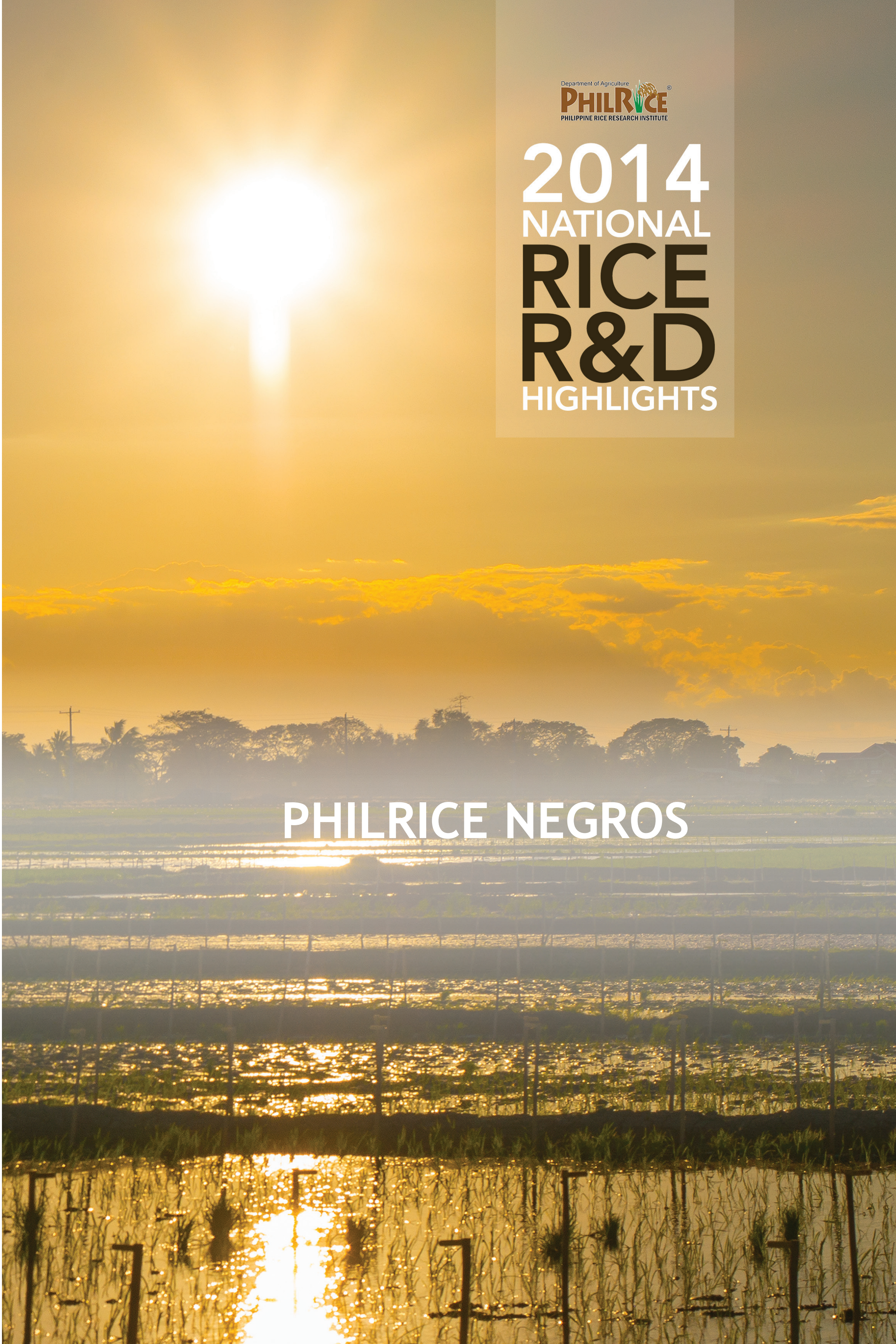

Department of Agriculture
PHILRICE
PHILIPPINE RICE RESEARCH INSTITUTE

# 2014 NATIONAL RICE R&D HIGHLIGHTS

## PHILRICE NEGROS

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# PhilRice Negros

*Acting Branch Manager: Edgar M. Libetario*

**Executive Summary**

PhilRice Negros, despite the very limited R&D staff, catered projects on various aspects of rice production, such as variety development, crop protection, soil science and a number of varietal trials for inbred and hybrid at the station with greater focus on organic rice production practices, technology extension to local stakeholders and advocacy campaigns and promotions. R&D endeavors of the station were focused on providing science-based technologies for organic rice farming.

## I. Characterization of organic rice production system of PhilRice Negros

*JEAD Bibar, BT Salazar, DKM Donayre, CE Tayson and EM Libetario*

PhilRice Negros devoted and established areas for organic system in support to the Island of Negros' endeavors as the Organic Food Bowl of Asia and the Organic Agriculture Act of 2010 (RA 10068) to refine and provide science and technology based technologies or practices for the organic rice production system.

This study was proposed to characterize, improve and standardize the organic production of the station through investigations on the response of rice to different organic inputs and the changes in soil and irrigation water properties within an established organic lowland rice system.

Component sub-studies included evaluation of different organic solutions as nutrient source; monitoring of rice yields, soil and water qualities under organic rice system, and evaluation of rice yield performance using different rates of organic fertilizers. At the end of this two-year study, the information to be generated could be used by researchers, practitioners, and certifying bodies for fine-tuning and standardization of the organic production and certification system.

**Highlights:**

- In April, the researchers of PhilRice Negros developed an organic rice production system protocol. The protocol described key production components and best recommended practices that were identified to be suitable for the conditions of the station. This protocol was used in the researchers' respective field studies with necessary modifications based on the study objectives and treatments.

- From June to July, seven (7) natural fermented solutions (NFS) were produced and analyzed for nutrient contents (Table 1). When used as seed treatments for germination test, comparable germination rates were observed among different NFS. However, radicle and plumule development were observed to be enhanced by indigenous microorganisms (IMO) and egg calcium phosphate (caphos).

- At the start of 2014 WS, the first field study to monitor rice, soil and irrigation water dynamics in a lowland rice ecosystem under organic production system was established. Soil and water samples were collected before establishment and analyzed to determine initial site characteristics (Table 2). These soil and water parameters will be monitored every season to assess possible changes in quality over time. Pest assessments were also conducted in the succeeding seasons to monitor dynamics of pests and diseases. By the end of the first season of implementation, NSIC Rc282 produced an average grain yield of 4,137kg/ha under organic system.

**Table 1.** Nutrient content of different fermented solutions produced from locally-available farm resources.

| NFS solution | Main substrate | Nutrient content (1:200 solution v/v), ppm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | K | Ca | Mg | Fe | Zn | S | Cu | Na |
| Indigenous Microorganisms (IMO) | Fermented rice | 2.317 | 51.089 | 19.77 | 5.349 | 0.235 | 0.051 | 4.397 | 0.151 | 1.232 |
| Fermented Plant Juice (FPJ) | Banana, kangkong | 1.388 | 48.844 | 15.373 | 3.945 | 0.256 | 0.05 | 2.56 | 0.116 | 1.34 |
| Fermented Fruit Juice (FFJ) | Banana, papaya | 1.288 | 49.551 | 14.395 | 3.83 | 0.227 | 0.041 | 2.884 | 0.102 | 0.895 |
| Kuhol Amino Acid (KAA) | Golden apple snails (GAS) | 1.189 | 51.075 | 62.829 | 8.015 | 3.173 | 0.085 | 6.396 | 0.101 | 2.139 |
| Oriental Herbal Nutrient (OHN) | Garlic, onion, ginger | 1.587 | 48.085 | 17.15 | 7.905 | 0.256 | 0.046 | 4.073 | 0.107 | 1.01 |
| Egg Calcium phosphate (Caphos) | Egg, GAS shells | 0.06 | 1.931 | 75.134 | 4.013 | 0.046 | 0.029 | 0.669 | 0.094 | 1.401 |
| Vermitea | Rice straw, cow manure | 0.325 | 4.877 | 2.89 | <LOD | 0.075 | 0.02 | 1.425 | 0.095 | 0.587 |

**Table 2.** Initial soil and water physical and chemical properties for field study on rice and irrigation water dynamics in a lowland rice ecosystem under organic production system.

| Soil | | Irrigation water* | |
|---|---|---|---|
| %Moisture content | 3.41 | Salinity | 0 |
| pH | 5.55 | Total dissolved solids mg/L | 40.42 |
| Organic matter, % | 1.2 | pH | 7.6 |
| üüüü= | 0.09 | Total Hardness mg/L | 56 |
| Phosphorus, ppm | 6.32 | Magnesium mg/L | 4.8 |
| Potassium, ppm | 12.04 | Calcium mg/L | 14 |
| Calcium, ppm | 863.04 | Chloride mg/L | 7.3 |
| Magnesium, ppm | 132.9 | Sulfate | nil |
| Zinc, ppm | 0.2 | Bicarbonate ppm | 61.2 |
| Iron, ppm | 47.34 | $NO_2$-Nitrogen ppm | 0.01 |
| Sulfur, ppm | 10.97 | $NO_3$-Nitrogen, ppm | 2.01 |
| Sodium, ppm | 28.52 | $NH_3$-Nitrogen, ppm | 0.06 |
| Copper, ppm | 3.32 | Phosphate, ppm | 0.05 |
| Aluminum, meq | 5.2 | Sodium, % | 0.51 |
| Hydrogen, meq | 4.66 | Boron, ppm | 0.69 |
| Exch Acidity | 9.86 | Iron, ppm | 0.65 |
| | | Total coliform | 70960 |
| Heavy metals | | Heavy metals | |
| Cadmium, mg/kg | <10 | Cadmium, mg/kg | <0.003 |
| Chromium, mg/kg | <0.83 | Chromium, mg/kg | <0.0075 |
| Lead, mg/kg | <0.25 | üü=üü | <0.00025 |

*Average of 5 samples collected strategically from irrigation canals including entry and exit points relative to study field.

- A second field study was also established starting 2014 WS to monitor yield performance of lowland rice within under organic system with different rates of organic fertilizers (vermicast) and water regimes (continuously flooded and controlled irrigation). This study aimed to determine the appropriate fertilizer rate for PhilRice Negros' conditions (Figure 1).

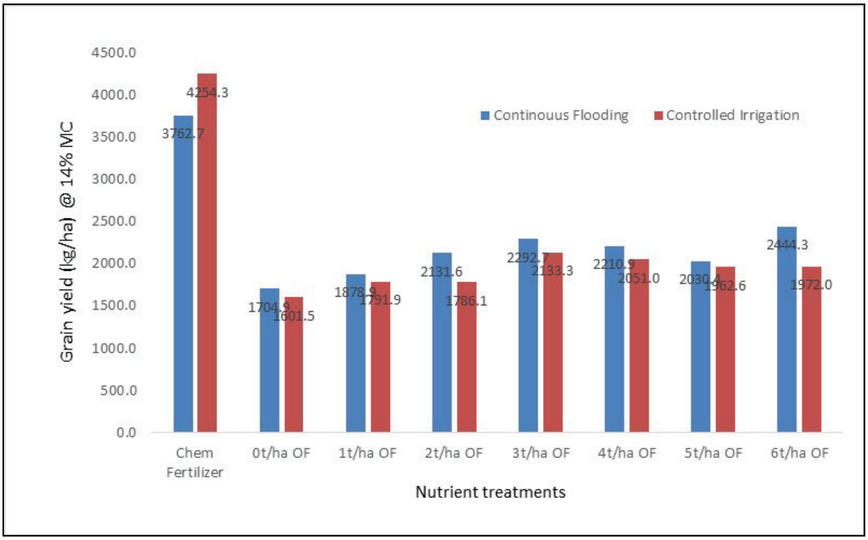


**Figure 1.** Grain yield (kg/ha) of NSIC Rc284 applied in 2 water regimes and different nutrient treatments during WS 2014.

## II. Optimizing crop establishment and water management technologies for organic rice production systems of PhilRice Negros

*BUTizon-Salazar*

In 2011, PhilRice Negros was designated as the institute's organic rice center (Memo 2011-178). Since then, the station's research activities were refocused on explaining the science behind organic farming, as well as on the improvement of practices. In 2012, average yield of organic rice in the station is 2.3t/ha, 1 ton lower compared with conventional rice. Increasing the yield will increase the production, and the income of the station since organic rice are commercially sold at PhP60/kg. One way to increase the production is to optimize the practices under organic rice seed production system.

The study aims to optimize crop management technologies, specifically seedling age and water management, for organic rice seed production system of PhilRice Negros. A 3x2x3 factorial experiment was laid out in split-split plot design, with fertilizer management (conventional, organic, zero) as the main plot, water regime as the sub-plot (controlled irrigation and flooded), and seedling age (10, 15, 20) as the sub-sub-plot.

**Highlights:**

- Initial result of the study shows that there is no signicant interaction between fertilizer treatments, water management and seedling age (Table 3 & 4). However, the different fertilizer treatments caused significant differences in plant height, tiller number, productive tillers, spikelet fertility, harvest index and yield.

- Initial result showed that plants in conventional fertilizer plots are generally taller, produced more tillers, and recorded the highest yield. Surprisingly, plants fertilized with organic fertilizers recorded the most number of filled grains, 3% and 6% higher than zero and conventional plots, respectively.

- Also, seedling age caused notable differences in plant height, productive tillers, spikelet fertility, and harvest index. Though younger seedlings produced more productive tillers, its spikelet fertility is 3% lower than older seedlings resulting in poorer yield.

- Water management treatments were not properly imposed during wet season due to frequent rainfall. Still waiting laboratory results of plant tissue and soil samples for nutrient use efficiencies. Dry season set-up of the study started ealy January 2015.

**Table 3.** Summary ANOVA for height and tiller number, PhilRice Negros, 2014 WS.

| Treatment | Height (cm) | | | Tiller Number | | |
|---|---|---|---|---|---|---|
| | Days after transplanting | | | Days after transplanting | | |
| | 30 | 60 | 120 | 30 | 60 | 120 |
| Fertilizer (F) | ** | ** | ** | ** | ** | ** |
| Water (W) | ns | ns | ns | ns | ns | ns |
| Seedling Age (SA) | * | * | ns | ns | ns | ns |
| FxW | ns | ns | ns | ns | ns | ns |
| FxSA | | ns | ns | ns | ns | ns |
| WxSA | ns | ns | ns | ns | ns | ns |
| FxWxSA | ns | ns | ns | ns | ns | * |
| **c.v. (%)** | 5.42 | 6.33 | 3.38 | 19.49 | 23.12 | 13.9 |

*ns = not significant; *significant at 5% level; **significant at 1% level*

**Table 4.** Summary ANOVA for yield and yield components, PhilRice Negros, 2014 WS.

| Treatment | üüüüü Tillers | Unproductive Tillers | Spikelet Fertility (%) | Harvest Index | Yield (t) |
|---|---|---|---|---|---|
| Fertilizer (F) | ** | ns | * | ** | ** |
| Water (W) | ns | ns | ns | ns | ns |
| Seedling Age (SA) | * | * | ** | ** | ns |
| FxW | ns | ns | ns | ns | ns |
| FxSA | ns | ns | ns | ns | ns |
| WxSA | ns | * | ns | ns | ns |
| FxWxSA | ns | ns | ns | ns | ns |
| c.v. (%) | 14.99 | 36.42 | 7.88 | 7.05 | 10.52 |

*ns = not significant; *significant at 5% level; **significant at 1% level*

## III. Optimizing seeding interval, row ratio, and timing of GA3 application for increased seed yield of M20 in PhilRice Negros

*BU Tizon-Salazar*

Seed production in two-line hybrids is faster since maintainer line is no longer required compared with three-line hybrids (Virmani et al., 2003). In other countries like China, two-line hybrids have 10% more yields compared to three-lines. In the Philippines, PhilRice Negros (having favorable temperature for two-line hybrid seed production) has been producing F1 seeds of M20, a major two-line hybrid variety commercially released in the country, yet increasing the seed yield to 1 ton ha-1 remains a major challenge. Initial data gathered from the station's seed production area WS 2012 and 2013 showed that average spikelet fertility ranged from 25 to 30%. Though this is very close to the ideal seed setting rate (during the fertile phase) of >30% (Virmani et al., 2003), seed yield was only 0.43t/ha and 0.30t/ha, respectively. These figures are far from China's 2.5 to 3.0t/ha average seed yield for two-line hybrids (Yuan, et al. _; Lu et al., 1998). Though it is inappropriate to compare seed yields from two countries considering the differences in the parental lines, agro-climatic conditions, and cultural management practices, among other factors, it is worthwhile to identify which factors influenced the seed yield obtained in the station. Through this, improvements on the practices can be done.

Generally, this study aims to increase seed yield of M20 in PhilRice Negros by 10% by 2016 through optimization of seeding interval, the row ratio and timing of GA3 application. The study has three substudies: sub-study 1, Synchronizing flowering of NSIC Rc204H parentals through optimum seeding interval; sub-study 2, Determining the appropriate row ratio for increased seed yield of M20 at PhilRice Negros; and sub-study 3, Determining the optimum timing of GA3 application for increased seed yield of M20 at PhilRice Negros. Sub-studies 2 and 3 started WS 2014 while sub-study 1 will start DS 2015. Ongoing data processing and analysis for sub-study 3.

**Highlights:**

- Generally, plant height, tiller number, panicle length, panicle exerted, filled grains, spikelet fertility, and 1000-grain weight did not differ significantly among treatments across parentals and growth stages (Tables 5 to 9). Compared to S lines, P1, P2, and P3 lines are generally taller by 34 to 37cm and developed 3 to 6 more tillers at maturity (Table 5 and 6). On the other hand, significant differences were recorded in plant height of P2 and S lines at maximum tillering (60 DAT), but they showed different trends.

- While S lines planted in 2:4 row ratio resulted to 5.63cm-shorter plants, P2 lines planted in the same row ratio led to 8cm-taller plants compared to those planted in 3:10 row ratio. Compared to panicle length, the length of exerted panicle is shorter by at most 6 cm across treatments and parentals (Table 7).

- Across parentals, S lines manifested generally shorter panicles. On the average, 90 more filled grains was observed in S lines following 3:10 row ratio compared to the other treatments, though differences were considered not significant (Table 8).

- However, the same plants recorded higher unfilled grains, 80 on the average, compared to the other treatments. This increased number of filled and unfilled grains observed led to 83 to 202 more total grains in 3:10 row ratio (Table 8). With this, spikelet fertility in S lines planted in 3:10 row ratio is generally higher by 13, 6, and 11%, respectively, at maturity (Table 9). The combined effect of additional tillers and filled grains could have contributed to the increased yield observed in 3:10 row ratio. These results will be verified DS 2015 set-up.

**Table 5.** Plant height of P1, P2 P3 and S lines 30, 60 and 120 days after transplanting (DAT), PhilRice Negros, 2014 WS.

| Treatment | Plant Height (cm), days after transplanting | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | | | P2 | | | P3 | | | S | | |
| | 30 | 60 | 120 | 30 | 60 | 120 | 30 | 60 | 120 | 30 | 60 | 120 |
| 2:04 | 68.06 | 84.83 | 114.00 | 65.73 | 86.38 | 121.56 | | | | 53.89 | 76.72 a | 76.74 |
| 2:06 | 67.86 | 86.33 | 110.35 | 68.33 | 84.44 | 114.58 | | | | 54.90 | 74.77 ab | 76.60 |
| 3:08 | 68.66 | 89.11 | 109.73 | 71.33 | 89.22 | 120.90 | 67.96 | 87.00 | 116.37 | 53.32 | 73.47 ab | 78.78 |
| 3:10 | 71.00 | 86.22 | 118.73 | 69.80 | 85.99 | 123.60 | 70.46 | 83.89 | 122.63 | 50.28 | 71.09 b | 87.04 |
| ANOVA | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | * | ns |
| C.V. (%) | 5.84 | 3.02 | 9.04 | 9.46 | 3.06 | 5.8 | 5.66 | 2.11 | 10.7 | 5.29 | 2.02 | 5.42 |

**Table 6.** Tiller number of P1, P2 P3 and S lines 30, 60 and 120 DAT, PhilRice Negros, 2014 WS.

| Treatment | Tiller number, days after transplanting | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | | | P2 | | | P3 | | | S | | |
| | $30^{ns}$ | $60^{ns}$ | $120^{ns}$ | $30^{ns}$ | 60* | $120^{ns}$ | $30^{ns}$ | $60^{ns}$ | $120^{ns}$ | $30^{ns}$ | $60^{ns}$ | 120* |
| 2:04 | 21 | 20 | 11 | 22 | 26 a | 14 | | | | 11 | 12 | 6 b |
| 2:06 | 22 | 16 | 9 | 19 | 26 a | 11 | | | | 12 | 13 | 6 b |
| 3:08 | 20 | 23 | 9 | 21 | 20 ab | 10 | 23 | 25 | 9 | 11 | 14 | 7 ab |
| 3:10 | 21 | 19 | 10 | 18 | 18 b | 9 | 18 | 19 | 11 | 10 | 14 | 8 a |
| ANOVA | ns | ns | ns | ns | * | ns | ns | ns | ns | ns | ns | * |
| C.V. (%) | 13.5 | 19.03 | 24.8 | 23.27 | 13.43 | 28.8 | 31.79 | 34.62 | 3.83 | 13.2 | 16.93 | 9.2 |

**Table 7.** Tiller number $m^{-2}$, panicle length, and panicle exerted of P1, P2 P3 and S lines 30, 60 and 120 DAT, PhilRice Negros, 2014 WS.

| Treatment | Tiller no per $m^2$, panicle length and panicle exerted | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | | | P2 | | | P3 | | | S | | |
| | Tiller/$m^2$ | PLength | PExerted | Tiller/$m^2$ | PLength | PExerted | Tiller/$m^2$ | PLength | PExerted | Tiller/$m^2$ | PLength | PExerted |
| 2:04 | 43 a | 26.26 | 23.02 | 54 a | 29 | 23.56 | | | | 110 b | 19 | 17 |
| 2:06 | 27 ab | 21.13 | 21.13 | 32 ab | 25 | 22.30 | | | | 115 b | 20 | 16 |
| 3:08 | 18 b | 22.60 | 22.60 | 20 b | 28 | 24.70 | 19 | 28 | 24.67 | 139 ab | 22 | 18 |
| 3:10 | 20 ab | 25.57 | 25.57 | 18 b | 28 | 25.06 | 22 | 28 | 25.15 | 162 a | 22 | 18 |
| ANOVA | * | ns | ns | ** | ns | ns | ns | ns | ns | ** | ns | ns |
| C.V. (%) | 10.4 | 13.4 | 13.4 | 17.2 | 10.4 | 9.6 | 4.21 | 2.5 | 4.3 | 9.3 | 5.22 | 7.75 |

*ns = not significant; *significant at 5% level; **significant at 1% level*

**Table 8.** Total number of filled and unfilled spikelets and number of grains of P1, P2 P3 and S lines 30, 60 and 120 days after transplanting, (DAT) PhilRice Negros, 2014 WS.

| **Treatment** | **Filled, unfilled and total number of grains** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | | | P2 | | | P3 | | | S | | |
| | Filled Grains | Unfilled Grains | Total | Filled Grains | Unfilled Grains | Total | Filled Grains | Unfilled Grains | Total | Filled Grains | Unfilled Grains | Total |
| 2:04 | 233 | 656 | 888 | 342 | 593 | 935 | | | | 61 | 432 | 493 ab |
| 2:06 | 214 | 339 | 554 | 432 | 359 | 792 | | | | 88 | 346 | 434 b |
| 3:08 | 249 | 499 | 749 | 285 | 486 | 771 | 389 | 385 | 774 | 83 | 470 | 553 ab |
| 3:10 | 294 | 494 | 788 | 244 | 507 | 751 | 367 | 419 | 786 | 167 | 469 | 636 a |
| ANOVA | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | ns | * |
| C.V. (%) | 6.95 | 16 | 11.5 | 18.1 | 10.2 | 17.6 | 19.6 | 17.6 | 17.4 | 19.8 | 11.1 | 9.85 |

**Table 9.** Spikelet fertility, 1000-grain weight and yield of P1, P2 P3 and S lines 30, 60 and 120 DAT, PhilRice Negros, 2014 WS.

| Treatment | Spikelet fertility (%), 1000 grain weight (g), and potential grain yield (t ha-1) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | | | P2 | | | P3 | | | S | | |
| | Fertility | 1000 Grain wt | Yield | Fertility | 1000 Grain wt | Yield | Fertility | 1000 Grain wt | Yield | Fertility | 1000 Grain wt | Yield |
| 2:04 | 28 | 25 | 2.56 | 38.67 b | 25 | 4.54 a | | | | 13 | 25 | 1.93 b |
| 2:06 | 38 | 26 | 1.76 | 54.33 a | 23 | 3.10 ab | | | | 20 | 25 | 2.87 b |
| 3:08 | 32 | 26 | 1.21 | 37.00 b | 24 | 1.36 b | 47 | 24 | 2.05 | 15 | 25 | 3.15 b |
| 3:10 | 36 | 27 | 1.61 | 32.33 b | 24 | 0.99 b | 43 | 26 | 2.2 | 26 | 25 | 6.56 a |
| ANOVA | ns | ns | ns | ** | ns | * | ns | ns | ns | ns | ns | * |
| C.V. (%) | 14.2 | 4.9 | 10.1 | 11.1 | 17.7 | 3.91 | 35 | 16.9 | 10.1 | 13.3 | 2.67 | 16.4 |

*ns = not significant; *significant at 5% level; **significant at 1% level*

## IV. Performance evaluation of rice genotype under low-external input system

*CU Seville, AD Palanog, IMG Ciocon and LT Sta. Ines*

Organic agriculture according to Dittrich (2012) is a production system that sustains the health of soils, ecosystems and people. It relies on one ecological processes, biodiversity and cycles adapted to local conditions rather than the use of inputs with diverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationship and a good quality of life for all involved. Conversion from conventional to full organic production requires sufficient time for the soil to accumulate enough nutrients from the application of local organic fertilizers. It decreases the cost due to the elimination of synthetic chemicals but requires intensive labor for production or application of local organic fertilizers. Furthermore, organic production is claimed to have higher profits due to lesser production costs and higher premiums. Another advantage of organic farming according to Pimentel (2006) is it significantly reduces the fossil energy inputs in production and also improves several aspects of agriculture's environmental performance compared with conventional farming systems.

In support to the declaration of Negros as an organic island, PhilRice Negros Station started its organic rice production and research in the six (6) hectares research and seed production area during the dry season of 2012. More research is needed to know the appropriate varieties or rice plant type suitable for organic rice production. It is also essential to know if there is need to have a separate varietal development intended for organic rice production, thus this study. The study aimed to assess the performance of genotypes under conventional and organic rice production systems. It also aimed to identify ideal plant type suitable for organic rice production.

**Highlights:**

A total of 30 genotypes were planted in organic, zero input and conventional production systems during the wet season of 2014 (Table 10).

- All genotypes differ significantly in all of the parameters gathered in three different production systems. Days to heading, number of productive tillers and panicle length are significantly affected by the system. Earlier days to heading was observed with the low-input or organic field, while no significant difference was observed between zero input and conventional fields. More productive tillers and longer panicle length were observed in genotypes under conventional field. Plant height, average spikelet per panicle, percent fertility, seed weight, harvest index and yield were not significantly affected by the production system (Table 11).

**Table 10.** Genotypes planted under organic, zero input and conventional production system at PhilRice Negros, 2014 WS.

| | Genotype | | Genotype |
|---|---|---|---|
| 1 | PSB Rc3 | 16 | NSIC Rc282 |
| 2 | NSIC Rc19 | 17 | üüüüü |
| 3 | PSB Rc36 | 18 | NSIC Rc302 |
| 4 | PSB Rc66 | 19 | NSIC Rc342 |
| 5 | PSB Rc78 | 20 | Mestiso 19 |
| 6 | PSB Rc82 | 21 | Mestiso 20 |
| 7 | NSIC Rc120 | 22 | Mestiso 29 |
| 8 | NSIC Rc214 | 23 | IRION 255 |
| 9 | NSIC Rc216 | 24 | IRIOM 238 |
| 10 | NSIC Rc218 | 25 | IRIOM 210 |
| 11 | NSIC Rc222 | 26 | PR35343-2B-1-3-1-3-1-5 |
| 12 | NSIC Rc224 | 27 | BR 261 |
| 13 | NSIC Rc226 | 28 | Calatrava |
| 14 | NSIC Rc240 | 29 | Corocan |
| 15 | NSIC Rc280 | 30 | Masipag 10-1-1 |

**Table 11.** Agronomic and yield components of genotypes under three conditions at PhilRice Negros, 2014 WS.

| Production System | Days to heading | Plant height (cm) | No. of productive tillers | Panicle length (cm) | Average spikelet per panicle | Percent fertility (%) | 1000 seed weight (g) | Harvest index | Yield (t ha$^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| Organic | 81 b | 99 | 9b | 24 b | 114 | 69 | 33 | 0.55 | 3.3 |
| Zero Input | 83 a | 95 | 9b | 23 b | 111 | 70 | 32 | 0.53 | 3.0 |
| Conventional | 84 a | 101 | 11a | 25 a | 125 | 64 | 33 | 0.50 | 3.3 |
| cv | 2.11 | 5.18 | 22.2 | 5.5 | 16.5 | 12 | 7 | 14.30 | 21.0 |
| üüüüü e | | | | | | | | | |
| Prod'n system | ** | ns | ** | ** | ns | ns | ns | ns | ns |
| Genotype | ** | ** | ** | ** | ** | ** | ** | ** | ** |
| System x gen | ns | ns | ns | ns | ns | ns | * | ns | ns |

Means with the same letters are not significantly different
ns = not significant; *significant at 5% level; **significant at 1% level

**Table 12.** Yield and agronomic performance of top ten yielder in organic production system at PhilRice Negros, 2014 WS.

| Genotype | | Days to heading | Plant height (cm) | No. of productive tillers | Panicle length (cm) | Average spikelet per panicle | Percent fertility (%) | 1000 seed weight (g) | Harvest index | Yield (t ha$^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mestiso 19 | 77 | 100 | 9 | 24 | 130 | 72 | 32 | 0.63 | 4.1 |
| 2 | NSIC Rc226 | 79 | 101 | 9 | 23 | 108 | 66 | 36 | 0.67 | 3.9 |
| 3 | NSIC Rc120 | 73 | 89 | 11 | 20 | 62 | 83 | 37 | 0.57 | 3.8 |
| 4 | NSIC Rc222 | 84 | 93 | 9 | 24 | 132 | 69 | 29 | 0.60 | 3.8 |
| 5 | NSIC Rc342 | 80 | 103 | 8 | 25 | 131 | 64 | 33 | 0.49 | 3.7 |
| 6 | NSIC Rc282 | 82 | 109 | 8 | 23 | 149 | 73 | 32 | 0.53 | 3.7 |
| 7 | NSIC Rc214 | 86 | 101 | 10 | 25 | 98 | 62 | 38 | 0.55 | 3.6 |
| 8 | Black Rice 261 | 77 | 92 | 9 | 21 | 90 | 72 | 36 | 0.58 | 3.6 |
| 9 | Masipag 10-1-1 | 85 | 122 | 7 | 28 | 173 | 72 | 28 | 0.53 | 3.5 |
| 10 | NSIC Rc280 | 82 | 99 | 10 | 24 | 119 | 57 | 33 | 0.55 | 3.5 |

Days to heading range from 73 to 89, 76 to 91 and 74 to 91 days after sowing under organic, zero input and conventional fields, respectively. Productive tillers ranges from 7 to 12, 7 to 11 and 8 to 16 and panicle length ranges from 20 to 28cm, 20 to 26cm and 21 to 29cm under organic, zero input and conventional fields, respectively.

Though did not significantly differ between production systems, average yield under conventional and organic conditions are relatively higher than zero input with 3.3 t/ha-1. Yield ranges from 1.8 to 4.2t/ha, 2.5 to 4.1t/ha; and 1.9 to 3.8 t/ha, under conventional, organic and zero input systems, respectively. NSIC Rc226 had higher yield in conventional system with 4.2t/ha and performed fairly under organic and zero input systems with 3.8t/ha. Mestiso 19 and Mestiso 29 are top yielder in organic and zero input systems with 4.1t/ha and 3.8t/ha respectively.

One public hybrid, 7 NSIC released varieties, 1 special rice and 1 farmer selection variety are the top 10 yielder in organic systems with yield average of 3.5t/ha and above (Table 12). Moreover, grain yields less than zero and conventional systems are positively correlated with the yield in organic system with coefficients of 0.50 and 0.45, respectively. Other traits response in conventional systems with significant positive correlation with yield under organic systems are plant height, harvest index and seed weight.

## V. The role of GxE in breeding for superior genotypes for low-external input system

ADPalanog, LAGDogeno, CUSeville, IMGCiocon, and LTStaInes

Organic agriculture is continuously growing worldwide in more than 160 countries with 132 million hectares of organic agriculture land (including transition stage land), which is mostly in Europe (24.0%), followed by Latin America (23.0%), Asia (9.6%), North America (7.1%), and Africa (2.8%) (Willer and Kilcher, 2011). The unsustainable practice and growing concern on the environmental of conventional high-input system are the core reasons for the increasing popularity of organic agriculture. Organic agriculture aims to achieve optimum yield without depleting the environmental resources. In input aspect, conventional agriculture intensively used commercial inputs produced from fossil fuel based processes compared to organic agriculture, which utilizes resources available within the bio-system. However, the variety used in organic agriculture is still largely dependent on the varieties produced in the conventional system, which may or may not suitable to the practice.

The response of varieties to conventional rice production system will be more likely differ to their response to organic rice system, which apparently due to the difference on level of inputs applied. Genotype x inputs (environment) interaction contributes largely to the variation of responses. Previous study showed significant genotype-by-fertilizer interaction when modern cultivars and advance lines were used. The genotypes with greater yield potential under fertilizer condition do not yield usually do not yield more than other genotypes high under low fertilizer/no fertilizer condition (Wonprasaid et al., 1996; Romyen et al., 1998; Inthapanya et al., 2000). High genotype x input interaction exhibited would mean that cultivars selected under research station would not perform well in low-input farmer's field. Thus, indirect selection of varieties with higher grain yield under conventional system intended for organic system may not be effective.

Study aims to (a) examine the effect of genotype x environment (input) interaction on grain yield and other agronomic traits; (b) identify genotypes generally- and specifically-adapted to low external input systems; and (c) Investigate the need for breeding for genotypes with general or specific adaptability to low-external input systems

**Highlights:**

- Established field trial in three sites: (a) Inayauan, Cauyan, Negros Occidental, (b) Tabunan, Bago City; and (c) PhilRice Negros. Each site (farmer) chosen for their considerable differences in cultural management and inputs used to determine if genotypes really respond differently under different management. Thirty different rice genotypes were used for the study.

- Phenotypic traits with importance to low-external input system (organic production) rice production and farmers preferred traits such as grain yield and above ground biomass, among others were measured. Other agronomic traits measured were productive tillers, plant height, 1000-seed weight, number of spikelets per panicle, spikelet fertility, and harvest index. Average grain yield for three sites is 1845 kg/ha while average biomass yield is 9011kg/ha. NSIC Rc240 recorded the highest yield (2171kg/ha) followed by NSIC Rc224 (2168kg/ha) and NSIC Rc238 (2117kg/ha). Corocan recorded the highest biomass (9719kg/ha) followed by PSB Rc18 (9594kg/ha). Combined heritability of grain yield – one of the important traits aside from biomass, is considerably high (0.53) suggesting that direct phenotypic selection of this trait will be effective.

Meanwhile, heritability of biomass is relatively low (0.34) thus; direct phenotypic selection might be ineffective in this case. However, correlation analysis of traits revealed that biomass is positively correlated yield thus; secondary/indirect selection is possible for this trait.

Moreover, plant and spikelet fertility are also positively correlated for biomass. Result of combined analysis of variance for 3 sites revealed a highly significant genotype by environment (management) interaction indicating that responses of rice genotypes differ on each management. Results are still inconclusive and need further confirmation.

- A Farm-Walk was conducted to facilitate participatory variety selection where neighboring organic rice farmers were invited to select for their preferred rice genotypes/varieties. Majority of the farmers selected NSIC Rc222 and Rosanna because of its good crop stand, resistance to field pests and diseases, fuller and filled grains, and high spikelet fertility, followed by NSIC Rc240 and NSIC Rc238. Some of the varieties preferred also are NSIC Rc224 and Masipag 10-1-1-1 which believed to have been developed particularly for organic rice production. The participatory variety selection will enable breeders to identify the traits preferred by organic rice farmers.

**Table 13.** Heritability of agronomic traits important for organic rice breeding, 2014 WS.

| TRAITS | HERITABILITY | | | |
|---|---|---|---|---|
| | CAUAYAN | TABUNAN | STATION | COMBINED |
| üü=üü | 0.60 | 0.60 | 0.66 | 0.53 |
| Above ground biomass | 0.68 | 0.55 | 0.62 | 0.34 |
| Productive tillers | 0.50 | 0.56 | 0.58 | 0.59 |
| Plant height | 0.72 | 0.60 | 0.92 | 0.47 |
| Harvest Index | 0.01 | 0.01 | 0.56 | 0.01 |
| 1000-üüüüü | 0.37 | 0.50 | 0.37 | 0.67 |
| No. of spikelets/panicles | 0.37 | 0.58 | 0.75 | 0.67 |
| Spikelet fertility | 0.01 | 0.01 | 0.41 | 0.01 |

**Combined – heritability was analyzed for the three sites*

**Table 14.** Combined ANOVA for grain yield for three sites, 2014 WS.

| Source | DF | SS | MS | F Value | Pr (>F) |
|---|---|---|---|---|---|
| Environment | 2 | 137135582.479 | 68567791.239 | 20.89** | 0.0020 |
| Rep w/in environ | 6 | 19698041.020 | üüüüü | 9.53** | 0.0000 |
| Genotype | 31 | 4üüüüü | üüüüü | 4.03** | 0.0000 |
| GxE | 62 | 50875687.255 | 820575.601 | 2.30 | 0.0000 |
| Pooled error | 168 | 57883213.829 | 344542.940 | | |
| Total | 269 | 308679888.810 | | | |

*** Significant at 1% level*

**Table 15.** Combined ANOVA for biomass for three sites, 2014 WS.

| Source | DF | SS | MS | F Value | Pr (>F) |
|---|---|---|---|---|---|
| Environment | 2 | 105093752.983 | 52546876.492 | 6.44* | 0.0321 |
| Rep w/in environ | 6 | 48929260.583 | üüüüü | 2.71* | 0.0155 |
| Genotype | 31 | 230144917.645 | üüüüü | 2.46** | 0.0001 |
| GxE | 62 | 336803489.484 | üüüüü | 1.80 | 0.0016 |
| Pooled error | 168 | 506130077.239 | üüüüü | | |
| Total | 269 | 1227101497.934 | | | |

*Significant at 5% level; ** Significant at 1% level*

**Table 16.** Pearson's correlation analysis of various phenotypic traits under low external input systems, 2014 WS.

| | Grain yield | Productive tillers | Plant height | Biomass | 1000-seed weight | Number of Spikelets/panicle |
|---|---|---|---|---|---|---|
| üü=üü | | -0.25 | 0.46* | 0.39* | 0.37* | 0.52* |
| Productive tillers | -0.25 | | -0.29 | 0.09 | -0.28 | -0.31 |
| Plant height | 0.46* | -0.29 | | 0.41* | 0.43* | 0.34 |
| Biomass | 0.36* | 0.09 | 0.41* | | 0.11 | 0.37* |
| 1000-seed wt | 0.37* | -0.27 | 0.43* | 0.1 | | 0.01 |
| No. Of spikelets/panicle | 0.52** | -0.31 | 0.34 | 0.37* | 0.01 | |

**Significant at 5% level*

| Parameter | Organic | Zero | Conventional |
|---|---|---|---|
| %Yield reduction | 0 | 10 | 0 |
| ó$_{g}^{2}$ | 0.02742290± 0.1655986<br>13.4840344±<br>3.6720613** | 0.17798149 ±<br>0.4218785 | 0.18880449 ±<br>0.4345164 |
| ó$_{f}^{2}$ | 2.0449544 ±1.4300190 | | |
| ó$_{gf}^{2}$ | 0.1846739± 0.4297370 | | |
| ó$_{e}^{2}$ | 3.0481486 ±1.7458948 | | |
| $H^2$ | 0.17 | 0.64 | 0.47 |
| $r_g$ | | | |
| $r_p$ | | | |
| $r_g$ between org and con | 1.0 | | |
| $r_g$ between org and zero | 1.0 | | |
| $r_g$ between zero and con | 1.0 | | |
| CR for direct selection under org | | | |
| CR for indirect selection under con | 1.66 | | |
| CR for indirect selection under zero | 1.99 | | |
| $r_p$ between org and con | 0.4508 | | |
| $r_p$ between org and zero | 0.4946 | | |
| $r_p$ between zero and con | 0.7021 | | |

*Breeding View results
**Stable cultivars under different organic practices

| Genotype | Finlay and Wilkinson sensitivity | Mean grain yield |
|---|---|---|
| Corocan | 0.2023 | 2088 |
| IR10M238 | 0.4306 | 2274 |
| PSB Rc10 | 0.4385 | 2621 |
| NSIC Rc280 | 0.5881 | 1528 |
| NSIC Rc240 | 0.6616 | 1155 |
| IR10255 | 0.6674 | 652 |
| PSB Rc18 | 0.6796 | 1310 |
| PR353342-2B... | 0.6836 | 920 |
| NSIC Rc302 | 0.7155 | 855 |
| NSIC Rc300 | 0.8034 | 2213 |
| üüüüü -1 | 0.8194 | 1489 |

*Breeding view (genotypexfertilizer)

| Genotype | Finlay and Wilkinson | Mean grain yield |
|---|---|---|
| NSIC Rc240 | -1.5032 | 2850 |
| PSB Rc10 | -1.4504 | |
| NSIC Rc282 | -1.1918 | 3560 |
| NSIC Rc222 | -1.1631 | 3600 |
| NSIC Rc120 | -0.3099 | 3620 |
| Masipag 10-1-1 | -0.2803 | 3430 |
| PR3542.. | -0.1908 | 3360 |
| NSIC Rc224 | -0.0260 | 3680 |
| NSIC Rc302 | 0.0783 | 3200 |
| IR10N255 | 0.1148 | 2590 |

*Other traits (detailed above)

| | Heading date | Plant height | Harvest Index |
|---|---|---|---|
| Organic | 81.1 | 98.6 | 0.50 |
| Zero | 83.3 | 94.7 | 0.50 |
| Conventional | 83.8 | 101.2 | 0.50 |
| Reduction (org) | 3 days advanced | 2.6 cm | 0 |
| Reduction (zero) | 0.5 days advanced | 6.5 cm | 0 |

*Correlation of traits to grain yield across different managements

| Traits | Organic | Zero | Conventional |
|---|---|---|---|
| Heading Date | 0.05 | -0.23* | -0.27* |
| Plant Height | 0.45** | 0.29* | 0.19 |
| Productive tillers | 0.18 | 0.17 | 0.13 |
| Panicle Length | 0.16 | 0.17 | 0.15 |
| Harvest Index | 0.23* | 0.29* | 0.17 |
| üüüüü | 0.13 | 0.16 | 0.27* |
| Spikelet number | 0.25* | 0.07 | 0.05 |
| Spikelet fertility | 0.11 | 0.14 | 0.05 |

*Heritability of traits

| Traits | Organic | Zero | Conventional | Combined |
|---|---|---|---|---|
| Yield | 0.17 | 0.64 | 0.47 | 0.90 |
| Heading date | 0.94 | 0.90 | 0.95 | 0.99 |
| Plant height | 0.80 | 0.88 | 0.89 | 0.97 |
| Productive tillers | 0.65 | 0.58 | 0.26 | 0.88 |
| Panicle length | 0.87 | 0.77 | 0.75 | 0.97 |
| Harvest Index | 0.47 | 0.59 | 0.63 | 0.92 |
| üüüüü | 0.82 | 0.84 | 0.79 | 0.92 |
| No. Of spikelet | 0.87 | 0.81 | 0.77 | 0.98 |
| Spikelet fertility | 0.76 | 0.65 | 0.61 | 0.92 |

| Traits | Organic | | Zero | | Conventional | |
|---|---|---|---|---|---|---|
| | r | H | r | H | r | H |
| Yield | - | 0.17 | - | 0.64 | - | 0.47 |
| Heading date | 0.05 | 0.94 | -0.23* | 0.90 | -0.27* | 0.95 |
| Plant height | 0.45** | 0.80 | 0.29* | 0.88 | 0.19 | 0.89 |
| Productive tillers | 0.18 | 0.65 | 0.17 | 0.58 | 0.13 | 0.26 |
| Panicle length | 0.16 | 0.87 | 0.17 | 0.77 | 0.15 | 0.75 |
| Harvest Index | 0.23* | 0.47 | 0.29* | 0.59 | 0.17 | 0.63 |
| üüüüü | 0.13 | 0.82 | 0.16 | 0.84 | 0.27* | 0.79 |
| No. Of spikelet | 0.25* | 0.87 | 0.07 | 0.81 | 0.05 | 0.77 |
| Spikelet fertility | 0.11 | 0.76 | 0.14 | 0.65 | 0.05 | 0.61 |

| Management | | Org | Zero | Con |
|---|---|---|---|---|
| Org | $r_G$ | - | 1.0 | 1.0 |
| | $r_P$ | - | 0.4946 | 0.4508 |
| | CR | - | 1.99 | 1.66 |
| Zero | $r_G$ | 1.0 | - | 1.0 |
| | $r_P$ | 0.4946 | - | 0.7021 |
| Con | $r_G$ | 1.0 | 1.0 | - |
| | $r_P$ | 0.4508 | 0.7021 | - |

## VI. Upland Rice Development Program (URDP)

*IMGCiocon, SMLEntero, FLDAlvero, ACSSuñer*

Region VI

Eight DA-RFO 6-funded and ATI-RTC 6-funded upland Palayamanan® sites were established and monitored in Panay and Guimaras islands for cropping year 2014. ATI- RTC 6-funded sites were located in the towns of: 1) Madalag, Aklan; 2) Valderama, Antique; 3) Jamindan, Capiz; and 4) Nueva Valencia, Guimaras. These were all new sites but did but no Farmers' Field School (FFS) was conducted.

ATI-RTC 6 focused on the establishment and demonstration of upland Palayamanan® model farms, because according to the Agricultural Extension Worker (AEW) assigned in the area, ATI-RTC 6 have observed that majority of the people stopped attending or did not want to attend trainings after typhoon Yolanda and instead, they opted to focus on other government assistance projects to affected areas.

DA-RFO 6-funded sites, on the other hand, were in: 1) Calinog and 2) Anilao, Iloilo; 3) Jordan, Guimaras; and 4) Libacao, Aklan. Except for Libacao where there was a problem on the number of participating farmers, FFS were conducted in all the DA-RFO 6 sites.

The upland Palayamanan® site in Anilao, Iloilo was a new site, while in Calinog is an old site but was transferred to a new barangay with new participants who attended the class. Libacao and Jordan were both old sites established in 2013.

Activities under the URDP was divided in to five components, namely: Component 1 - ; Component 2 – Rice seed assistance of traditional and modern upland rice varieties.

From 2012 to 2014, the URDP was able to generate master list of 2,276 upland farmers and validate a total of 1,687.68 upland areas in Panay and Guimaras islands in Region 6 (Table 17).

Average area per farmer can be computed to 0.66 ha, its shows that only small land area is really planted by upland farmers.

These data were from 18 municipalities and majority of upland areas were recorded from the province of Capiz from its five municipalities. Planting months in this region started in March to June, it depends on when the rain started to pour, enough for farmers to start land preparation.

Traditional varieties planted depend on the preference in each province but the most common on the list are Palawan, Dinorado and Malido. These varieties are known for their soft and aromatic eating quality.

A total of 5,280kg of seeds of various traditional varieties were distributed to 445 farmers, for planting in about 257 ha of upland rice, during the cropping year of 2012 to 2013 under through URDP's Component 2 or the Rice Seeds Assistance of Traditional and Modern Upland Rice Varieties (Table 18).

Varieties distributed were Karutak, Lubang Red, Malido, Palwan, UPL Ri1 and UPL Ri3. Some amount of seeds (140kg) was used by DA- RFO 6 for their FFS and demonstration sites.

**Table 17.** Summary of the validated upland areas in URDP master list for Panay and Guimaras Islands, Region 6, 2012-2014.

| Province | Municipality | No. of Upland Farmers | Validated Upland Areas (ha) | Planting Month | Traditional Varieties Planted |
|---|---|---|---|---|---|
| **PANAY ISLAND** | | | | | |
| Aklan | Madalag | 239 | 136.25 | Mar-May | Kinaw-itan, Milagrosa |
| | Libacao | 38 | 32.00 | Mar-May | Diamante, Intan, Kapino, Kinabuno, Milagrosa, Mintik |
| | Banga | 78 | 8.50 | | |
| | *Subtotal* | **495** | **202.56** | | |
| Antique | Barbaza | 25 | 8.63 | Apr-may | Black Rice, Thailand |
| | Valderama | 10 | 10.00 | Mar | Awot, Azucena, Kabangge, Kahuwi, Kanangan, Malido, Palawan, Pondol, Sinambawan |
| | | | | | |
| | *Subtotal* | **35** | **18.63** | | |
| Capiz | Jamindan | 29 | 7.08 | Apr-May | Denolores, Ginatos, Himitana, Kabasag, üüüüü Karatak, Malido, Palawan, Pondol, Sinambawan |
| | Tapaz | 906 | 516.61 | Apr-May | Azucena, Malido, Palawan |
| | Mambusao | 203 | 231.60 | Apr-May | üüüüü Kabiray, Kapino, Karatak, Malido, Manumbalay, Tatlong-buwan, Tiyangkaw |
| | Dumalag | 286 | 319.00 | Apr-May | |
| | Dumarao | 139 | 93.50 | Apr-May | |
| | *Subtotal* | **1, 563** | **1,167.79** | | |
| Iloilo | Calinog | 76 | 30.00 | May-Jun | Malido, Palawan, Panumbalay |
| | Passi | 25 | 39.50 | May-Jun | Dinorado, Kamuros |
| | Tubungan | 33 | 18.65 | May-Jun | Dinorado, Kamuros |
| | Anilao | | | | Palawan, Tampopoy |
| | *Subtotal* | **134** | **88.15** | | |
| **GUIMARAS ISLAND** | | | | | |
| Guimaraz | Jordan | 42 | 21.50 | Apr-May | Palawan, Malido, Dinorado |
| | Nueva Valencia | 7 | 3.75 | Apr-May | Lubang, Malido, Kutibos, Azucena, Black Rice, Kapopoy |
| | *Subtotal* | **49** | **25.25** | | |
| | **Total** | **2, 276** | **1, 502.38** | | |

In 2014, 500 kg of Malido were distributed to 30 participants of the different FFS, while others were used for seed production in ATI funded Palayamanan® sites (Table 19). Another 80 kg were given to Hinobaan, Negros Occidental Upland Palayamanan® site which was being handled by the UpTech from region 7(not reflected in the table).

**Table 18.** Summary of the validated upland areas in URDP master list for Panay and Guimaras Islands, Region 6, 2012-2014.

| **Province** | **üüüüü** | **Varieties** | **Volune of seeds (kg)** | **No. of Upland Farmers** | **üü=üü Area (ha)** |
|---|---|---|---|---|---|
| Aklan | Malinao | Lubang Red | 80.00 | 138 | 25.76 |
| | | Malido | 200.00 | | |
| | | Palawan | 160.00 | | |
| | | UPL Ri3 | 60.00 | | |
| | *Subtotal* | | **500.00** | | |
| Capiz | Mambusao | Azucena | 40.00 | 122 | 126.95 |
| | | Karutek | 80.00 | | |
| | | Lubang Red | 260.00 | | |
| | | Malido | 1,000.00 | | |
| | | Palawan | 500.00 | | |
| | *Subtotal* | | **1880.00** | | |
| Guimaraz | Jordan | Lubang Red | 360.00 | 48 | 25.50 |
| | | Malido | 400.00 | | |
| | *Subtotal* | | **760.00** | | |
| Iloilo | Calinog | Malido | 50.00 | 76 | 30.00 |
| | | Palawan | 30.00 | | |
| | | UPL Ri1 | 680.00 | | |
| | | UPL Ri3 | 440.00 | | |
| | Passi City | Lubang Red | 800.00 | 61 | 48.50 |
| | *Subtotal* | | **1200.00** | | |
| üüüüü FSS c/o Mr. Victorio Nabor (DA-RFO 6) | | Malido | 40.00 | | |
| | | Palawan | 20.00 | | |
| | | UPL Ri3 | 40.00 | | |
| | | UPL Ri3 | 40.00 | | |
| | *Subtotal* | | **140.00** | | |
| | **Total** | | **5,280.00** | **445** | **256.71** |

**Table 19.** Distribution of Malido seeds in Upland sites,in Aklan, Capiz, Guimaras and Iloilo, 2014.

| URDP Site | No. of Farmers Served | Volume of Seeds (kg) | Variety |
|---|---|---|---|
| Libacao, Aklan | * | 1.50 | Malido |
| Madalag, Aklan | * | 2.00 | Malido |
| Alderama, Capiz | * | 2.00 | Malido |
| Jamindan, Capiz | * | 1.00 | Malido |
| Panit-an, Capiz | * | 1.00 | Malido |
| Jordan, Guimaras | 5 | 3.00 | Malido |
| Nueva Valencia, Guimaras | * | 2.00 | Malido |
| Anilao, Iloilo | 18 | 3.00 | Malido |
| Canilog, Iloilo | 7 | 1.00 | Malido |
| Total | 30 | 420.00 | |

**distributed to ATI-RTC 6 Palayamanan demo sites for their seed production area*

Upland Technologists (UpTechs) deployed in the region between 2012 and 2014 have identified 12 potential seed producers of traditional varieties (Table 20). These were farmers who consistently planted upland rice and with a considerable farm area that can produce enough seeds for the seed procurement project by either PhilRice or DA- RFO 6. They were from Aklan, Capiz, Guimaras and Iloilo and usually planted upland rice once a year. They plant different traditional rice varieties but a number of them planted Malido, Palawan and Azucena, which were also among the most preferred varieties in the region. Some of them have also planted modern rice varieties, such as: UPL Ri1 and UPL Ri3.

Community-based Upland Palayamanan were established in 8 sites around the region. Four were ATI-funded and the other four were RFO-funded located on different provinces. Seeds, fertilizers and other needed inputs were provided by both parties. In addition to upland rice, corn and other vegetables crops were also included. Field days were held in three upland sites: in 1) Calinog and 2) Anilao, Iloilo and in 3) Jordan, Guimaras, attended by neighboring farmers, through the collaborative efforts of LFTs and LGUs.

Another URDP site was established at Barangay Pook, Hinoba-an, Negros Occidental and was handled by another UpTech of PhilRice Negros. Thirty-five farmers, an agricultural technologist and a local farmer-technician participated in the URDP Farmer Field School. Three-hundred twenty-four upland rice farmers were identified and farming a validated upland rice area of 175.30 ha. Eight traditional varieties were identified that are being planted in these areas, namely: Dinorado, Palawan, Azucena, Darilng, Sulig, Dinolones, Tabukanon and Kapagsik.

**Table 20.** List of potential seed producers of traditional varieties in Region 6, 2012-2014.

| Name of farmer | Address | Upland Area (ha) | Variety | No. üüüüü Harvesting |
|---|---|---|---|---|
| John Zausa | Janlud, Libacao, Aklan | 1.50 | Diamante, Malido, Manumbalay | üüüüü |
| Dielma Masias | Pangpang Sur, Mambusao, Capiz | 2.00 | Lubang, Malido, Palawan | üüüüü |
| Elleo Gonzaga | Bugnay, Jordan, Guimaraz | 2.00 | Malido, Palawan | üüüüü |
| Elisa Casumpang | Vista Alegre, Anilao, Iloilo | 1.00 | Malido | üüüüü |
| David Diaz | Vista Alegre, Anilao, Iloilo | 1.00 | Malido | üüüüü |
| Remin Ayroso | Impalida, Canilog, Iloilo | 3.00 | Malido | Twice a year |
| Pedro Franco | Impalida, Canilog, Iloilo | 2.00 | Malido | üüüüü |
| Edmer Gonzales | Impalida, Canilog, Iloilo | 3.00 | Azucena, Malido | üüüüü |
| Henry Orbino | Impalida, Canilog, Iloilo | 1.00 | Azucena, Palawan | Twice a year |
| Bernaldo Lastimoso | Impalida, Canilog, Iloilo | 1.00 | UPL Ri3 | üüüüü |
| Armando Parcon | Aglalana, Passio City, Iloilo | 3.00 | Karutak, UPL Ri1, UPL Ri3 | üüüüü |
| | Total | 2.50 | | |

Region VII

Two URDP sites were established in Region VII, in collaboration with the Department of Agriculture Regional Field Office VII and the Agricultural Training Institute Regional Training Center VII. URDP Palayamanan model farms were established at Barangay Villa Teresita, Ubay, Bohol and Barangay Bulak, Dalaguete, Cebu (Table 21).

A total of 7,000 m2 was alloted for seed production of Palawan, Malido and Lubang varieties in Ubay, Bohol site, while Brgy. Tara Farmers' Association of Mabinay, Negros Occidental was identified as potential upland seed producer for Tatlong Buwan, Azucena, Tumindog, Dinorado and UPL Ri3.

DA-RFO VII established additinal Palayamanan® model farms in Bohol thru the the Bohol Agricultural Promotion Center (Bohol-APC) (Table 22): 1) Barangay San Miguel, Danao Bohol, where the URDP funded the establishment of the model farm and conduct of FFS; and 2) Barangay Tambonga, Candijay, Bohol, where the URDP funded only the varietal trial.

Community Seed Bank building was to be erected in Candijay, Bohol. There was already a contractor for the construction of the said facility, but there was no definite schedule yet when to start the project. Nevertheless, aside from the varietal trial established in the site, there were no record of other upland rice planted in the area.

Thirty farmers attended the FFS at Brgy. Villa Teresita in Ubay with one local farmer- technician (LFT) and an agriultural technician (AT) from the Local Government Unit (LGU) Ubay, while also thirty farmers attended the FFS at Brgy. San Miquel, Danao, Bohol with one LFT and 2 ATs from LGU-Danao.

The project has distributed a total of 12,660 kg of seeds in Hinobaan for Region VI and in the four provinces of Region VII (Table 22) throgh the Rice Assistance Component .

**Table 21.** URDP Palayamanan model farms in Region 7, 2014 WS.

| **Site** | **Area (ha)** | **Rice** | | **üüüüü** | **Other Information** |
|---|---|---|---|---|---|
| | | Varietal Trial | Area Planted ($m^2$) | | |
| Brgy. Bulak, | 2.40 | Malido | 100 | String Beans | 1,000 Tilapia fingerlings |
| Dalaguete, Cebu | | Black Rice | 100 | Carrots | from OPA-Cebu |
| | | Azucena | 100 | Spring Onion | |
| | | Dinorado | 100 | Cucumber | 3 heads of goats from |
| | | | | Tomato | DA-ATI RTC 7 |
| | | | | Sweet Pepper | |
| | | | | Squash | |
| | | | | Eggplant | |
| | | | | Camote | |
| | | | | Cassava | |
| Brgy. Villa Teresita, | 1.20 | NSIC Rc23 | 100 | Corn | 1,500 Tilapia fingerlings |
| üü=üü | | NSIC Rc284 | 100 | Eggplant | from BFAR |
| | | UPL Ri1 | 100 | Squash | |
| | | UPL Ri 3 | 100 | Hot pepper | 2,000 Tilapia fingerlings |
| | | Red Rice | 100 | Pechay | from OPA-Bohol |
| | | Galo | 100 | Camote | |
| | | Dinorado | 100 | Mungbean | Peanut seeds from BES |
| | | Palawan | 100 | Bottle gourd | (Bohol Experiment Station) |
| | | Pinilisa | 100 | Banana | |
| | | Malido | 100 | | |

**Table 22.** Additional URDP Palayamanan model farms in Region 7, 2014 WS.

| Site | Area (ha) | Rice | | üüüüü |
|---|---|---|---|---|
| | | Varietal Trial | Area Planted ($m^2$) | |
| Brgy. San Miguel, Danao | 1.00 | Palawan | 50 | Upland Kangkong |
| Bohol | | Gakit | 50 | Okra |
| | | UPL Ri1 | 50 | Eggplant |
| | | UPL Ri 3 | 50 | Tomato |
| | | Magsanaya | 50 | Hot pepper |
| | | Lubang | 50 | Corn |
| | | Black Rice | 50 | Cassava |
| | | Red Rice | 50 | |
| | | Red Tower | 50 | |
| Brgy. Tambongan, Candijay | 0.20 | Lubang | 300 | |
| Bohol | | Magsanaya | 300 | |
| | | Palawan | 300 | |
| | | UPL Ri 1 | 300 | |
| | | UPL Ri 3 | 300 | |
| | | Red Tower | 300 | |
| | | NSIC Rc23 | 200 | |

**Table 23.** URDP Rice seed assistance in Region 7, 2014 WS.

| Province/Municipality | January – July 2014 | | |
|---|---|---|---|
| | No. of Farmers Served | Volume of Seeds (kg) | Varieties |
| Region 7 | | | |
| Cebu/Ginatilan | 40 | 720 | NSIC Rc23 |
| Bohol/Ubay, Dagohoy, Pilar | 80 | 3,400 | NSIC Rc23, NSIC Rc9 (RS) |
| Negros Oriental | 100 | 3,680 | Black Rice=üüüü |
| Siquijor | 32 | 1,280 | NSIC Rc23 |
| Total of Region 7: | 25 | 9,080 | |
| Region 6 | | | |
| Negros Occidental/Hinoba-an | 180 | 3,660 | Malido, Dinorado, Palawan, Azucena, 3 buwan, Black Rice, Red Rice |
| Grand Total as of July 2014 | 432 | 12,660 | |


**Figure 2.** Upland rice varieties planted in Hinobaan, Negros Occidental, 2014 DS.

Region VIII

A total of 6,588 upland farmers and about 5,667 ha of upland areas were validated for Region 8 (Table 24). Three URDP sites were established covering the provinces of Northern Samar (Lope de Vega), Samar (Motiong) and Leyte (Ormoc). Through the Component 3 of the program, three Palayamanan model farms were established (Table 25) where Farmers' Field School and Participatory Technology Development (PTD) was conducted. For Brgy Getigo (Lope de Vega, Northern Samar), the PTD only included varietal trial, but for Brgy Caranas (Motiong, Samar) and Brgy Dolores (Ormoc, Leyte), there were also seed production component and nutrient management trial. Additional trial on planting distance was done at Brgy Caranas, as requested and identified by the farmers as important to them.

Construction/establishment of warehouses for the community seeds banks were on going. However, for Lope de Vega, the Kalinayan production of about 17.50 ha was devasted when typhoon Glenda hit the province. Nevertheless, the Brgy Getigo Upland Farmers Organization (Upland UFO) re-established their crop and remained the supplier of the variety in the succeeding season. Upland Farmers' Organizations at Barangay Molabag of Northern Samar, Barangays Carans, Cabiga, Lale and Mangcal of Western Samar, Barangay Maytibag of Eastern Samar and Barangay Dolores of Ormoc City have their CSB warehouse under construction. Four potential seed producers of traditional varieities were identified for Samar, while one each was identified for Northern Samar and Leyte (Table 26).

**Table 24.** Master list of upland rice farmers in Region 8, 2014.

| Location | Upland Areas (ha) | Validated Upland Areas (ha) | No. of Upland Farmers | Planting Months | Local Varieties Planted |
|---|---|---|---|---|---|
| Northern Samar | 606.00 | 606.00 | 988 | May-June | *Kanukot, Calumpit, *Kalinayan |
| Lope de Vega | 248.00 | 248.00 | 483 | May-June | *Kanukot, Calumpit, *Kalinayan, Pilit |
| San Roque | 154.00 | 154.00 | 172 | May-June | *Kanukot, *Kalinatan |
| Pambujan | 204.00 | 204.00 | 333 | May-June | *Kalinayan, Guinobanon |
| Eastern Samar | 232.41 | 232.41 | 411 | May-June | *Kalinayan, Guinobanon |
| San Julian | 40.03 | 40.03 | 35 | November | *Baysilanon, Guinobanon |
| Maydolong | 30.06 | 30.06 | 39 | November | *Kalinayan, Guinobanon |
| Balangga | 141.75 | 141.75 | 229 | May-June | *Kalinayan, Guinobanon |
| Maslog | 20.57 | 20.57 | 108 | November | *Kalinayan, Guinobanon |
| (Western) Samar | 4435.60 | 4435.60 | 4835 | May-June | *Baysilanon, Guinobanon, Kalumpit |
| Pinabacdao | 218.43 | 218.43 | 513 | May-June | üüüüü |
| Matuguinao | 93.10 | 93.10 | 255 | May-June | *Baysilanon, Kalumpit |
| San Jose de Buan | 1124.50 | 1124.50 | 703 | May-June | *Kalinayan, Kalumpit, Makaba |
| Gandara | 540.89 | 540.89 | 540 | May-June | *Baysilanon, *Kalinaya, Pilit, Mud-bod |
| Calbiga | 999.58 | 999.58 | 915 | May-June | üüüüü |
| Basey | 45.50 | 45.50 | 37 | May-June | *Baysilanon, Koruyong |
| Paranas | 206.50 | 206.50 | 211 | May-June | *Kalinayan |
| San Jorge | 264.93 | 264.93 | 690 | May-June | *Baysilanon, *Kalinayan |
| Motiong | 729.76 | 729.76 | 723 | May-June | *Kalinayan, *Baysilanon, Kalumpit |
| Sta. Rita | 161.16 | 161.16 | 1771 | May-June | *Kalinayan, *Baysilanon |
| Hinabangan | 51.25 | 51.25 | 71 | May-June | *Kalinayan, *Baysilanon |
| Leyte | 140.65 | 140.65 | 158 | May-June | Lubang, Manumbalay |
| Ormoc | 140.65 | 140.65 | 158 | May-June | Lubang |
| Biliran | 252.61 | 252.61 | 171 | May-June | Lubang |
| Naval | 252.61 | 252.61 | 171 | May-June | Lubang |
| Southern Leyte | 12.50 | - | 25 | May-June | Lubang |
| Thos Oppus | 5.00 | - | 10 | May-June | Lubang |
| Macrohon | 7.50 | - | 15 | May-June | Lubang |
| Total | 5679.77 | 5667.27 | 6588.00 | | |

*Baysilanon and Kalinayan are the most in demand traditional varieties in the region.*

**Table 25.** Upland FFS and Palayamanan sites in Region 8, 2014.

| Palayamanan Sites | Total Upland Areas (ha) | Palayamanan üüüüü (e.g. rice, other crops) | Varieties Planted | Land üüüüü | Number of FFS Participants |
|---|---|---|---|---|---|
| Brgy. Getigo, Lope de Vega, Northern Samar | 1.50 | Upland Rice, Vegetables (Ampalaya, Pole Beans, Eggplant Upo), Corn, Peanut | üüüüü Red Rice, Dinorado, Lubang | 1,400 m$^2$ üüüüü | 25 |
| | | | Baysilanon, | | |
| | | | NSIC Rc11, | | |
| | | | NSIC Rc23 | | |
| Brgy. Caranas, Motiong, | 1.00 | Upland Rice, Vegetables (Okra, Ampalaya, Eggplant, Pechay) | üüüüü Lubang, | 1,400 m$^2$ | 28 |
| [Western] Samar | | | üüüüü | (Var Trial); | |
| | | | üüüüü Kanukot | 600m$^2$ (Planting üüüüü | |
| | | | | 400m$^2$ | |
| | | | | (Nutrient Mgt) | |
| Brgy. Dolores, Ormoc City, | 1.90 | Upland Rice, Corn, Sweet potato, Vegetables | Lubang Red, | 1,400 m$^2$ | 30 |
| Leyte | | | Red Rice, Dinorado, | (Var Trial); | |
| | | | Binubua, Kalinayan, | 200 m$^2$ | |
| | | | NSIC Rc23 | (Seed Production); | |
| | | | | 400m$^2$ (Nutrient Mgt) | |

**Table 26.** List of potential seed producers of traditional varieties in Region 8, 2012-2014.

| Location | Potential Seed Producer | Seed Source | Traditional Varieties Planted | Area Planted per variety | Expected Date of Harvest | Expected Volume of Harvest (kg) |
|---|---|---|---|---|---|---|
| Brgy. Getigo, Lope de Vega, Northern Samar | Danilo de Gabriel | RFO8-CSB | Kalinayan | 1.0 | last week of October | 800 |
| Brgy. Lale, Pinabacdao, Western Samar | Leo C. Cachero | RFO8-CSB | Baysilanon | 1.5 | 3rd week of October | 1,200 |
| Brgy. Beri, Calbiga, Western Samar | Evelyn L. Labado | RFO8-CSB | Baysilanon | 1.0 | 3rd week of October | 800 |
| Brgy. Caranas, Motiong, Western Samar | Romeo Dacles | RFO8-CSB | Kalinayan | 1.0 | last week of October | 850 |
| Brgy. Caranas, Motiong, Western Samar | Francisco Labong | RFO8-CSB | Kalinayan | 1.0 | 3rd week of October | 850 |
| üü=üü g, Ormoc City, Leyte | Fidel M. Cabale | RFO8-CSB | Kalinayan | 1.0 | last week of October | 1,200 |

## VII. The Learning Center of PhilRice Negros

CE Tayson, AP Orque, ACS Suner, EM Libetario

PhilRice Negros' Learning Center was set on April 2014 at a 1.5-hectare section of the station's research, technology demonstration and seed production farm to showcase and package appropriate technology interventions for transplanted and direct-seeded rice. The learning center shall serve as an clean, green, practical and sustainable (Clean, GPS) on-farm learning center that will provide experiential learning opportunities to visitors/trainees by showcasing holistic and comprehensive technology packages through the integrated and diversified rice-based production system approach, capacity enhancement and inclusion of other available technology components that will mjjaximize the potentials in agriculture.

**Highlights:**

- Established and maintained the relay rice planting component that showcase the major growth stages of the rice plant (NSIC Rc222). The one hectare area was strategically divided into 8 plots with an area of 21.5 m x 58 m per paddy. Sowing was scheduled every 18 days, such that there are paddies representing the different crop stages of rice (seedling, tillering, panicle initiation, heading, flowering, milking, maturity) at any given time (Figure 3). Each paddy was further sub-divided into two to showcase crop establishment practices common in Negros: 1) direct seeding and 2) transplanting methods. The agronomic and yield performance of NSIC Rc222 as well as the pest reactions were monitored at different planting dates.

- Started the construction of 2 units of learning shed for on-farm training, reception and briefing area for trainees and visitors. Improvement of the irrigation canals, drainage ditch and levees was continued; fixed frames for removable billboard and plot labels were also fabricated and installed (Figure 4).

- Showcased the learning center area to the visitors and guests during the station's 2014 WS Field Day (Figure 5).

- Catered 2 batches of training for PhilRice Negros staff (First batch: BDD and Laborers; Second batch: Admin and R&D Staff) utilizing the learning center as learning fields. The two-day PalayCheck® Refresher Course and Technology Updates equipped the new staff (technical and non-technical) with the basics of rice science and technology; existing staff were also updates with the latest information.


**Figure 3.** They relay rice planting component of the learning center, PhilRice Negros.


**Figure 4.** Left to right: learning center shed; learning center billboard and plot label.


**Figure 5.** LEFT: Dr Teodoro Mendoz (Board Director) explains the benefits of optimum soil depth to rice production; RIGHT: demonstration of the mechanical transplanter, PhilRice Negros
2014 WS Field Day.

## VIII. Integrated Rice-Based Agri-bio System (IRBAS)

AOrque, CETayson, ACSSuñer, EMLibetario

IRBAS projects at PhilRice Negros were in its primary year of implementation, incorporating other crops, animals and other components into rice production in a sustainable and resource-efficient system, namely:

**Highlights:**

- Mushroom and vermicast production: Constructed temporary sheds for mushroom and vermicast production which has handled by the research group. Initial production was recorded.

  Due to unavailability of production facility of for the mushroom, the station opted to acquire 500 mushroom fruiting bags from various farmer-producers to start growing mushrooms at the station. The temporary mushroom growing house was established within the station's Palayamanan model farm using an abandoned structure of what used to be a chicken house. Mushroom produced were sold out to the station's staff and laborers.

  The vermicast production shed collapse when typhoon Glenda hit the station and left seven (7) out of the 10 vermi beds unsuitable for vermicast production. Renovation of the facility was postponed owing to the processing of documents for the implementation of an institute-wide standard design for the mushroom and vermicast production facility. Three (3) vermi-beds were maintained to keep the vermi-worms active.

- Banana production: The banana component of the farm was conceptualized to provide additional substrate for the vermicast production – biomass residues from the banana (dead stalks, suckers and leaves) will be collected and fed to vermi-worms for decomposition; and obtain additional income from the banana fruits and suckers. The initial stock (10,000 tissue-cultured seedlings) was procured from Davao City and was planted on both sides of the main roads.

- Duck raising: Initially acquired 500 heads of 1- to 2-week-old ducks. The ducks were housed in a 50-$m^2$ (2m x 25m) pen at the organic seed production area. Owing to harsh weather, 35% mortality was noted to account for the significant decrease in stock.

- Goat raising: Ten (10) heads of healthy and carefully selected native bucks were procured from goat raisers in Calatrava, Negros Occidental, in collaboration with the Multi-Sectoral Alliance for Development of Negros (MUAD-Negros). The station also acquired a model goat house from MUAD.

  All the bucks were castrated except for one for growth comparison. An elevated and more spacious animal shed was constructed for the goats. Significant increase in growth was recorded and more active goats were observed when they were transferred to the bigger shed.

  Goats were fed with leaves of paragrass, ipil-ipil, kakawate and other green biomass found within the station. Salt-leak (molasses and salt mix in a bamboo container) was also provided for the goats as supplements.

- Swine production: The station engaged in a small-scale/backyard swine production in the Palayamanan model farm area. The started with seven (7) heads under the Palayamananproject, then followed with another ten (10) heads under the IRBAS project. The pigs were fed with commercially available feeds.

  The swine were raised/maintained using the stay-in household/labor force for the Palayamanan model farm.

- Tilapia culture: In collaboration with the Bureau of Fisheries and Aquatic Resources (BFAR), the station acquired 5,000 tilapia fingerlings and 25 bags of feeds for the station's tilapia production. The fingerlings were stocked at the spillway/reservoir/lagoon at the entrance of the station. Fishes were fed daily. By November, additional 1,000 breeder tilapia (Excel A & B) were acquired from BFAR Main Office in Nueva Ecija and were grown in different ponds in the station.

- Sorjan Technology: PhilRice Negros adapted and modified an Indonesian indigenous technology for swampy environment called, "Sorjan". An area in the Palayamanan model farm was excavated to create swampy ecosystem composed of two raised beds/plots separated and surrounded by perimeter canals. Upland kangkong were grown in the raised beds. The canal served as the water source for the upland kangkong, which is distributed using a "rain-boat" or a modified floating pump.

  The station demonstrated the technology as one of the components of an integrated rice farming system that can increase the income of farmers and production per unit of land area. It also aimed to help increase income by growing high-value off-season crops, simultaneous growing of upland crops and increased fodder production for livestock. Upland kangkong harvests were sold to PhilRice Negros staff and walk-in visitors. Unsold kangkong tops were fed to swine.

**Table 27.** Summary of financial status for 2014.

| Component | Stock | | Expenses | Gross Income | Net Income |
|---|---|---|---|---|---|
| | Initial | As of Dec 2014 | (labor, üüüüü feeds) | (PhP) | (PhP) |
| Goat | | | | | |
| Kid (1st batch, 10) | 10 | 3 | 18,000.00 | | - |
| Kid (2nd batch, 20) | | 20 | 30,000.00 | | |
| Labor, materials, feeds | | | 71,466.74 | | |
| Chevon | | | | 16,370.00 | |
| Subtotal | | | üüüüü | 16,370.00 | (103,096.74) |
| Duck | | | | | |
| Ducklings | 500 | 240 | 12,500.00 | | |
| Labor, materials, feeds | | | 43,082.50 | | |
| Egg production | | | | 27,294.00 | |
| Live duck | | | | 22,675.00 | |
| Subtotal | | | 55,582.50 | 49,969.00 | (5,613.50) |
| Swine | | | | | |
| Piglets (1st batch, 7) | 7 | - | 15,400.00 | | |
| Piglets (2nd batch, 10) | | 10 | 22,000.00 | | |
| Labor, materials, feeds | | | 24,660.00 | | |
| Pork | | | | 66,209.00 | |
| Subtotal | | | 62,060.00 | 66,209.00 | 4,149.00 |
| Fish (Tilapia/Mudfish) | 800 | - | - | 20,760.00 | 20,760.00 |
| Banana | | | | | |
| Planting material | 3,000 | 3,595 | 45,000.00 | 3,188.25 | |
| Labor | | | üüüüü | 3,188.25 | |
| Bunch | | | | 3,188.25 | |
| Heart | | | | 630.00 | |
| Sucker | | | | 8,185.00 | |
| Subtotal | | | üüüüü | 18,379.75 | (130,940.25) |
| Mushroom | 500 | - | | | - |
| Fruiting Bags | | | 8,500.00 | | |
| Labor | | | 1,531.25 | | |
| Fresh Mushroom | | | | 5,158.00 | |
| Subtotal | | | 10,031.25 | 5,158.00 | (4,873.25) |
| Kankong | | | 5,760.00 | 1,020.00 | (4,740.00) |
| Total | | | üüüüü | üüüüü | (224,354.74) |

## IX. PALAYABANGAN: The 10-5 Challenge

*AD Palanog, LeT Sta. Ines, L Dogeno, C Ubales, EM Libetario*

With the national average yield of 4.0t/ha at a cost of PhP11/kg, PhilRice launched the Palayabangan: 10-5 Challenge to raise the rice production standard to 10.0t/ha at only PhP5.00 by inviting farmers, farmer groups and private companies to showcase their best rice farming technologies to achieve this target at PhilRice branch stations.

The contest required thorough monitoring and specific data gathering especially in the aspects of socio-economics and technology identification which are both recorded and updated timely to the project's online databank. Implementation of the proposed project plan and application of technologies of each participant were strictly supervised by a PhilRice Monitor at all times to ensure fairness and unbiased project outputs.

**Highlights:**

Dry Season 2014 (January to May, 2014)

- The Palayabangan: 10-5 Challenge in PhilRice Negros was participated by five (5) competing entries (4 conventional and 1 organic) and four (4) non-competing entries (all conventional) during the 2014 dry season (Table 28). All non-competing entries were handled by the station's seed production team, which did not compete for the contest prize, but also aimed to achieve the 10-5 challenge.

- The competing entries for conventional system were three individual farmers, namely: Mr. Silvestre Estrao, Reymond Riopay and Precious Diamante, while the contenders for the organic system were Green Farm Company and VPAN (Vermiculture Practitioners Association of Negros).

  Based on the presented result in Table 29, Mr. Estrao's technology obtained the highest yield of 6.34t/ha at a cost of Php 10.94 per kilogram of rice produced. This was followed by Ms. Precious Ann Diamante with the yield of 6.24t/ha with corresponding cost/kg of PhP8.83. The entry with lowest yield recorded was VPAN with only 2.93t/ha and a cost/kg of 18.34.

For 2014 dry season, no entry reached the 10-5 challenge.

- All field activities, inputs and application of such, were strictly supervised and recorded by the Palayabangan monitors (Tables 29 & 30). The socio-economic and technology identification data were gathered and immediately encoded to the databank by each station's in-charge for consolidation and finalization at PhilRice CES. Preliminary data were as follow:

**Table 28.** Participatns of the Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 DS.

| **Entry Name (Competing)** | **Variety Used** | **Entry Name (Non-competing)** | **Variety Used** |
|---|---|---|---|
| Silvestre B. Estrao | NSIC Rc214 (RS) | PhilRice 1 | üüüüü |
| Reymond Riopay | SL8H | PhilRice 2 | NSIC Rc226 (RS) |
| Precious Ann Diamante | NSIC Rc222 (RS) | PhilRice 3 | NSIC Rc222 (RS) |
| Green Farm Company | NSIC Rc128 (RS) | PhilRice 4 | üüüüü |
| Vermiculture Practitioner Association of Negros (VPAN) | Masipag 45 | | |

**Table 29.** Results of Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 DS (competing entries).

| **Items** | **Palayabangan 2014 DS: Non-competing Participants** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PhilRice 1 | | PhilRice 2 | | PhilRice 3 | | PhilRice 4 | |
| Area (ha) | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 |
| Yield at 14% MC (kg/area) | 826.67 | 4,133.35 | 609.05 | 3,049.77 | 609.95 | 3,049.75 | 948.72 | 4,743.60 |
| Material inputs (PhP) | 5,099.40 | 25,497.00 | 2,042.00 | 10,210.00 | 2,048.40 | 10,242.00 | 5,701.40 | 28,507.00 |
| Labor Cost (PhP) | 1,593.86 | 7,969.30 | 1,996.14 | 9,980.70 | 1,650.00 | 8,250.00 | 1,629.43 | 8,147.15 |
| Others: (irrigation, fuel, etc.) | 750.00 | 2,950.00 | 750.00 | 2,950.00 | 600.00 | 2,200.00 | 600.00 | 2,200.00 |
| Total Production Cost (PhP) | | 36,416.32 | | 23,140.68 | | 20,692.00 | | 38,854.16 |
| üüüüü | | 8.81 | | 7.59 | | 6.78 | | 8.19 |
| Profit | | 33,851.01 | | 28,705.36 | | 31,154.05 | | 41,787.12 |

**Table 30.** Results of Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 DS (non-competing entries).

| Items | Palayabangan 2014 DS: Contenders | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | S. Estrao | | R. Riopay | | üüüüü | | Green Farm | | VPAN | |
| Area (ha) | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 |
| Yield at 14% MC (kg/area) | 1,267.85 | 6,339.25 | 1,106.93 | 5,534.65 | 1,247.09 | 6,235.45 | 977.62 | 4,888.10 | 586.05 | 2,930.25 |
| Material inputs (PhP) | 4,979.36 | 24,896.80 | 3,242.08 | 16,210.40 | 2,661.36 | 13,306.80 | 2,446.32 | 12,231.60 | 2,247.00 | 11,235.00 |
| üüüüü (PhP) | 8,291.20 | 41,456.00 | 6,193.81 | 30,969.05 | 7,950.12 | 39,750.60 | 7,652.02 | 38,260.10 | 7,742.56 | 38,712.80 |
| Others: (irrigation, fuel, etc.) | 710.00 | 3,014.00 | 560.00 | 2,160.00 | 414.00 | 2,014.00 | 640.00 | 2,240.00 | 980.00 | 3,780.00 |
| Total üüüüü Cost (PhP) | | 69,336.79 | | 49,338.21 | | 55,071.38 | | 52,731.72 | | 53,727.79 |
| üüüüü | | 10.94 | | 8.91 | | 8.83 | | 10.79 | | 18.34 |
| Profit | | 38,400.66 | | 44,750.86 | | 50,911.84 | | 30,365.76 | | (3,913.84) |

Wet Season 2014 (June- December, 2014)

- The Palayabangan: The 10-5 Challenge in the wet season of 2014 was participated by six competing entries (5 conventional and 1 organic) from various individuals and private companies and six non-competing entries (5 conventional and 1 organic) which were under the management of PhilRice Negros Business Development Unit (BDU) (Table 31).

  The contenders for conventional rice production were Precious Agri-Products, Mr. Dennis Guarra, Bayer Crop Science, Syngenta Philippines, Inc., and Mr. Silvestre Estrao while VPAN came back for another chance to demonstrate his technologies for the organic rice production. After the strict supervision, monitoring and recording, the unofficial initial results are presented in Tables 5 and 6 for the competing and non-competing entries, respectively. This initial result showed that Bayer Crop Science got the highest yield at 7.7t/ha with a production cost of PhP 6.11per kilogram.

  Bayer was followed by Mr. Guarra with the yield of 6.11t/ha and corresponding cost/kg of PhP 5.32. Moreover, the

VPAN produced the lowest yield of 2.33t/ha with cost/kg of PhP 10.72. On the other hand, in non-competing entries, the PhilRice 3 got the highest yield of 4.5t/ha with corresponding cost/kg of PhP 5.46. This was followed by PhilRice 4 with the yield of 4.2t/ha and a cost/kg of PhP 16.26. Furthermore, the entry with lowest yield was the PhilRice 1 with 2.8t/ha yield and a cost/kg of PhP 11.45.

From the results, the 10-5 standard was still not met given the conditions at the station.

**Table 31.** Participants of Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 WS.

| Entry Name üüüüü | Variety Used | Entry Name (Non-competing) | Variety Used |
|---|---|---|---|
| Precious Agri-Products | Smi Jumbo (Line) | PhilRice 1 | NSIC Rc226 (RS) |
| Dennis Guarra | ĐĐĐĐĐ | PhilRice 2 | NSIC Rc226 (RS) |
| Syngenta Philippines, Inc. | ĐĐĐĐĐ | PhilRice 3 | NSIC Rc222 (FS) |
| Bayer Crop Science | ĐĐĐĐĐ | PhilRice 4 | NSIC Rc214 (FS) |
| Silvestre B. Estrao | NSIC Rc238 (RS) | PhilRice 5 | NSIC Rc226 (FS) |
| VPAN | Dalagang Bukid | PhilRice 6 (Organic) | Calatrava (SQR) |

**Table 32.** Results of Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 WS (competing entries).

| Items | Palayabangan 2014 DS: Contenders | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | S. Estrao | | R. Riopay | | üüüüü | | Green Farm | | VPAN | |
| Area (ha) | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 | 0.20 | 1.00 |
| Yield at 14% MC (kg/area) | 1,267.85 | 6,339.25 | 1,106.93 | 5,534.65 | 1,247.09 | 6,235.45 | 977.62 | 4,888.10 | 586.05 | 2,930.25 |
| Material inputs (PhP) | 4,979.36 | 24,896.80 | 3,242.08 | 16,210.40 | 2,661.36 | 13,306.80 | 2,446.32 | 12,231.60 | 2,247.00 | 11,235.00 |
| üüüüü (PhP) | 8,291.20 | 41,456.00 | 6,193.81 | 30,969.05 | 7,950.12 | 39,750.60 | 7,652.02 | 38,260.10 | 7,742.56 | 38,712.80 |
| Others: (irrigation, fuel, etc.) | 710.00 | 3,014.00 | 560.00 | 2,160.00 | 414.00 | 2,014.00 | 640.00 | 2,240.00 | 980.00 | 3,780.00 |
| Total Production Cost (PhP) | | 69,336.79 | | 49,338.21 | | 55,071.38 | | 52,731.72 | | 53,727.79 |
| üüüüü | | 10.94 | | 8.91 | | 8.83 | | 10.79 | | 18.34 |
| Profit | | 38,400.66 | | 44,750.86 | | 50,911.84 | | 30,365.76 | | (3,913.84) |

**Table 33.** Results of Palayabangan: 10-5 Challenge, PhilRice Negros, 2014 WS (non-competing entries).

| Entry Name | Yield (kg) | | Cost (PhP) | | Cost per kg (PhP) |
|---|---|---|---|---|---|
| | 0.20 ha | 1.0 ha | 0.20 ha | 1.0 ha | |
| PhilRice 1 | 620.00 | 2,775.58 | 7,097.81 | 35,489.05 | 11.45 |
| PhilRice 2 | 641.00 | 2,914.31 | 6,370.66 | 31,853.30 | 9.94 |
| PhilRice 3 | 1,176.00 | 4,553.58 | 6,422.88 | 32,114.40 | 5.46 |
| PhilRice 4 | 887.00 | 4,177.16 | 14,421.76 | 72,108.80 | 16.26 |
| PhilRice 5 | 687.00 | 3,215.32 | 13,987.93 | 69,939.65 | 20.36 |
| PhilRice 6 (Organic) | 600.00 | 2,947.67 | 4,463.27 | 22,316.35 | 7.44 |

Notes:

1. Computed yield for 1.0 ha are corrected to 14% moisture content, whereas the yield for 0.20 ha (plot area) was actual fresh yield.
2. Cost per kg presented was based on the output of the Palayabangan database computation

Seminars and Trainings:

- PalayCheck Refresher Course and Technology Updates for PhilRice Negros Staff

  Two sets of two-day training was conducted for seed production staff of the Business Development Division and office staff of the Administration and Finance Division, as well as the R&D Division on November 11-12 and 13-14, respectively, to update the staff on the PalayCheck system and with the latest rice technologies. Members of the R&D group served as resource persons in various topics. First day of the training session was a whole day lecture on the principles and key checks of PalayCheck, while the second day was composed of a half day hands-on field activities and sharing of technology updates.

- Seminar on the Challenges of Organic Agriculture in the Philippines by Dr Teodoro C. Mendoza, UPLD Scientist, PhilRice BOT.

  The station hosted and facilitated the seminar conducted by PhilRice BOT member, Dr. Mendoza, which was participated by different local organic agriculture advocates, such as Negros Organic Rice Industry Association (NORIA), Vermiculture Practitioners Association in Negros (VPAN) and Alter Trade.

## Campaigns

- Be Riceponsible

  Beyond the National Year of Rice 2013, the station joins in the advocacy in giving importance to our country's staple crop through our new advocacy campaign, Be Riceponsible; The Run for Rice.

- Dumaguete Adventure Marathon

- Rural Transformation Movement

## Expert Dispatch

- In view of our commitment to serve the Visayan farmers, the station dispatched its R&D staff to serve as resource persons in various meetings, seminars and trainings in rice as requested by our partner agencies.

  Common concerns raised during the seminar/training courses, such as: available seeds at the station; where to buy high quality seeds; clarification of some ideas and management practices that were tackled in the lecture were addressed accordingly. However, some concerns that were noted by the staff were highlighted in this report.

## Visitor Services

- There were almost 200 visitors accommodated in the Station composed of farmers, students and other stakeholders. Among them were farmers from Iloilo, Negros Occidental and Oriental. There were also other visitors from National, Regional, Provincial and Municipal government personnel.

## Activities of the Station

- Pinggang Pinoy

  On July 31, 2014, PhilRice Negros, in partnership with the Department of Health, launched the "Pinggang Pinoy" in observance of National Nutrition Month and to promote better health while helping achieve rice self-sufficiency in the country.

In support to the advocacy, PhilRice Negros spearheaded the cooking contest at Marañon Elementary School followed by a feeding program to elementary students of the said school.

- FunRun

This activity, held last October 31, 2014, was conducted to encourage and support employees' wellness and to promote awareness on PhilRIce "Be RICEponsible campaign". This advocacy campaign aimed to promote RICEponsibility of every Filipino to their bodies and to our country. Through this activity, participants were informed on how they can help the country achieve rice self-sufficiency.

The FUNRUN had two categories: the 5kms run and the 16kms run. The activity was a success, having 20 participants in 16kms run and 34 participants in the 5kms run.

Partner agencies from the Provincial Agricultural office actively participated in PhilRIce Negros BE RICEponsible FunRun.

- Field Day, Training and Workshops

| Month | Activity | Participants | Venue |
|---|---|---|---|
| April | Panaad ng Negros Festival | Staff | Bacolod |
| July | Governor's Cup Provincial Inter-Agency | All staff | Bacolod |
| November | Organic Festival | | Bacolod |
| | PalayCheck Refresher Course and Technology Updating for PhilRice Negros Staff | All Staff | Station |
| | Seminar on Organic Agriculture | All Staff, invited stakeholders | Station |
| | Station Field Day | All Staff, various stakeholders | Station |
| | Run foüüüüü Riceponsible Fun Run) | All Staff, students, stakeholders | Station |
| December | | All Staff, ISD Staff of Central Office | Station |
| | | R&D Staff, Admin, DEVCOM CES | Bacolod |
| | | All Staff | Station |

## 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

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