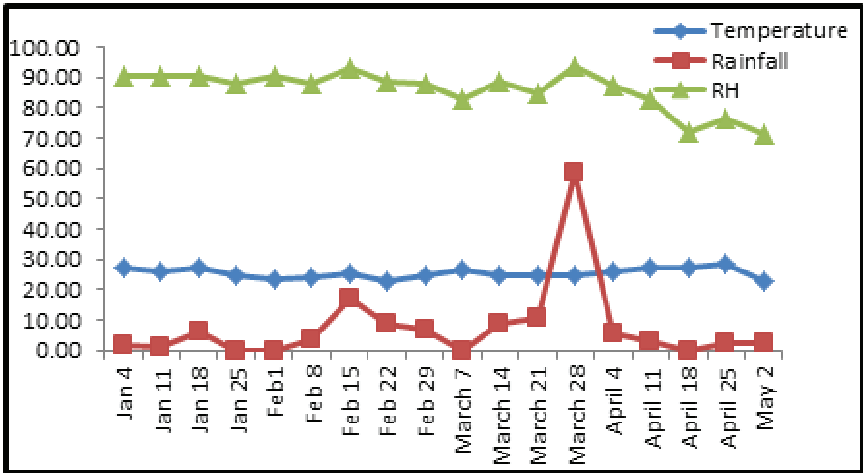

Figure 2. Mean temperature, rainfall and relative humidity. 2012 DS. PhilRice Isabela.

- In 2012 dry season, BPH was at its highest during the onset of March, while WBPH was highest during mid-February. The BPH and WBPH population showed a negative relationship with temperature, rainfall, and relative humidity. A decline in these weather factors caused an increase on BPH and WBPH population.

2012 Wet Season

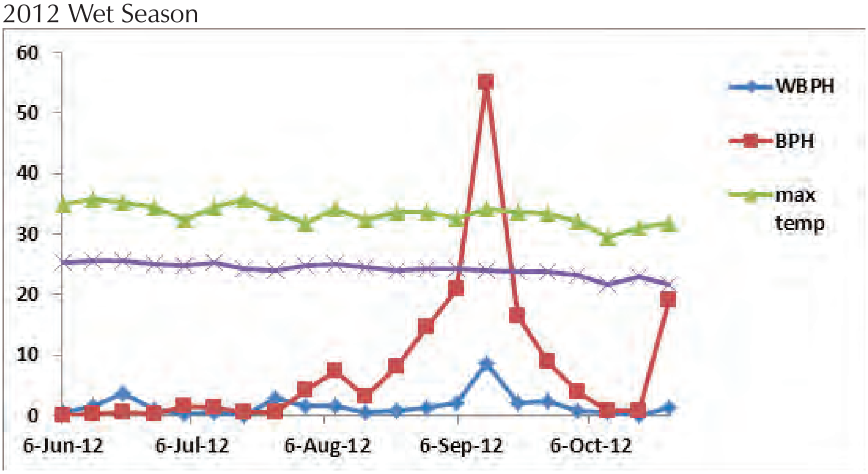

Figure 3. Mean temperature, rainfall and relative humidity. 2012 WS. PhilRice Isabela.

- During the wet season, WBPH and BPH were observed highest in 2nd and 3rd week of September when the crops were at its booting stage.

- Similarly, the result of the study in 2012 Wet Season showed a relationship between temperature and number of BPH and WBPH. This implies that a decrease in weather factors, specifically temperature, causes the increase of BPH and WBPH.

Evaluation of Seeding Techniques and Rates in Upland Rice in Isabela
NS Sosa

Rice plays an important and dominant role in crop production in more or less 100,000 ha upland areas in the Philippines. It is a key crop in agricultural land use. Thus, increasing rice yields is a determining factor to food security and reducing poverty in the country. The current upland practices in the Philippines are still considered traditional methods (i.e. the use of animal-drawn wooden plow to open furrows, dry seeds are being broadcasted, and the use of wooden plank in covering and diverting the seeds into rows). Appropriate methods of planting, row spacing, and seeding rates of upland rice have yet to be practiced. These factors affect plant competition for light, water, nutrients, and space that also affect the yield of upland rice. Hence, this study aimed to (1) identify the best method of sowing and seeding rate of upland rice that could give 90-100% crop establishment in selected upland areas in Isabela; (2) evaluate broadcast, drill, and drum seeding methods under various seeding rates; and (3) package and recommend crop establishment techniques for upland rice in Isabela. This study was conducted during the 2011 WS in Delfin Albano & Ilagan, Isabela and 2012 WS in Ilagan, Isabela.

Highlights:

- The treatment combination of seeding techniques and seeding rates for both 2011 WS and 2012 WS showed no significant difference.

- For 2011 WS, the use of drum seeder gave significant difference in yield with 2.185t/ha compared to broadcast (1.796t/ha) and drill method (1.658t/ha) of seeding.

- Moreover, for the 2012 WS, the use of 120 kg/ha seeding rate obtained significantly higher yield with 2.34t/ha than that of the 40 kg/ha with a yield of 1.78t/ha but was comparable with the use of 80 kg/ha seeding rate with a yield of 2.00t/ha.

Cultural management of Two-line hybrids in Northeast Luzon
GB Amar and FM Ramos

The success of growing hybrid relies on good management from seeding to harvest and postharvest operations. This study assessed the proper handling of seed production of the TGMS hybrid Mestiso 20 (NSIC Rc204H). The results showed that the high yield of S line was attained at treatments with high nitrogen rate of 150kg N/ha. This is comparable with the yield obtained from the farmer's fertilizer rate of 120kg N. The various rates on P and K did not affect much the yield of S line. The row ratio experiment showed the highest yield at 8:2, followed by 10:2, and 12:2 S and P line. Beyond the 12 rows of S, the yield already decreased at 15:2 and 20:2. For differential seeding, the interval of seven days was noted during the 2012 DS both by seeding interval and leaf counting methods.

Highlights:
2012 Dry Season

- If the N application increases, yield also increases. Although the result showed no statistical difference between treatments, higher yield were obtained from plots applied with higher N.

- Yield of SxP was noted to be highest at 8:2, 10:2, and 12:2 ratios. This suggests that considerable yield of M20 (F1) can be obtained from eight up to 12 rows of S but the pollinating capacity of P line is lessened beyond this. However, the row ratio was best at 8:2 which was proven in other three-line hybrids.

- Seven-day interval had the best synchronization during 2011 WS and 2012 DS even in drought and with sufficient water.

Figure 4. SxP with 7-day interval. 2011 WS. Figure 2. SxP with 7-day interval. 2012 DS.

A. Leaf Counting Method

- By leaf counting method, it could be noted that panicle initiation started at 9th leaf of the S line and 10th leaf of the P line. Primordial stages changed every three days. The S line developed an average of 14 leaves while the P line had 17 leaves. The best synchronization was achieved at seven days seeding interval conforming with the differential seeding study by primordial sampling .

2012 Wet Season

- It was noted that the S-line self-crossed in both areas during the wet season. Two factors possibly contributed to selfing; 1. The cold nights and frequent rains during the panicle initiation stage. 2. The S line used was produced on-station that affected sterility of the S line when planted in the same location.

- Nevertheless, the yields of P and S were not significantly different among treatments. S and P line yields were highest at 120-40-40kg NPK/ha at PhilRice Isabela with yields of 4.13 and 4.93t/ha, respectively.

- In Tabuk Kalinga, the S line had the highest yield of 2.96t/ha at 150-40-40kg NPK/ha while P line had the highest yield of 2.65t/ha at NPK rate of 120-60-40kg/ha.

- Seven days was the best seeding interval for S and P lines. Leaf counting method showed that S line developed 16 leaves while the P line had 17. Panicle initiation stages were observed on the 11th leaf of the S line and 12th leaf of the P line.

Comparative Assessment of Public and Private Hybrid Rice Seeds (F1 Cultivation) in Region 02

JC Portilla and JR Pagaduan

Rice production hardly copes with the continuous population growth in the country. To address this, the government introduced the cultivation of hybrid rice seeds to improve productivity and profitability of farmers. In Region 02, hybrid rice cultivation is widely adopted because it can give higher yield and income for farmers. This study aimed to (1) compare the demand of farmers in public and private hybrid seeds; (2) determine the level of hybrid seed adoption; (3) to determine and assess the factors affecting hybrid seed adoption; and (4) determine farmers' productivity and profitability.

Highlights:

- A total of 315 hybrid rice growers/farmers were interviewed from the municipalities of Lal-lo, Aparri, and Camalaniugan in Cagayan; Roxas, Cauayan City, and Santiago City in Isabela; Diffun, Saguday, and Cabarroguis in Quirino; and Bambang, Aritao, Solano, and Dupax del Sur in Nueva Vizcaya.

- One hundred respondents were encoded and evaluated, 100% of whom use private hybrid rice seeds such as SL8, Bigante, TH82, PHB71, and Jolly Rice. The unavailability of F1 seeds to input dealers and seed centers was identified as one of the main reasons for non-adoption of public hybrid seeds.• High cost of seeds and labor, susceptibility to pests and diseases, laboriousness, low buying price, deteriorating quality of seeds, and the declining optimum yield target were among the constraints in the adoption of hybrid rice seeds.

Assessment on the Status of Rice-Corn Eating Households in Region 02
JC Portilla and JR Pagaduan

Rice comprises a major part of the Filipino diet and supplies a significant proportion of energy and nutrient needs. Aside from energy-giving carbohydrates, it also contains protein, minerals, vitamins, and fiber. Corn, on the other hand, ranks second to rice with 20% of the population eating it as staple. It is also a richer source of vitamin A than polished rice and contains high amounts of minerals such as calcium and phosphorus. The increase in population in the country with an average of 2.3 percent per annum requires agricultural production to meet food and nutritional requirement of the populace. Region 02 is one of the biggest corn-producing areas in the Philippines. Hence, the mixing of corn to everyday diet may lessen the dependency on rice and its importation.

Highlights:

- A total of 168 corn farmers were interviewed across Region 02. This included the municipality of Enrile, Tuguegarao, and Penablanca in Cagayan; Cabagan, Sta. Maria, and San Pablo in Isabela; Nagtipunan, Aglipay, and Maddela in Quirino and Diadi in Nueva Vizcaya.

- Majority of the corn farmers have been eating corn since childhood. Only few respondents were interviewed in Quirino and Nueva Vizcaya (10 respondents). Most corn eaters were from the provinces of Cagayan and Isabela.

- Only 102 questionnaires were encoded and assessed. All of the respondents said they alternate rice and corn as staple food. Majority of them (55%) said their yearly food consumption is composed predominantly of corn while 29% answered their yearly food consumption includes 50% rice and 50% corn. On the other hand, the remaining 16% said their yearly food consumption is mostly rice.

Socio-Economic Analysis on Rice Cropping Practices in the Uplands of Region 02

JC Portilla and JR Pagaduan

Rice diversification has been adopted since 1970s to raise farm income and intensify employment opportunities in the rural areas. The need to diversify crops is in response to meet the increasing demand on food other than rice amidst the continuous growth of population, industrialization, and urbanization. This strategy helped alleviate poverty and increase productivity of rural farmers. In the rainfed and upland areas, rice cropping pattern differ by geographical location. Researchers identified about 25 rice-based cropping patterns with rice as the main crop followed by another crop. After a decade of research in the cropping pattern of the upland areas, there is a need to evaluate whether these cropping patterns still exist and profitable considering the adverse effect of climate change in these areas.

Highlights:

- A total of 287 respondents were interviewed in four provinces of Region 02 particularly in Dupax del Norte, Diadi, and Quezon in Nueva Vizcaya; Nagtipunan, Maddela, and Aglipay in Quirino; Benito Soliven, Jones, and Ilagan in Isabela; and Lal-lo, Lasam, and Gattaran in Cagayan.

- Initially, 40 survey returns were encoded and evaluated. Six rice-based cropping patterns were determined namely: rice-corn, rice-beans, rice-ginger, rice-peanut, rice-sitao, and rice-mongo. A slight majority (58%) of the 40 respondents plant corn after rice.

- Most rice produced by upland farmers is set for family consumption. The alternate crop such as beans, sitao, mongo, and peanut are planted in small portions, not covering the entire area planted with upland rice. Corn was recorded as the most profitable crop alternated to rice.

Promotion of Rice-based Integrated Farming System at PhilRice Isabela

FD Garcia, RS Agbayani, NS Sosa, and RR Yumul, Jr.

Productivity of many rice farmers remains low because of the declining profitability of growing monocrop rice. With the increasing cost of labor and inputs and yields of rice reaching a plateau, the income of farmers has decreased tremendously. The Palayamanan System is composed of well-integrated components, maximizing the use of farm resources. Modern available technology components are integrated with rice and other high value crops, fish, poultry, livestock, and fruit trees. This uses the available farm resources and highlights the integration between each resource and by-product in various technology components of the farming systems. The project developed and promoted integrated rice-based farming technologies, and showcased integrated and sustainable rice-based farming systems models that can be adapted by local government units and farmers. PhilRice Isabela maintains two models: (1) Integrated farming systems (IFS) model for retirees and (2) IFS for well-to-do families (commercial level). These models embrace the close-loop biomass recovery and utilization system for sustained and profitable farming.

Highlights:

A. Integrated Farming Systems for Retirees

- A 0.5-ha area was used as model. A portion (400m2) was planted with NSIC Rc238. A fishpond was stocked with tilapia during the 2012 DS and African catfish during the WS due for harvest in December. The orchard was maintained. Vegetables like eggplant, tomato, and okra were planted along the fishpond embankments. This setup was showcased during the farmers' field day in March and September 2012.

B. Integrated Farming Systems for Well-to-do Families (commercial model)

- A 2.1-ha area was utilized in the commercial model. It was appropriated to rice production (1.1ha), aquaculture (0.7ha), pasture/animal (0.2ha), and vegetable (0.1ha).

- During the DS, positive profit was obtained combining all the proceeds of sales (Table 1). During the WS, cost-and-return analysis cannot be performed since some of the components like aquaculture was not completed nor harvested.The sales of harvested components are presented in Table 2.

Table 1. Cost-and-return analysis of the IFS setup at PhilRice Isabela during the 2012 DS.

<table>
<tr><th>Component/ Commodity</th><th>Sales/Harvest</th><th>Cost of Production (Inputs & Labor)</th><th>Profit</th></tr>
<tr><td>Rice</td><td>61,880.00</td><td rowspan="4">78,573.00</td><td rowspan="4">6,526.00</td></tr>
<tr><td>Corn</td><td>3,625.00</td></tr>
<tr><td>Vegetables</td><td>7,634.00</td></tr>
<tr><td>Fish</td><td>11,960.00</td></tr>
<tr><td>Total</td><td>85,099.00</td><td>78,573.00</td><td>6,526.00</td></tr>
</table>

Table 2. Sales during the wet season.

Component/Commodity	Sales/Harvest
Rice	22,032.00
Corn, Mungbean, Papaya, Vegetables, and Fish	12,967.00
Total	**34,999.00**

Strengthening ICT Utilization in Region 02 for easy access of rice-based updates and technologies

MA Baliuag, RE Valdez, and NS Sosa

Disseminating information on latest rice production technologies is difficult to attain especially in far-flung areas. Reaching remote areas is very costly. To address the problem, the Open Academy for Philippine Agriculture (OpAPA) was created to promote the use of Information and Communication Technology (ICT) i.e. use of cellular phones, computers, CD's and internet among farmers for fast delivery of information.

Highlights:

- Thirty seven agricultural technicians from Region 2 were trained on ICT. Since the training required hands-on computer use, each trainee was assigned with a computer to facilitate efficient learning.

Table 3. ICT training conducted, 2012 DS

AT's municipalities	Training Date	No. of ICT Trainees
Cabatuan, Isabela	February 21, 2012	6
Aurora, Isabela	February 24, 2012	4
Gamu & Naguillian, Isabela	March 2, 2012	5
Cauayan & Luna Isabela	March 7, 2012	10
Quezon, Isabela	March 8, 2012	6
Alcala, Cagayan	May 22, 2012	6

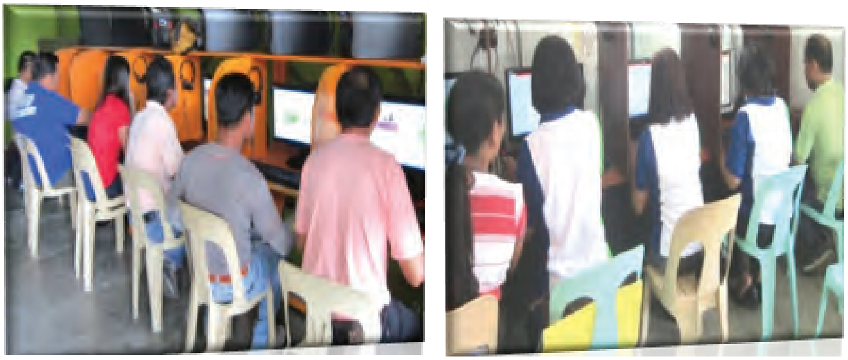

Figure 5. ICT trainings of Agrigultural Technicians in Isabela and Cagayan

Training Activities:

- PFTC registration: The trainess registered to the PhilRice Text Center. They were informed on the importance of the text center for answering rice production queries.

- Hands-on computer training: Basic computer operations were discussed to familiarize the trainees on the basic parts and functions of a computer. Lessons on creating and using electronic mail (email) were also discussed.

- The trainees also surfed the internet on latest agricultural technologies and explored the Pinoy Rice Knowledge Bank (PinoyRKB) website to gather essential information on pest management and the Palaycheck system. The trainees also obtained from PhilRice website a list of PSB and NSIC varieties and their characteristics .

- Each participant also answered the Nutrient Manager online in IRRI website for fertilizer recommendation.

After the training:

- There were 177 text messages received from PFTC. After classifying all the messages received, it was found that the most common queries were on varietal information, pest management, and nutrient management.

- Moreover, 31 emails were received. Organic farming and pest management were the most common queries.

Observations:

- Municipalities of Cauayan, Quezon, Ilagan, and Cabatuan have internet connection in their offices. Aurora and Alcala rented an internet café for the training.

- Computer Literacy –All trainees are computer literate but only 75% have a good knowledge on computer technologies.

- Frequency of Internet Use – Only 22% of the trainees use internet on a daily basis,62% use the internet one to three times per week, and 16% use the internet at least once a month.

- Common internet usage and impact

- Social networking (communication purposes)

- Organic farming

- Pests and diseases

- Technology updates

- Prices of commodities

- Management practices in rice

- Varieties of rice

- General information

Mobile Advisory cum Technology Clinic
HR Pasicolan, NR Gawat, DB Rebong II, Al dela Cruz, YB Mercado, and MA Baliuag

The establishment of mobile advisory cum technology clinic helped provide advisory service on crop selection, agricultural inputs, best farming practices with emphasis on insect pests and diagnosis of diseases, and management. Agri-clinics acted as knowledge provider and channel of information to the farmers without taking much of their time. By providing the said advisory system to the farmers, farmers had enough knowledge on mitigating or preventing potential disaster consequences. If the technology transfer is effective, then there will be an increase on crop productivity and the per capita income of the farmers.

Highlights:

- The components of the advisory system included radio program, mobile advisory, flyer distribution, posting of tarpaulin, and S&T updates

- The radio program was in partnership with the DA-RFU 2. Through the regular block air time programs of the partner agency, the advisory service was made possible. Having five (5) stations all over Region 2, the advisory service was done once a week. The topics aired were Overview of the PalayCheck System, Key Checks 1-8, and special topics on disease management (fungal diseases of rice, bacterial diseases of rice, viral diseases of rice, GAS management, rat management, seedbed preparation, seed production and purification, National Year of Rice celebration, Palayamanan System, station's field day, and VAAT results).

- For the mobile advisory, a vehicle with built-in sound system roamed around the barangays of San Mateo, Isabela every 5 o'clock in the morning. The topics aired via the system depended on the prevailing crop management in the area and the current crop production problem. In particular, topics included were PalayCheck system, seed selection and seedbed preparation, land preparation, crop establishment, nutrient management, management of rice tungro disease, and rat management. Local dialect was used to assure better understanding.

- Leaflets/flyers on the said topics were also distributed to farmers during the roving.

- A local TV channel (Cable TV) was also tapped to reach more farmers. Flash advertisements were utilized to inform viewers about the program to be aired. The topics flashed included the PalayCheck System, Key Checks 1-8, PhilRice story, rat management video, and controlled irrigation system video.

- S& updates were demonstrated through actual field activities in the barangays.

Use of Organic Pesticides on the Management of Rice Pests
GB Amar and DA Gomez

Rice is one of the major crops widely produced in Region 2. For several years now, the region is considered one of the largest contributors in the total annual rice production of the country. This was attained through the collaborative efforts of research institutions and local government units in the region especially in creating different rice production intensification projects.

Pest status such as the arthropods and diseases is believed to have shifted over the years. These pest problems could have increased with the intensification of irrigated rice production (Sujeetha, 2008). Among the common rice pests, insects are considered the most damaging. Insects account for 20-50% yield losses in rice production while diseases account for 10- 30%

losses in heavily damaged crops.

The study was funded by the DA-RFU 2 to test common biopesticides against rice pathogens and insect pests and determine the usefulness of biopesticides to the farmers. The study was conducted in 2011 WS to 2012 WS at the experimental farms of PhilRice Isabela and Abulug Seed Farm, Abulug, Cagayan.

Highlights

- There was no significant difference among treatments on the number of damaged leaves by bacterial leaf blight. However, the length of lesion, which indicates infection rate or time of increase of infection, was least when applied with EM, lactic acid, and soap and water, both in dry and wet season.

- Against insect pests, Metarizhium, fermented fruit juice, and soap and water were comparable with Cypermethrin in lowering insect population by at least 8% over the unsprayed plots.

Assessment of Rice Insect Pests and Diseases in Region 2
HR Pasicolan, NR Gawat, NS Sosa, and AB Obaña

Insect composition and disease occurrence in the field change within one cropping period, over a year or longer. Also, insect population density fluctuates over time. Varieties released as resistant became susceptible after only few seasons or years of cultivation due to pathogen evolution and adaptation to cultivated varieties. A close watch is required to gather information on changing status of disease, insect composition, and population density fluctuation.

Highlights:

- In San Mateo, Isabela, slight infection of BLS and RTV was observed on NSIC Rc224. In Mallig and Cabagan, no disease infection was observed during the 2012 WS. Green leafhopper was the most abundant insect pest, peaking on the third week of August.

- In Aglipay, Quirino, slight infection of RTV was observed from NSIC Rc138. Green leafhopper was the most abundant insect pest. Similar to the above, its peak wss on the third week of August.

- In Bagabag, Solano, Aritao, Dupax del Sur, and Villa Verde, Nueva Vizcaya, most of the varieties planted had slight RTV infection. It can be due to asynchronous planting that the farmers practiced. Green leaf hopper was the most abundant insect pest in Villaverde, Dupax del Sur, and Aritao, also peaking on the third week of August. In Bagabag, GLH reached its peak in July while in Solano, in September.

- Rice bug was also the most abundant insect pest in Bagabag, Aritao, and Dupax del Sur, which peaked in September.

- In Solana, Tuao, Gattaran, Buguey, Camalaniugan, and Baggao, Cagayan, PSB Rc10, Rc222, Rc130, and Rc152 had slight infection of RTV, BLB, and BLS. GLH was the most abundant insect pest in Gattaran, Tuao, Solana, Buguey, and Baggao, which peaked in August to September. In Camalaniugan, GLH was the most abundant insect pest but peaked in October.

Table 4. Most abundant insect pests in selected municipality in Region 2

Province/Municipality	Most abundant insect pest	Peak of Population
Nueva Vizcaya		
Bagabag	GLH	2nd week of July
	rice bug	1st week of September
Aritao	GLH	3rd week of August
	rice bug	2nd of September
Dupax del Sur	GLH	3rd week of August
	rice bug	2nd week of September
Villa Verde	GLH	3rd week of August
Solano	GLH	2nd week of September
Isabela		
Cabagan	GLH	3rd week of August
Mallig	GLH	3rd week of August
San Mateo	GLH	3rd week of August
Quirino		
Aglipay	GLH	3rd week of August
Cagayan		
Gattaran	GLH	August
Tuao	GLH	August to September
Solana	GLH	4th week of August
Camalaniugan	rice bug	October
	GLH	October (late attack)
Baggao	GLH	August
	rice bug	October
	BPH	August
Buguey	GLH	September
	rice bug	September to October

Table 5. Disease infection in selected municipalities in Region 2

Province/Municipality	Variety	Disease	Severity
Isabela			
San Mateo	NSIC Rc224	BLS	Slight
	MS8		
	Diamond x	RTV	Slight
Mallig	PHB71	-	
	NSIC Rc224		
Cabagan	NSIC Rc222	-	
Quirino			
Aglipay	PJ25	RTV	slight
Nueva Vizcaya			
Bagabag	NSIC Rc152		
	NSIC Rc214		
	NSIC Rc222		
Solano	NSIC Rc152	RTV	slight
	NSIC Rc214		
	NSIC Rc222		
Aritao	NSIC Rc146		
	NSIC Rc214		
	PHB77		
Dupax del Sur	PSB Rc82		
	NSIC Rc216		
	Jasmin		
Villaverde	Bongkitan		
	NSIC Rc222		
	NSIC Rc152		
Cagayan			
Solana, Tuao, Gattaran	PSB Rc10,PSB Rc82	BLS,BLB	slight
Buguey,Camalaniugan	NSIC Rc222	RTV	
	NSIC Rc130		
Baggao	PSB Rc10,	BLS, BLB	
	NSIC Rc222		
	NSIC Rc130		
	PSB Rc82	RTV	slight

Use of Biopesticides on the Management of Rice Pests in the Cordillera
GB Amar and DA Gomez

Rice pests found in the rice areas of Cordillera are very diverse. These pests can cause bacterial, viral, and fungal diseases. When exposed to chemicals, pests have the ability to resist. Hence, farmers find difficulty in controlling these pests. Chemicals, such as copper fungicides, are commonly used for pest control. However, residual toxicity from continuous use of synthetic pesticides has caused health hazard in humans and animals. As observed in other rice areas, control of diseases with copper compounds, antibiotics, and other chemicals has not proven highly effective (Philippine Rice Production Training Manual, 2007). Cordillera farmers prefer the natural way. Thus, they practice integrated disease management .

Nowadays, non-chemical treatment has been prioritized against bacterial diseases. Studies show that plant extracts have played significant role in the inhibition of bacteria (Seema et al., 2007). Research reported that weeds have antimicrobial property against bacterial leaf blight such as “Cobra-cobra” (Ipomea sp.), Lemon grass (Cymbopogon citrates), “Asyang” (Mikania chordate), “Bugang“ (Roetboella exaltata), and Cogon grass (Imperata cylindrical) (MDidea Extracts Professional, 2006). Biopesticides such as Trichoderma and Metarhizium have been formulated as control measures. Compounds derived from plant extracts were also explored as an alternative method of minimizing plant diseases in vegetables and other upland crops. These organisms and compounds showed potential in rice pests but research works on these are still very limited. This study was undertaken to experiment on efficacy test of some common biopesticides against rice pathogens and insect pests and determine its use to the farmers.

Highlights:

- The study was conducted to identify the effect of biopesticides in reducing insect pests of rice and reducing disease damage on rice in the Cordillera.

- An FGD was conducted in 2011 WS prior to experimentation to gather baseline information. Results showed that most of the farmer-respondents are in their 40-70s, 92% of whom are women. The average landholding is 500 m2 (owner) planted with traditional varieties. In Banaue, only two farmers plant improved variety like PSB Rc18. Their average harvest is 10-15 bundles or 100 -150kg.

- In Barlif, Mountain Province, farmers do not use inorganic fertilizers. They use weeds, stubbles, and other plant materials as N source. In Ifugao, 7% of the farmers use inorganic fertilizer (urea and zinc sulfate).

- On pests, of the 47 respondents, 90% named earthworms as their major problem, 76.8% had rats, 46% had snails and 12.11% had birds.

- Farmers manage rice pests by handpicking kuhol, application of angels' trumpet leaves, and wild sunflower leaves and planting 60 days-old seedlings.

- Earthworm is managed by scattering wild sunflower and angels' trumpet leaves.

- Rats are controlled by poison (black rat poison) while birds are manually shooed away and by scare crows.

Location specific technology development with promotion of Palayamanan System in Ifugao, Kalinga, Mt. Province, and Benguet
FD Garcia, NS Sosa, AL dela Cruz, Jr., and MC Reyes

Declining profitability of monocrop rice is evident in many rice farmers in the upland. This is a result of increasing labor and input costs coupled with the plateauing yield in rice production. PhilRice has embarked on promoting highly diversified and well-integrated farming systems called Palayamanan in some parts of the country.

The Palayamanan System has inter-related activities focused on developing farmers and farmer groups as partners in developing and promoting location-specific rice-based farming system technologies. These activities include: 1) capacity enhancement of farmers and extension workers; 2) establishment of technology demonstration farms where farmers use the technologies they learned in their own farm; and 3) information and communication support which includes setting-up of farmers' learning centers. The approach emphasizes the active participation of farmers as partners in the adaptation and fine-tuning of location-specific integrated farming systems to suit farmers' needs. Farmers have already been practicing integrated farming systems (IFS) proven to increase farming income and productivity. However, only few farmers have embraced IFS as a farming strategy maybe because the efforts in promoting the system are not sustained. It is therefore needed to promote diversified and integrated farming systems to generate higher income. More importantly, diversification strategies have to be integrated to achieve a meaningful impact in increasing income and productivity of rice farmers.

The project started in 2012 with funding from the Department of Agriculture-Cordillera Administrative Region to develop and promote the Palayamanan System in four provinces of CAR namely: Kalinga, Ifugao, Mt. Province, and Benguet. The project aimed to improve the capacity and productivity of rice farmers; develop and promote sustainable and location specific integrated rice-based farming technologies developed in partnership with farmers and other stakeholders of the rice industry; and showcase integrated and sustainable rice-based farming systems models that can be adapted by local government units and farmers.

Highlights:

- Palayamanan model farms were established in Laya (31 farmers), Tabuk City, Kalinga; Pindongan (21 farmers), Kiangan, Ifugao; Marat (29 farmers) and Banana (27 farmers), Paracelis, Mt. Province; and Sabdang (29 farmers), Sablan, Benguet. Season-long capacity enhancement was also done in the sites. Once a week, the farmers met to discuss PalayCheck System in growing rice and apply what learned in the field.

- Participatory technology development on rice and other Palayamanan components were also established in the model farm. For rice, variety adaptation trial on newly-released and promising inbred and hybrid rice was established. Open-pollinated varieties of vegetables were also planted to determine the suitability of vegetables in each location.

- A showcase and learning area for biomass recycling was also set up. This includes the setting up of mushroom production area, vermiculture for organic fertilizer production, and production of carbonized rice hull.

- The grain yield of rice in the PTD area is presented in Table 5. In Laya the Mestiso 29 and NSIC Rc40 obtained the highest yield with 7.1t/ha followed by Mestiso 20, 38, and INH10001 with 7.0t/ha. In Marat, NSIC Rc240 obtained the highest yield with 8.6t/ha followed by NSIC Rc238, Mestiso 20, and 29 with 8.4t/ha. In Pindongan, Mestiso 19 and PHB77 got the highest yield with 5.9t/ha followed by NSIC Rc238, Mestiso 20, Mestiso 38, and INH10001 with 5.8t/ha. In Sablan, PR31379 and PHB73 obtained the highest yield with 7.3t/ha , although some of the entries are not yet harvested.

- The inputs provided in the sites are presented in Table 6. The participants in each site received 2kg each of registered rice seeds of NSIC Rc222 or NSIC Rc224. This seed will serve as their seed stock, the produce of which can be utilized as seed material for planting during 2013 DS. For the vegetable components, parts of the seeds were utilized in the model farm and part for the farmer participants. The participants were taught to propagate the seedlings in the model farm. When the seedlings were ready for transplanting, the participants were given planting materials. The vegetables were of open-pollinated type so that they can use it as planting material for the next season.

- Biomass recycling was another component wherein rice straw was used as mushroom substrate. If the mushroom were no longer productive, the spent was used for vermicomposting with animal manure.

- The farmers' field day and forum conducted in each site is presented in Table 7. Rice stakeholders in the region attended the event.

- The model farm will be maintained for the next season. Capacity enhancement will be there as the need arises. Participatory technology development on rice will be established to have wet and dry season data. Opening of another model farm in another municipality per province will be done.

Table 6. Grain yield (t/ha) of test entries in participatory technology development on rice in Palayamanan sites. 2012 WS. PhilRice Isabela.

Entries	Laya, Tabuk City, Kalinga	Marat, Paracelis, Mt. Province	Pindongan, Kiangan, Ifugao	Sabdang, Sablan, Benguet
Mestiso 19	6.6	7.3	5.9	6.3
Mestiso 20	7.0	8.4	5.8	Not yet harvested
Mestiso 29	7.1	8.4	5.7	6.1
Mestiso 38	7.0	7.1	5.8	Not yet harvested
PR35664H	6.7	7.6	5.0	7.2
PR36474H	6.9	8.3	5.0	6.8
PhilSCAT-6-1H	6.5	6.4	5.6	5.5
SL18H	-	6.4	5.0	6.7
PHB73	6.9	6.2	5.4	7.3
PHB77	6.9	8.0	5.9	Not yet harvested
INH10001	7.0	7.5	5.8	Not yet harvested
IR 79643	6.6	7.4	4.8	6.2
PR31379	6.7	7.6	5.6	7.3
NSIC Rc 238	6.6	8.4	5.8	6.7
NSIC Rc240	7.1	8.6	5.7	6.3
NSIC Rc216	5.8			

Table 7. Inputs provided and planted in the Palayamanan sites, 2012WS. PhilRice Isabela.

Components	Laya East, Tabuk City, Kalinga	Marat, Paracelis, Mt. Province	Bananao, Paracelis, Mt. Province	Pindongan, Kiangan, Ifugao	Sabdang, Sablan, Benguet
Rice					
NSIC Rc222 (kg)	90	-	90	-	80
NSIC Rc224 (kg)	-	90	-	20	30
Vegetables					
Ampalaya (g)	500	500	500	500	500
Patola (g)	500	500	500	500	500
Sweet pepper (tin can)	6	6	6	6	6
Eggplant (pack)	25	25	25	20	25
Tomato (tin can)	6	6	6	6	6
Pole sitaw (g)	500	500	500	500	500
Upo (g)	500	500	500	500	500
Squash (g)	500	500	500	500	500
Pechay (g)	200	200	200	200	200
Ginger (kls)	2	-	-	-	-
Aquaculture *Tilapia fingerlings*	-	-	-	-	6000
Vermiculture *African nightcrawler* (kg)	1	1	1	2	2
Mushroom spawn (kg)	5	5	5	2	3

Table 8. Field day and forum conducted in the Palayamanan sites, 2012WS. PhilRice Isabela.

Palayamanan Site	Date Conducted	No. of Attendees
Brgy. Laya East Tabuk, Kalinga	7-Nov-12	113
Sitio Marat Brgy. Poblacion Paracelis,, Mt. Prov.	5-Nov-12	116
Brgy. Pindongan Kiangan, Ifugao	6-Nov-12	103
Sitio Sabdang Poblacion Sablan, Benguet	14-Nov-12	122

Evaluation of fallow management and tillage in rainfed/upland lowland rice cultivation

JRF Mirandilla

The prevalence of pests and diseases in rice cultivation can be influenced by land management during the fallow between rice crops. It is hypothesized that mowing the standing biomass and hastening its decomposition during the fallow could reduce the habitat for pests and diseases and increase nutrient supply to rice.

Moreover, recent land preparation practices in rice cultivation tended to reduce the depth of plowing. Some past researches indicate that indigenous soil nutrient supply can be greater in deep than shallow soil. Also, increased costs associated with deeper tillage could more than offset the savings in fertilizer associated with increased indigenous nutrient supply and enhanced decomposition of organic materials.

The study aimed to (1) determine best combination of fallow management and tillage practice for rice cultivation; (2) assess the effect of two different fallow managements to prevalence of insect pests and diseases; (3) assess the effect of different tillage practices in soil bulk density and soil depth; and (4) assess the effect of the different fallow and tillage managements in nitrogen availability in the soil.

Highlights:

- The experiment was established in the farm of Capt. Jason Ulani, Sr. in Brgy. Lawig, Lamut, Ifugao. It was laid in a split plot design with two replications. The plot size was 12m x 3m (36m2). The variety used was NSIC Rc274 and transplanted on July 18, 2012.

- Based on the soil laboratory analysis, the level of percentage organic matter (1.13) is sufficient. However, the levels of phosphorus (1ppm) and potassium (12ppm) were not sufficient.

- No significant difference between treatments in terms of yield, tiller count, and percent seed set were observed. The combination of improved fallow and tillage management with a full dose of nutrients gave the highest plant height.

- The soil laboratory analysis is still continuing.

Documentation of Indigenous Practices in the Upland (Traditional) Rice Production Areas and Site Characterization in CAR
JC Portilla and JR Pagaduan

The Cordillera Administrative Region is known for its rich cultural heritage, ethnic diversity, and rice production practices. People from the upland are tied with the indigenous people's (IPs) culture and tradition. Planting of upland rice has already been practiced in the Philippines. These are usually done in small areas and in the highlands where most of the IPs live. Usually, the varieties they plant are connected with their identity as a clan or a tribe. Hence, upland rice farmers follow traditions in cultivating upland rice.

The project aimed (1) to document the indigenous practices in upland rice production from seed selection and postharvest management; (2) to characterize selected upland rice production areas in CAR; and (3) to produce a catalog of information on the indigenous practices in upland rice areas.

Highlights:

- Focus Group Discussions (FGD) were conducted among upland rice farmers in Paracelis, Mt. Province; Pinukpuk, Kalinga; Lamut, Ifugao; and Sablan, Benguet. Key informants such as the elders were also interviewed.

- Indigenous practices of upland rice farmers in the four provinces were documented from seed selection, land preparation, crop establishment, nutrient management, pest management, harvest and postharvest management.

- Most of the farmers have been planting upland rice from 10 to 50 years. Most rice production practices were inherited from their parents.

- The Cordillerans currently use 26 upland rice varieties . These include Palawan, Azucena, Sarong, Bolinao, Gobyerno, Galadok, Diplog, Toron, Malapay, Tuwar, Alig, Banig, Larag, PSB Rc11, Mimis, Batangas, Diket, Ginobyerno, Dannelog, Sinumay, Dumalsin, Ugsa, Lomon, Azucena, Agagon, and Malalag.

- Land preparation starts in April, beginning with slashing and burning. Common method of crop establishment is dibbling (asad). Fertilizer is not applied to upland areas except for slightly sloping (<18°) areas.

- Superstitious beliefs and rituals are still practiced in most of the upland areas in CAR.

Adaptation Trial of Different Rice Varieties in Upland Condition/Cool Elevated Areas in CAR

NR Gawat and HR Pasicolan

Rice is grown under a broad range of environmental conditions in terms of topography, soil type, water regime, and climatic factors. Climate change threatens to affect rice production and hinder efforts to achieve global food security and address poverty. Use of idle land areas should be explored, hence the conceptualization of this adaptation trial. The use of appropriate and improved varieties with high adaptation level to extreme weather conditions should be tested to attain productivity and profitability of rice farmers in the upland/cool elevated areas in CAR.

Highlights:

- Location performance revealed that in cool elevated ecosystem, only one entry PR28705-B-3-86-6 (6232.5kg/ha) significantly outyielded all the test entries with a difference of 1285.4kg to 3,668.3kg/ha. This entry matured in 116 days, with good phenotypic acceptability, a plant height of 113.0m, high number of productive tillers (17), a seed set fertility of 87.3%, number of filled grains of 121 and 22 grams 1000 grain weight respectively. Based on field walk, this entry was the farmers' preference with the highest number of votes.

- In Barangay Nayon, Lamut, PSB Rc9 registered as the top yielder out of the nine entries tested. It yielded 3302.3kg/ha, followed by Palawan (2895.81kg/ha), NSIC Rc222 (2322.48kg/ha), Piniliza (2201.55kg/ha), NSIC Rc23 (2191.21kg/ha), NSIC Rc274 (2086.56kg/ha), NSIC Rc272(1752.97kg/ha), and PSB Rc82 (1098.19kg/ha). The lowest yielder was a traditional variety named Mindanao with a yield of 1060.47kg/ha. It was noted that the high peak population of birds and rice bug that attacked the entries from the milking to soft dough stage caused the low yields. However, integrated pest management was employed for to control birds and rice bug. Due to the high-rolling location of the area and the nearby forest, the birds tend to eat the crop.

- It was observed that these entries had a good phenotypic acceptability and crop stand, starting from the flowering stage up to milking stage, if not damaged by birds and rice bug, a good result was obtained.

- Further evaluation should be conducted in an area for upland-unbunded to obtain more reliable results as basis for recommendation of farmers in the Cordillera region. Furthermore,

Testing and validation of different nutrient management systems for rice in rainfed ecosystem
AM Flores

The favorable rainfed ecosystem intergrades with irrigated rice. Field water cannot be completely controlled, but rainfall is usually adequate, well-distributed, or can be supplemented. Most of the rainfed rice in the Philippines fall within this category. Asia has about seven million hectares of land with favorable ecosystem, about one-fifth of rainfed lowland areas. Hence, while sustaining and increasing yields in irrigated areas, rainfed research should not be neglected because of its significance in production area. One of the important production management areas is on nutrient/ fertilizer management. Soils planted to rice under flooded condition undergo chemical transformation in a very different way compared to those under dry condition. The availability of nutrients that affect plant growth depends on the properties of the soil (physical, chemical, and biological). Thus, the concern should be the suitability of a fertilizer for a particular soil condition. Therefore, the study focused on nutrient management strategy for favorable rainfed ecosystem.

Highlights:

- Yield Parameters. Based on the nutrient recommendations following the different methods of identifying soil limitations, the nutrient manager (NM) recommended the highest rate of nitrogen (N) fertilizer. MOET test, on the other hand, showed deficiencies but recommended just enough fertilizer for expected yield of 4tons/ha and applicable for irrigated lowland condition. However, soil laboratory test gave the highest rate for phosphorus (P) and potassium (K) fertilizer. This may justify the highest significant result of soil laboratory recommendation in grain yield (5.71t/ha). Plots without fertilizer showed lowest but have comparable yield with the three nutrient management practices (farmer's practice, MOET, and NM).

Table 9. Yield and yield components of NSIC Rc272 as affected by different nutrient management practices under rainfed ecosystem (WS, 2012).

Treatment	Plant Height (cm)	Tiller Number (#)**	Grain Yield (t/ha)
Control (no amendment)	88 ab	12	4.22 b
MOET	90 ab	13	4.65 b
Nutrient Manager	86 b	12	4.46 b
Laboratory Analysis	96 a	13	5.71 a
Farmer's Practice	85 b	12	4.41 b

*Means with the same letter(s) are not significantly different at 5% level of significance.
** Not significant

- **Problems Encountered and Recommendations.** No significant difference was observed for each treatment in tiller count. But based on plant height, laboratory recommendation had significant effect compared with NM and farmer's practice. In addition, laboratory analysis recommendation gave the highest significant yield. This might be explained by the high rate of P and K fertilizer applied during the season. MOET test, however, could have been more effective if P and K rates were increased. MOET test recommendation for irrigated rice was followed so the rate applied was not enough to satisfy the needs of the crop. The study must be conducted for another season for soil indigenous nutrient supply validation since plots without fertilizer showed lowest but have comparable yield with three nutrient management (farmer's, MOET and NM) tools. Same plots will be used for the experiment and land preparation will be done per plot. MOET recommendation for P and K rates will be increased. Inclusion of organic fertilizer application treatment will be considered for the next cropping (2013 DS). Hydrology cycle (weather data) will also be gathered.

Abbreviations and acronymns

ABA – Abscicic acid
Ac – anther culture
AC – amylose content
AESA – Agro-ecosystems Analysis
AEW – agricultural extension workers
AG – anaerobic germination
AIS – Agricultural Information System
ANOVA – analysis of variance
AON – advance observation nursery
AT – agricultural technologist
AYT – advanced yield trial
BCA – biological control agent
BLB – bacterial leaf blight
BLS – bacterial leaf streak
BPH – brown planthopper
Bo - boron
BR – brown rice
BSWM – Bureau of Soils and Water Management
Ca - Calcium
CARP – Comprehensive Agrarian Reform Program
cav – cavan, usually 50 kg
CBFM – community-based forestry management
CLSU – Central Luzon State University
cm – centimeter
CMS – cystoplasmic male sterile
CP – protein content
CRH – carbonized rice hull
CTRHC – continuous-type rice hull carbonizer
CT – conventional tillage
Cu – copper
DA – Department of Agriculture
DA-RFU – Department of Agriculture-Regional Field Units
DAE – days after emergence
DAS – days after seeding
DAT – days after transplanting
DBMS – database management system
DDTK – disease diagnostic tool kit
DENR – Department of Environment and Natural Resources
DH L– double haploid lines
DRR – drought recovery rate
DS – dry season
DSA - diversity and stress adaptation
DSR – direct seeded rice
DUST – distinctness, uniformity and stability trial
DWSR – direct wet-seeded rice
EGS – early generation screening
EH – early heading
EMBI – effective microorganism-based inoculant
EPI – early panicle initiation
ET – early tillering
FAO – Food and Agriculture Organization
Fe – Iron
FFA – free fatty acid
FFP – farmer's fertilizer practice
FFS – farmers' field school
FGD – focus group discussion
FI – farmer innovator
FSSP – Food Staples Self-sufficiency Plan
g – gram
GAS – golden apple snail
GC – gel consistency
GIS – geographic information system
GHG – greenhouse gas
GLH – green leafhopper
GPS – global positioning system
GQ – grain quality
GUI – graphical user interface
GWS – genomwide selection
GYT – general yield trial
h – hour
ha – hectare
HIP - high inorganic phosphate
HPL – hybrid parental line
I - intermediate
ICIS – International Crop Information System
ICT – information and communication technology
IMO – indigenous microorganism
IF – inorganic fertilizer
INGER - International Network for Genetic Evaluation of Rice
IP – insect pest
IPDTK – insect pest diagnostic tool kit
IPM – Integrated Pest Management
IRRI – International Rice Research Institute
IVC – in vitro culture
IVM – in vitro mutagenesis
IWM – integrated weed management
JICA – Japan International Cooperation Agency
K – potassium
kg – kilogram
KP – knowledge product
KSL – knowledge sharing and learning
LCC – leaf color chart
LDIS – low-cost drip irrigation system
LeD – leaf drying
LeR – leaf rolling
lpa – low phytic acid
LGU – local government unit

LSTD – location specific technology development
m – meter
MAS – marker-assisted selection
MAT – Multi-Adaption Trial
MC – moisture content
MDDST – modified dry direct seeding technique
MET – multi-environment trial
MFE – male fertile environment
MLM – mixed-effects linear model
Mg – magnesium
Mn – Manganese
MDDST – Modified Dry Direct Seeding Technique
MOET – minus one element technique
MR – moderately resistant
MRT – Mobile Rice TeknoKlinik
MSE – male-sterile environment
MT – minimum tillage
$mtha^{-1}$ - metric ton per hectare
MYT – multi-location yield trials
N – nitrogen
NAFC – National Agricultural and Fishery Council
NBS – narrow brown spot
NCT – National Cooperative Testing
NFA – National Food Authority
NGO – non-government organization
NE – natural enemies
NIL – near isogenic line
NM – Nutrient Manager
NOPT – Nutrient Omission Plot Technique
NR – new reagent
NSIC – National Seed Industry Council
NSQCS – National Seed Quality Control Services
OF – organic fertilizer
OFT – on-farm trial
OM – organic matter
ON – observational nursery
OPAg – Office of Provincial Agriculturist
OpAPA – Open Academy for Philippine Agriculture
P – phosphorus
PA – phytic acid
PCR – Polymerase chain reaction
PDW – plant dry weight
PF – participating farmer
PFS – PalayCheck field school
PhilRice – Philippine Rice Research Institute
PhilSCAT – Philippine-Sino Center for Agricultural Technology
PHilMech – Philippine Center for Postharvest Development and Mechanization
PCA – principal component analysis
PI – panicle initiation
PN – pedigree nursery
PRKB – Pinoy Rice Knowledge Bank
PTD – participatory technology development
PYT – preliminary yield trial
QTL – quantitative trait loci
R - resistant
RBB – rice black bug
RCBD – randomized complete block design
RDI – regulated deficit irrigation
RF – rainfed
RP – resource person
RPM – revolution per minute
RQCS – Rice Quality Classification Software
RS4D – Rice Science for Development
RSO – rice sufficiency officer
RFL – Rainfed lowland
RTV – rice tungro virus
RTWG – Rice Technical Working Group
S – sulfur
SACLOB – Sealed Storage Enclosure for Rice Seeds
SALT – Sloping Agricultural Land Technology
SB – sheath blight
SFR – small farm reservoir
SME – small-medium enterprise
SMS – short message service
SN – source nursery
SSNM – site-specific nutrient management
SSR – simple sequence repeat
STK – soil test kit
STR – sequence tandem repeat
SV – seedling vigor
t – ton
TCN – testcross nursery
TCP – technical cooperation project
TGMS – thermo-sensitive genetic male sterile
TN – testcross nursery
TOT – training of trainers
TPR – transplanted rice
TRV – traditional variety
TSS – total soluble solid
UEM – ultra-early maturing
UPLB – University of the Philippines Los Baños
VSU – Visayas State University
WBPH – white-backed planthopper
WEPP – water erosion prediction project
WHC – water holding capacity
WHO – World Health Organization
WS – wet season
WT – weed tolerance
YA – yield advantage
Zn – zinc
ZT – zero tillage

List of Tables

List of Tables

Department of Agriculture

PHILRICE

PHILIPPINE RICE RESEARCH INSTITUTE

We are a chartered government corporate entity under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding, cost-reducing, and environment-friendly technologies so farmers can produce enough rice for all Filipinos.

We accomplish this mission through research and development work in our central and seven branch stations, coordinating with a network that comprises 58 agencies and 70 seed centers strategically located nationwide. To help farmers achieve holistic development, we will pursue the following goals in 2010-2020: attaining and sustaining rice self-sufficiency; reducing poverty and malnutrition; and achieving competitiveness through agricultural science and technology.

We have the following certifications: ISO 9001:2008 (Quality Management), ISO 14001:2004 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series).

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CERTIFICATION INTERNATIONAL
ISO 9001:2008 CIP/4360/Q/09/10/668
ISO 14001:2004 CIP/4360/E/09/10/668
OHSAS 18001:2007 CIP/4360/HS/09/10/668

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