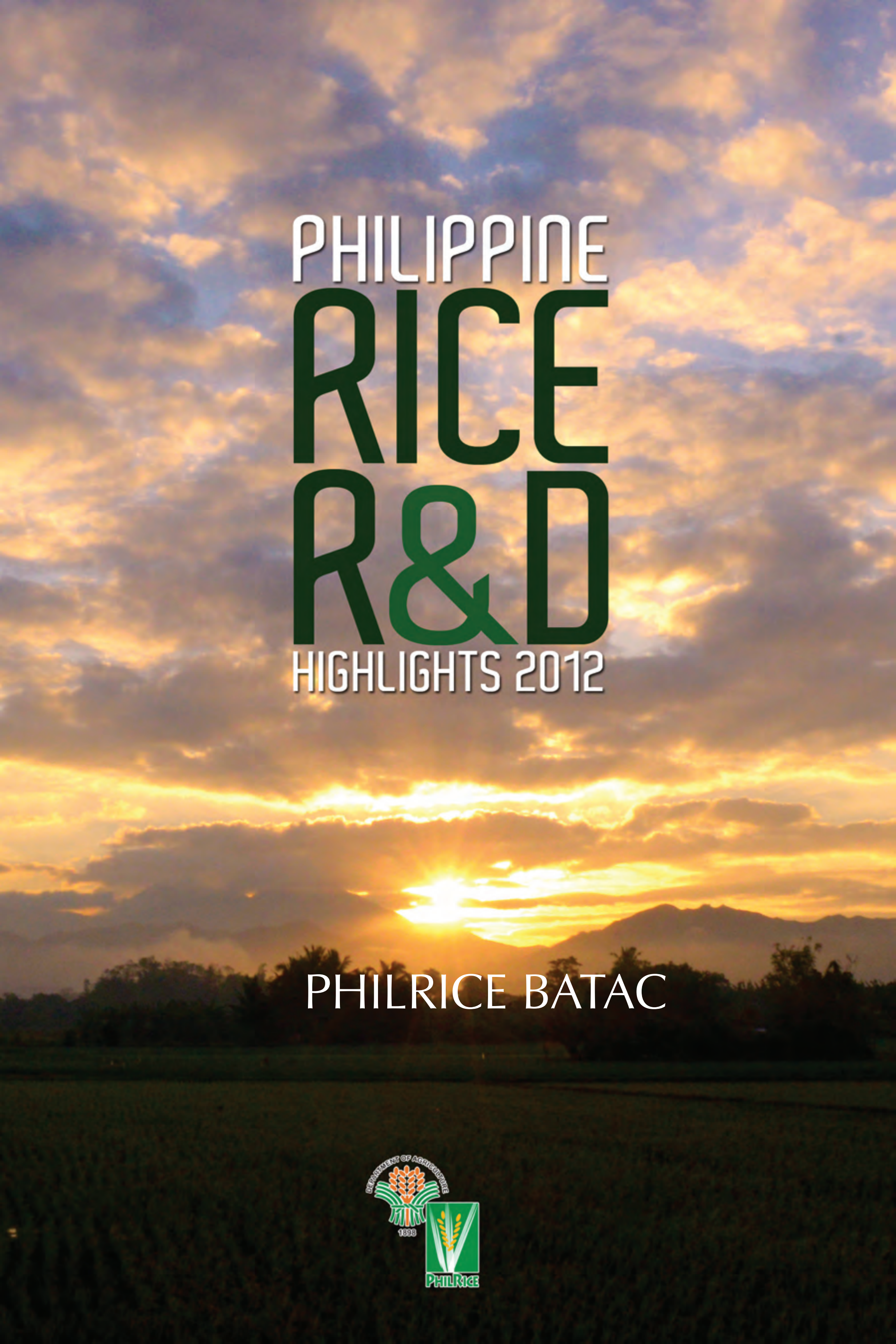

PHILIPPINE RICE R&D HIGHLIGHTS 2012

PHILRICE BATAC

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PhilRice Batac

Branch Manager: Fe P. Bongat

PhilRice Batac is located in a rainfed area and its coverage are mostly limited with water and is comprised of small landholdings. Its task is to develop and promote sustainable and location-specific integrated rice-based farming systems and technologies suited for dryland areas. Most farmers plant rice only during the wet season, followed by vegetables and other cash crops during the dry season. Trials on adaptation of recommended rice varieties in drought, submergence, and saline-prone areas were established both using the direct-seeded and transplanted methods. In the drought ecosystem, trials using the transplanted method had better yields. For submergence-prone areas, traditional varieties Raminad and Los Banos yielded better than the modern varieties. NSIC Rc190 and Rc188 showed great potential to withstand high salinity levels.

Sixteen drought-prone farmers' fields were also assessed for major pests. The incidence of Brown Spot and Leaf feeder injury showed significant correlation with the rate of N fertilizer applied. Pests were generally lower in 2012 than in 2011. Also, the rice direct-seeding technology in farmers' fields was evaluated. Reasons of farmers for using direct-seeding technology include lower production cost, less labor, and less water requirement for crop establishment. Yield and net income under the direct-seeded method, however was lower than transplanted. Regression analysis between outputs and inputs showed significant relationships of the direct-seeded rice major inputs. Fertilizers, herbicides, labor cost, and age of farmers revealed positive significant relationships on the yield of direct-seeded rice. Hence, direct-seeding is a technology that shall be promoted widely in the area.

Four production technologies for the rainfed and upland ecosystems were showcased at the on-station Palayamanan model farm, which is considered a marginal area. These technologies include off-season vegetable production with the use of Good Agricultural Practices (GAP), the Low-Cost Drip Irrigation System (LDIS) for supplemental irrigation, planting of different aromatic upland rice varieties using the direct seeding and transplanted methods, including its response to furrow seeded and rationing, and orchard and nursery with the production of medicinal plants.

The technologies and extension strategies used in the study, and Women Initiatives to Integrate Vegetable Production Using Good Agricultural Practices were replicated by the Local Government Unit (LGU) in 9 barangays and 10 elementary schools in Lagangilang, Abra. A significant number of families in the project sites have established and adopted the LST on vegetable production in their gardens.

The branch also evaluated the effects of drying methods on the storability and aromatic characteristics of fragrant rice with promising initial results. Conclusion has yet to be generated as the study has just started. Promotion of rice-based knowledge products through training and briefing of farmers, students, legislators, and agricultural extension workers has been one of the strong points of the PhilRice Batac branch. The holding of several festivals through exhibits and providing of [delete: as] resource persons in "Usapang Palay" organized by the Department of Agriculture (DA) and Agriculture Training Institute (ATI) in several towns in Northwestern Luzon were also implemented by the branch.

For easy access of data and results of previous studies and projects, the branch has its database management of research and development (R&D) outputs. It has details of R&D technical reports of studies and projects, trainings, briefings, and demonstrations conducted from 1999 to 2011, technology promotion materials such as coursewares, and a compendium of photographs since the time of its operation. Similarly, all literatures searched from the internet and raw data of studies from 2004 to 2012 are all stored for easy retrieval. These data could enhance the efficiency and productivity of the staff. Hence, maintenance of this database is actively being pursued. Likewise, linkages and networking with LGUs and national government agencies have been vigorously fostered and strengthened. Nine studies have been implemented with IRRI, DA-Regional Field Office 1, and DA-Cordillera Administrative Region Field Office (DA-CARFO). Initial results have been gathered.

Adaptation of Recommended Rice Varieties under Unfavorable Agro-Ecosystems in Ilocos

A Y Alibuyog, JM Solero, RG Rosales, and MABBartolome

The study is on its third year of implementation. On-farm trials were established in Batac and Dingras, IlocosNorte (for drought); Sta. Catalina and San Vicente, Ilocos Sur (for salinity); and Currimao (for submergence). Nine early maturing rice varieties (PSB Rc14, PSB Rc80, PSB Rc82, NSIC Rc120, Rc130, Rc134, Rc138, Rc146 and Rc158) were tested in verification trials in Naguirangan, Batac (direct-seeded) and Capasan, Dingras, IlocosNorte (transplanted), both rainfed areas. Nine saline-tolerant rice varieties were also evaluated in Sta. Catalina under a slightly-saline condition. On the other hand, three submergence trials at different stress levels [(non-stressed with 1-centimeter to 6-cm water level (Site 1); slightly- stressed with 1-cm to 16-cm water level (Site 2); and highly-stressed with 6-cm to 24-cm water level (Site 3)] were established in Tapao-Tigue, Currimao, IlocosNorte for 2011 and 2012 DS. Two modern rice varieties (PSB Rc68 and NSIC Rc194) and two traditional rice varieties (Raminad), and a farmer's variety (Los Banos) were tested.

Highlights:

Drought Trial

- Entries performed better in Dingras than in Batac due to the difference on the method of crop establishment and fertilizer application. Results showed that the entries produced higher yield when transplanted (2,910 kilograms per hectare to 9,384 kg/ha) than when direct-seeded (2,036 kg/ha to 4,228 kg/ha). Among the transplanted varieties, the top three were NSIC Rc130 (9,384 kg/ha), Rc138 (8,900 kg/ha), and Rc120 (5,360 kg/ha).

- The high yield of NSIC Rc130 can be attributed to its good tillering ability (17 tillers/hill) and high number of filled grains (134/panicle). NSIC Rc138 had lower tiller count (16 tillers/hill) and lower number of grains (116/panicle) than Rc130, but it had longer panicles (26 cm) and denser seeds (26 grams). PSB Rc14, the check variety had the highest tiller count (21/hill), but it had shorter panicles (23 cm) and lower number of grains (109/panicle).

- Generally, the entries grew taller when transplanted (82 cm to 97cm) than when direct seeded (70 cm to 91 cm), however, in terms of maturity, there was no significant difference between the two methods (102 to 110 DAS for transplanted vs. 102 to 113 DAS for direct-seeded). It can be noted that among the top three entries, only NSIC Rc120 showed consistent performance (102 DAS) under the two methods.

- Five of the entries in Dingras were infected by neck rot at the dough grain to mature grain stage. The highest infection based on incidence was observed from NSIC Rc146 (50%), followed by PSB Rc14 (40%), and NSIC Rc134 (30 %). The severe blast infection in these varieties might have contributed to the entries' lower yields.

- Participatory evaluation was done only in Dingras. NSIC Rc138, PSB Rc80 and Rc82 were the three most acceptable varieties to farmers because of their good crop stand, particularly good tillering ability, long panicles, and resistance to disease, especially that most of the entries were infected by neck rot.

- Under dry direct-seeding method, the highest yielding entries were PSB Rc80 (4.228 tons/ha), NSIC Rc120 (3.893 t/ha) and PSB Rc82 (3.536 t/ha). The top three entries had lower number of tillers but had longer panicles than the other entries. The high yield of PSB Rc80 can be attributed to its long panicles (26 cm) and intermediate number of grains (100/panicle). On the other hand, the high yield of NSIC Rc120 can be explained by its dense grains (27 g).

The good performance of PSB Rc82 can be attributed by its long panicles (26 cm) and dense grains (25 g). Aside from PSB Rc80, Rc82 and NSICRc120, two other varieties (NSIC Rc146 and Rc158) out yielded PSB Rc14. All the entries had plant height less of than a meter (70 cm to 91 cm).

- Among the entries, NSIC Rc120 had the shortest maturity (102 DAE) when direct- seeded, followed by PSB Rc80, Rc82; NSIC Rc130 and Rc134 (all 109 DAE). It can be noted also that the top three yielders had earlier maturity than PSB Rc14 and three other entries.
- Five of the entries had above 5% yield advantage over PSB Rc14, the check variety, namely: PSB Rc80, Rc82; NSIC Rc120, Rc146 and Rc158 under direct-seeding method while only NSIC Rc146 did not reach the 5% yield advantage under the transplanting method.

Salinity Trial

- Although not statistically different, NSIC Rc190 and Rc182 produced the highest yields of 3.23 t/ha and 3.14 t/ha, respectively. NSIC Rc182 had the highest number of filled grains and heaviest seed while NSIC Rc190 and Rc188 produced the highest number of tillers (16 and 18 tillers/hill, respectively).

- PSB Rc88 was the tallest among the test varieties while NSIC Rc188 and Rc190 were the earliest to mature.

- NSIC Rc190 and Rc188 showed their potential, that even if transplanted at 19 DAS, they were able to withstand the salinity level of 5.76 dS/m2 to 11.7 dS/m2 within three weeks after transplanting.

Submergence Trial

- Results from the two season trails (2011 and 2012), showed no significant differences of all the entries in the three sites in terms of grain yield. Generally, the traditional varieties (Los Banos and Raminad) had higher yield than the modern varieties under higher water level. Days to maturity also did not differ at this environment. However, under non-stressed and slightly-stressed conditions, the modern varieties (PSB Rc68 and NSIC Rc194) had higher yield. Days to maturity of the modern varieties were also statistically shorter.
- In Site 1 (non-stressed), all entries did not statistically differ in all the agronomic parameters, except for the days to maturity, which showed highly significant differences among entries. NSIC Rc194 had the highest yield (3,718 kg/ha), followed by PSB Rc68 (3,129kg/

ha) and Los Banos (3,017 kg/ha). Raminad, the check variety, had the lowest yield (2,476 kg/ha).

- The higher yield of NSIC Rc194 can be attributed to its higher number of tillers (10 tillers/hill) and denser seeds (28 g/1000 seeds). Raminad and Los Banos had lower number of tillers, however, they had longer panicles and more filled grains. The tallest variety was Los Banos (152 cm) but was still comparable with the other entries. The two modern varieties had significantly earlier maturity than two the traditional varieties.

- In Site 2 (slightly-stressed), all entries were also comparable in terms of yield, tiller count, panicle length, and seed weight. On the other hand, entries significantly differed in number of filled grains, plant height and days to maturity. NSIC Rc194 and PSB Rc68 had higher yields (3,554 kg/ha and 3,397 kg/ha) than the traditional varieties (3,397 kg/ha and 2,857 kg/ha), however, all entries were still comparable with each other.

- The two traditional varieties produced more filled grains than the two modern varieties, although all entries were comparable in terms of panicle length. Los Banos outperformed Raminad (160 vs. 139), and all other entries. NSIC Rc194 had statistically lower number of filled grains than Raminad.

- Genetically, the traditional entries were taller while the modern entries were shorter in height. Likewise, the traditional varieties were had longer maturity than the modern varieties. The better tillering ability (12 tillers/hill) and denser seeds (28 g) of NSIC Rc194 contributed to its higher yield.

- Results in Site 3 showed that Los Banos (2.558 t/ha) was the highest yielder among the entries. The yield of Los Banos can be attributed to its longer panicle (25 cm) and higher number of filled grains (125).

Table 1. Agronomic and yield performance of the early maturing rice varieties under dry direct-seeding method in a rainfed area. Naguirangan, Batac, IlocosNorte. 2012 WS.

Entry Name	Yield (kg/ha)	No. of Tillers/ Linear Meter	Panicle Length (cm)	No. of Filled Grains	Seed Weight (g/1000 Seeds)	Plant Height (cm)	Maturity (DAE)
PSB Rc80	4,228	80	26	100	22	86	109
NSIC Rc120	3,893	96	24	88	27	82	102
PSB Rc82	3,536	83	26	102	25	91	109
NSIC Rc158	3,431	112	24	94	22	83	112
NSIC Rc146	3,354	107	24	83	23	77	112
PSB Rc14*	3,194	139	24	103	21	79	111
NSIC Rc138	3,131	118	25	105	23	70	113
NSIC Rc134	2,688	89	23	87	25	72	109
NSIC Rc130	2,036	88	23	100	22	72	109

**check variety*

Table 2. Agronomic and yield performance of the early maturing rice varieties under transplanting method. Capasan, Dingras, IlocosNorte. 2012WS.

Entry Name	Yield (kg/ha)	No. of Tillers/Hill	Panicle Length (cm)	No. of Filled Grains	Seed Weight (g/1000 seeds)	Plant Height (cm)	Maturity (DAS)
NSIC Rc130*	9,384	17	24	134	23	85	107
NSIC Rc138	8,900	16	26	116	26	90	109
NSIC Rc120	5,360	16	23	81	28	86	102
NSIC Rc134*	5,330	14	24	109	25	82	107
NSIC Rc158	5,174	17	26	110	24	94	113
PSB Rc82*	4,593	15	24	90	26	97	110
PSB Rc80	4,567	13	25	127	25	95	110
PSB Rc14*	4,126	21	24	109	23	88	110
NSIC Rc146*	2,910	15	26	82	24	88	110

**Infected by blast at dough grain to mature grain stage*

Table 3. Agronomic and yield performance of the saline varieties based on the adaptability trial conducted in Sta. Catalina, Ilocos Sur. 2012WS.

Variety Name	Yield (t/ha)	No. of Tillers/Hill	Panicle Length (cm)	No. of Filled Grains/ panicle	Seed Weight (g/1000 grains)	Plant Height (cm)	Days to Maturity (DAS)
PSB Rc88	2.29	10	25	115ab	21.8c	102.0a	138b
PSB Rc90	2.22	13b	25.3	104c	20.3d	91.5c	144a
NSIC Rc182	3.14	10c	23.8	124a	24.2a	89.4c	136c
NSIC Rc184	2.19	11c	24.4	123ab	21.9c	96.7b	139b
NSIC Rc188	2.38	18a	23.5	112b	20.7c	81.7d	113f
NSIC Rc190	3.23	16ab	24.8	102c	21.3c	83.0d	117f
NSIC Rc290	2.26	11c	23.7	104c	21.2c	78.4f	133e
NSIC Rc292	2.06	10c	24.7	97d	23.8ab	83.6d	132e
NSIC Rc296	2.28	11c	23.7	112b	21.7c	79.0f	134d
Level of Significance	*ns*	*	*ns*	**	**	**	**
LSD	*0.84*	*4*	*1.83*	*12*	*1.47*	*3.2*	*1*
CV (%)	*21.7*	*17*	*4.3*	*21.2*	*3.9*	*3.7*	*0.8*

Means followed by the same letter in each column are not significantly different

Table 4a. Agronomic and yield performance of the entries evaluated under non-submerged condition, Tapao-Tigue (Site 1), Currimao, IlocosNorte.2011 DS and 2012 DS.

Varieties	Yield (kg/ha)	Tiller Count/ Hill	Panicle Length (cm)	Number of Filled Grains/ Panicle	Weight of 1000 seeds (g)	Plant Height (cm)	Days to Maturity (DAS)
Raminad (Check)	2476	8	24	138	29	133	139
Los Banos	3017	8	26	204	25	152	138ns
NSIC Rc194	3718	10	23	106	28	89	113#
PSB Rc68	3129	9	23	98	28	87	115#
Level of significance	ns	ns	ns	ns	ns	ns	**
LSD value (5%)	2547.44	4.58	3.53	94.16	8.67	62.27	12.13

ns- not significant
*** Significant at 5% level*

Table 4b. Agronomic and yield performance of the entries evaluated under slightly-submerged condition. Tapao-Tigue (Site 2), Currimao, Ilocos Norte.2011 DS and 2012 DS.

Varieties	Yield (kg/ha)	Tiller Count/ Hill	Panicle Length (cm)	Number of Filled Grains/ Panicle	Weight of 1000 seeds (g)	Plant Height (cm)	Days to Maturity (DAS)
Raminad (check)	2857	9	24	139	29	127	142
Los Banos	3244	8ns	24ns	160*	25ns	133ns	142ns
NSIC Rc194	3554	12ns	22ns	81#	28ns	80#	114#
PSB Rc68	3397	9ns	23ns	87ns	28ns	85#	115#
Level of significance	ns	ns	ns	**	ns	**	**
LSD value (5%)	2020.95	4.53	2.78	53.14	6.11	31.93	16.68

ns – not significantly different from the check
**- significantly different at 5% level*
***- significantly different at 1% level*

Table 4c. Agronomic parameters as affected by the interaction of site and variety under submergence condition. Site 3, Tapao-Tigue, Currimao, IlocosNorte.2011 DS and 2012 DS.

Varieties	Yield (kg/ha)	Tiller Count/ Hill	Panicle Length (cm)	Number of Filled Grains/ Panicle	Weight of 1000 seeds (g)	Plant Height (cm)	Days to Maturity (DAS)
Raminad	2478	10	23	72	30	131	127
Los Banos	2558ns	10ns	25ns	125ns	26ns	140	126ns
NSIC Rc194	1432ns	10ns	21ns	50ns	25ns	66	115ns
PSB Rc68	1747ns	9ns	21ns	58ns	25ns	66	117ns
Level of significance	ns	ns	ns	ns	ns	ns	ns
LSD value (5%)	3899.55	6.86	16.09	63.76	49.32	181.52	33.45

Assessment of Damage Caused by Major Rice Pests under Rainfed Ecosystem

EP Agres and JNalundasan

Drought is identified as the key factor for low rice productivity in the drought-prone rainfed ecosystems of the Ilocos Region. The coping mechanisms of Ilocanos may influence the occurrence and degree of injury or damage by pests. Hence, pests were monitored for two seasons in 61 farms in Ilocos Norte to document major pests and percent of injuries, production practices, and yield, and, to establish relationships between current production practices with pests incidences and yield.

Highlights:

- A total of 45 farmer's fields in the rainfed sites of Paoay, Currimao and Badoc, Ilocos Norte were assessed in WS2011. In WS2012, 16 drought-prone rice fields in Sta. Cruz and Caraitan, Badoc were chosen as assessment fields for pest occurrence, pest injuries and damage, and yield. It is in these same fields where PhilRice Batac documented the production practices of farmer partners (FPs).

- The rice crop of FPs were assessed at booting stage when the foliage has been fully grown, the stage when most of the field operations have translated into a visible effect on the crop, and when most pests have not yet achieved their highest possible intensity.

- Majority (91%) of the FPs planted inbred and hybrid varieties recommended for irrigated lowland ecosystem in WS2011 and 86% of them in 2012.

- Sixty four percent of the FPs in 2011 applied high amount of N fertilizer (>120 kgN/ha) compared to only 15% in 2012. The reason for the low fertilizer application in 2012 is the more abundant and better distribution of rainfall (Figure 1).

- Varieties with resistance to Rice Blast such as PSB Rc28 showed high incidence (100%) of the disease when applied with high amount of N fertilizer (345 kgN/ha). At ripening stage, NSIC Rc154, Rc160, Rc28 and PSB Rc82 showed Brown Spot incidence ranging from 45% to 100%. Correlation analysis of N with the diseases, however, was not significant.

- In 2012, the incidence of Brown Spot and Leaf feeder injury showed significant correlation with the rate of N fertilizer applied. NSIC Rc160 applied with 360kg N/ha had 13% Brown Spot incidence and 19% leaf feeder injury.

- Generally, insect pest injury and percent incidence of diseases was lower in 2012 than in 2011.

Evaluation of the Rice Direct Seeding Technology in Farmers' Fields in Northwest Luzon
NQ Abrogena and LMdCTapec

Increasing shortages of irrigation water, uncertainty of rainfall patterns due to climate change, and the rising cost of fuel for irrigation; as well as escalating labor cost pose threats in the sustainability of rice production in the rainfed areas. Dry direct- seeded rice (DDSR) could be one of the solutions that counter the irrigation water insufficiency; and the increasing rainfall uncertainty and the scarcity of labor and increasing wages rate. It can be a technology that increases the capacity of farmers to cope with climate-induced change. In case of early drought, farmers can direct seed with minimal soil moisture, rather than waiting for sufficient rainfall for transplanting. Considering these climate-induced changes and other biophysical and economic environment changes, the prospects of DDSR is bright. Hence, there is a need to assess the economic viability of DDSR.

The study aimed to identify the factors that encourage farmers to use direct seeding method in crop establishment; determine the cost-saving effect of DDSR and its cost and benefits; identify the agro-physical situations when direct seeding are viable; and recommend information flow and decision frameworks for R&DE workers and farmers for their technology options.

The data were gathered using structured interview schedules and guide questions. The sample-respondents of DDSR and transplanted rice (TPR) farmers were also monitored on their production activities: land preparation, seeding to harvesting.

Highlights:

- The average area planted to direct seeding was relatively small but ranges from 144 to 20,000 square meters. (Figure 1).

- The major reasons of farmers for using DDSR were lower production cost, 53%; less labor, 40%; and less water requirement for crop establishment, 33%. (Table 5).

- With DDSR, labor cost was reduced to 45% from the total labor days required by TPR. (Table 6).

- The DDST total production cost was lower than the TPR by 14,623/ha (64%). The DDSR material cost was lower by 100% due to the reduced expenses on fuel, insecticides and fertilizers; despite the high herbicide cost. The production cost per kilogram palay of DDSR was P6.57 while the TPR cost P8.48/kg. The DDST was more cost efficient by 29% or P1.32/kg of palay.

- Though the DDSR was cost efficient compared to TPR, the productivity of the latter was higher by 27% than the former. Partial profit budget analysis shows that the DDSR was outperformed by TPR by P8,579/ha due to the average lower yield of DDSR (Table 7).

- Net income of DDSR was lower by 34% compared to TPR. However the former incurred lower investment cost by 72% than the later.

- Regression analysis for the functional relationships between outputs and inputs with Cobb-Douglas type production function showed significant relationships of the DDSR major inputs (Table 6).

- Results showed that fertilizers, herbicides, labor cost; and age of farmers revealed positive significant relationships on the yield of DDST. These variables contributed to the increase of the DDSR yield. However, age showed relatively low coefficient as compared to fertilizer, herbicide and labor utilization.

- Other variables like weed situations, farm elevation and soil textures were included as 0, 1 variables, and significantly influenced yield increase of DDSR. The estimation variables showed a relatively good fit to predict the behavior of yield of the DDSR farms.

- Considering that fertilizer and herbicides costs had the greatest influence on the yield of DDST, R&D activities on how to optimize the use of these inputs should be given focus to increase DDSR yield.

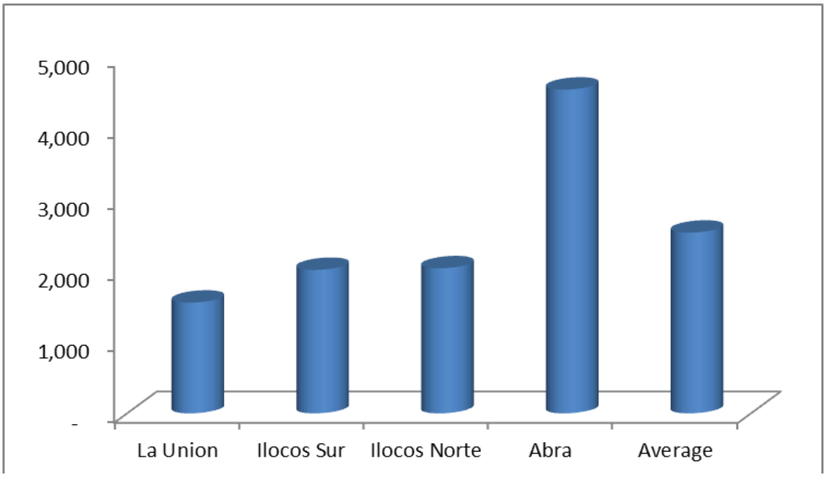

Figure 1. Average area planted (sq.m) to direct seeding by the farmer respondents. 2012

Table 5. Percentage distribution for the reasons of farmer-respondents in using DDST. WS 2012. PhilRice Batac

Item	La Union	Ilocos Sur	Ilocos Norte	Abra	Total
lower production cost	80	40	56	47	53
early to harvest	20	60	6	26	22
requires less labor	40	40	69	16	40
need not to irrigate	20	20	0	0	4
requires less water/suited in the area	20	0	44	37	33
higher yield			6		2

Table 6. Comparative yield (kg/ha), production cost (P/ha), net income (P/ha) of the farmer respondents. WS 2012. PhilRice Batac

Items	DDSR	TPR	Difference
Yield (kg/ha)	3,491	4,429	938
Gross Income	59,347	75,293	15,946
Material Cost	8,388	16,800	8,412
Labor Cost	14,302	20,766	6,464
Production Cost	22,943	37,566	14,623
Cost /kg of palay	6.57	8.48	1.91
Net Income	36,404	37,727	1,323

Table 7. Partial budget analysis for DDSR versus TPR. WS 2012. PhilRice Batac

Benefits			**Cost**		
Added returns		**0**	**Reduced returns**		**15,946**
Reduced cost			**Added cost**		
Material cost		**4,251**	Material cost		**2,318**
Fertilizer	3,102		Seeds	847	
Insecticides	458		Herbicides	1,471	
Fuel Cost	691				
Labor cost		**5,518**			**2,043**
Seedbed/seedling care	474		Herbicide application	154	
Land preparation	1,449		Weeding	1,889	
Planting/ Transplanting	898				
Fertilizer Application	152				
Insecticide	102				
Irrigation	156				
Harvesting	2,287				
Sub-total reduced cost		**9,769**	Sub-total added cost		**4,361**
Total		**11,728**	Total		**20,307**
Net benefits			**(8,579)**		

Table 8a. Estimate of production function of DDSR farms pooled regression model, Northwest Luzon, 2012. PhilRice Batac

ITEM	**Estimate**	**Standard Error**	**T-Value**	**Level of Significance**
Intercept	3.1478	2.3830	1.32	0.206
Fertilizer Cost	0.4349	0.1330	3.26	0.005
Herbicide Cost	0.2218	0.1235	1.75	0.093
Labor Cost	0.2274	0.1516	2.82	0.013
Age	0.0242	0.0101	2.38	0.031
Crop Establishment	0.4830	0.2751	-1.76	0.100
Weed Situation	1.2873	0.5542	2.32	0.035

R^2 - 81.57

Table 9b. Estimate of production function of DDSR farms pooled regression model, Northwest Luzon, 2012. PhilRice Batac

ITEM	Estimate	Standard Error	T-Value	Level of Significance
Intercept	2.7331	1.8406	-1.48	0.172
Fertilizer Cost	0.4881	0.0980	4.98	0.001
Herbicide Cost	0.2693	0.0897	3.00	0.015
Labor Cost	0.3502	0.1115	3.14	0.012
Weed Situation	1.1098	0.3881	2.86	0.019
Elevation	0.7467	0.2344	3.19	0.011
Crop Establishment	-0.9142	0.2360	-3.87	0.651
Soil texture	-0.7879	0.3404	-2.31	0.046
Age	0.0322	0.0075	4.27	0.002

R^2 - 95.06

On-station Palayamanan Model Farm: Showcasing the Developed Technologies for Rainfed Ecosystem

AC Aguinaldo, JG Casil and BA Pajarillo, Jr.

This year, four production technologies for the rainfed and upland ecosystems were showcased at the On-station Palayamanan model farm. These technologies included the following: (1) off-season vegetable production with the use of Good Agricultural Practices (GAP); (2) the Low Cost Drip Irrigation System (LDIS) was used for supplemental irrigation; (3) the performance of different aromatic upland rice varieties using the direct-seeding and transplanted methods was also demonstrated, including its response to furrow seeded and ratooning; and (4) a pomology orchard and nursery was established, including the production of medicinal plants. The area served as the learning field of on-the-job students, trainees, agriculture extension workers, and visitors of the station and other stakeholders. It served as one of the highlights during the successful annual field day of the station.

Highlights:

- Gross income from the vegetables harvested was P3,129.29, as shown in Table 10 for WS 2012. Two beds (each bed had an area of 1x14 sqm) were allotted for each of the 4 kinds of the vegetables planted, and supplemental irrigation was provided through the use of the established LDIS.

Table 10. Yield and gross income of vegetables planted in the on-station Palayamanan. 2012 WS

Vegetables	Number of Hills	Yield(kg)	Price (P)/kg	Gross Income (P)
Patola	30	30.33	25	758.25
Ampalaya	30	22.65	40	906
Eggplant	96	11.63	40	465
Tomato	64	25	40	1000
Total				3,129.29

- The aromatic rice varieties, both direct seeded and transplanted, yielded an average of 3.2 and 1.29 t/ha, respectively.

- Of the13 upland rice varieties planted (collected from the upland areas of Abra and Apayao), an average of 2.08 t/ha (crop cut) was harvested. Dinorado obtained the highest yield at 4.03 t/ha while 90 days yielded the lowest at 0.08 t/ha. Table 11 shows the agronomic data of the traditional varieties planted for seed increase.

Table 11. Agronomic data of traditional rice varieties established at the On-Station Palayamanan. Wet season 2012.

TRV	Seeding Rate/ha	Days to Maturity	Number of Panicles at Maturity (1m²)	Plant Height (cm)	Panicle Length (cm)	Number Grains/Panicle		Crop Cut Yield (t/ha)
						Filled	Unfilled	
Payakan	60	135	185	142	30	116	36	3.04
Palawan	60	125	146	194	29	102	30	2.41
IsekPugot	60	114	157	136	23	98	22	1.81
IsekDiket	60	114	118	175	29	77	14	1.5
Gannal	60	122	110	156	30	119	12	2.71
Ballatinaw	60	120	178	103	20	88	23	3.19
Dagmuy	60	123	141	176	38	96	22	1.52
Maluit	60	114	73	136	26	127	22	1.6
Bullilising	60	120	141	163	34	72	6	1.42
Mindanao	60	114	161	168	25	71	65	0.91
Dinorado	80	120	243	113	27	97	15	4.03
Kinamurus	80	125	197	120	20	88	10	2.84
90 Days	80	102	123	75	14	42	11	0.08

- Dagmuy exerted the highest height of 110 cm among 13 planted rice varieties. IsekPugot was the shortest at 72 cm and both Payakan and Palawan had no panicle exertion documented. However, there was no yield gathered due to drought.

- A total of 307 accession of fruit crops (Papaya, Dragon Cactus, Atis, Bignay, Tamarind, Guapple, Macopa) were established and 65 accession of medicinal plants (Ashitaba, Gisol, Lemon Grass, Pandan, Pepper Mint, Luyang Dilaw and Oregano) were produced.

Women Initiatives to Integrate Vegetable Production Using Good Agricultural Practices

EP Agres, LG Inocencio, AC Aguinaldo and RA Beronio

The Technical Cooperation Project Phase 3 (TCP3) of PhilRice, JICA and the LGUs of Currimao, Ilocos Norte, and Cabugao, Ilocos Sur developed and promoted Location-Specific Technologies (LST) for rice and vegetables from 2005 to 2008. The strategies of TCP3 worked for women farmers in Ilocos, hence, PhilRice Batac embarked on expanding it in Abra. This study assessed the contributions of women as adopters of the LST on vegetables.

Highlights:

- The LST on vegetables, including the developed promotion strategies as inputs, were geared toward food security, increased income, improved nutrition and employment generation (Figure 2).

- The processes in adopting and promoting the LST on vegetables started with a strong partnership with the LGU that has very low (3.8%) sufficiency level of vegetables and with nutritional problems among pre-schoolers.

- The first dissemination process was the hands-on training of the Agricultural Extension Workers and the women partners through the GulayCheck Field School.

- Simultaneous with the training, the women participants experienced the technologies by establishing a technology demonstration farm (TDF) (Figure 3) or a learning field (FLF) (Figure 4).

- The technologies and the extension strategies were replicated by the LGU in 9 barangays and 10 elementary schools. After two years of the project, 56% of the total numbers of families in the project sites have established their vegetable gardens using the technologies. The women leaders from the original project sites outscaled the project on their own within their barangays. They extended the technologies to the recipients of the PantawidPamilyang Pilipino Program (4Ps) who had underweight children.

- Technologies that were highly adopted were those that required labor only and minimal material inputs (Table 12). Adaptation was made on materials used which were locally available, cheap or free. The women also resorted to recycling papers, plastics and other local materials. Likewise, they converted previously unproductive areas into very productive vegetable gardens (Figure 5). Others established urban gardens and even at their house's rooftop (Figure 6).

- The areas grown with vegetables increased from 400m2 before project intervention to 27,000 sqm two years after project implementation (Table 13). It resulted to the municipality's improved vegetable sufficiency level from 3.8% in 2007 to 40% during the first half of 2012 (Table 14). The women leaders claim that the 34% decrease in the number of underweight children (Table 15) was due to their monitoring and promoting the LSTs to recipients of the 4Ps.

- The LSTs on vegetables provided cash income as much as P26,000 per year to some women farmers, who before the project contributed not more than P4,000 imputed labor for her household farming activities in a year (Table 16).

- LGU Lagangilang institutionalized vegetable production following the LST in the entire municipality. The project was integrated with other projects such as the 4Ps, GulayansaPaaralan, and finally the GulayansaBakuraninvolving all households in the municipality.

- Enabling factors for the commercialization of the LST on vegetables included the desire of the LGU and the women to increase the sufficiency level of vegetables and improve nutrition of pre-school children; their active participation, and the strong support of the LGU.

- The training of women farmers should be right at the farm, includes hands-on exercises, experiential in nature and season-long. The training should be enhanced with IEC materials in the local dialect.

- Women leaders and successful women farmers should be tapped to assist in disseminating technologies. Their capabilities as food producers and technology promoters are needed especially that the country envisions becoming food self-sufficient.

- Hence, the country must invest in devising an extension system and training programs for women farmers.

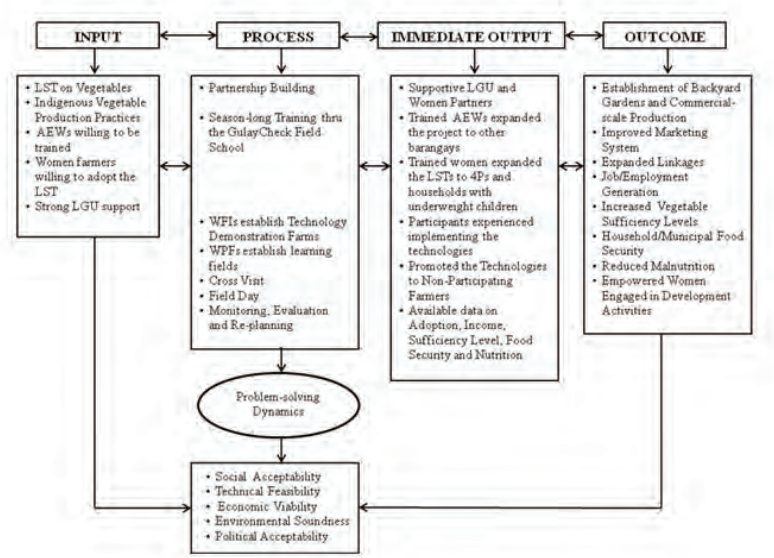

Figure 2. The conceptual framework of the women's involvement in adopting location-specific technologies on vegetable production

Figure 3. TDF on ampalaya established by a WFI in WS 2010.

Figure 4. FLF on eggplant established by a WPF in WS2010.

Figure 5. WFI successfully planted upo in a stormy area, 2010 WS.

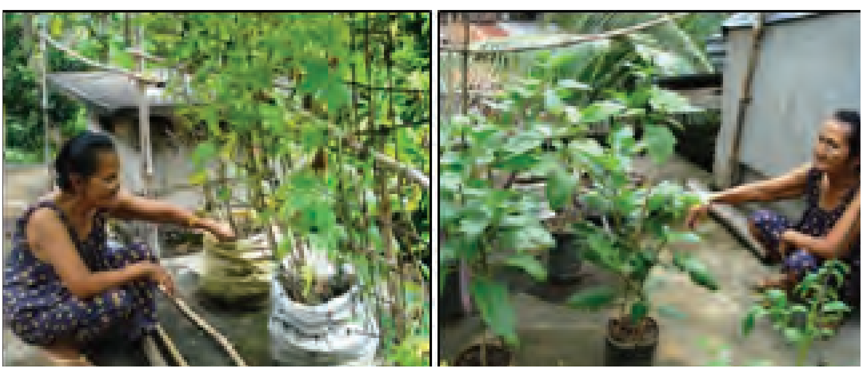

Figure 6. WPF established her ampalaya and eggplant at their rooftop, 2010 WS.

Table 12. Technology components adopted according to type of inputs required, Abra 2011.

Technology Component	% Adopting	Input Category
Planting in raised beds and high ridges	100	Labor
Appropriate distance of plating	100	Labor
Practice of IPM	99	Labor
Construction of Simple Nursery	99	Labor
Construction of Trellis	98	Labor
Raising Seedlings in Cell Trays	94	Labor
Use of Recommended Seedling Media	89	Labor
Off-Season Cultivation	73	Labor
CRH Making	73	Labor
Composting	61	Combination
Use of High Quality Seeds	41	Material
Basal Fertilization	35	Material
Plastic Mulching	8	Material

Table 13. Total area planted to vegetables by project participants from 2010 to 2012 at the project sites. Lagangilang, Abra

Site	Area (m^2)		
	2010 (Baseline)	2011	2012
Dalaguisen	135	7,100	12,400
Pawa	160	4,625	9,100
Nagtupacan	120	3,585	5,330
All Sites	415	15,310	26,830

Table 14. Vegetable sufficiency level (%) of Lagangilang, Abra. 2007-2012.

Year	Population	Production (MT)	Demand (MT)	Deficit (MT)	Sufficiency Level (%)
2007	13,552	19,989	528,528	508,539	3.8
2010	14,072	109,256	548,808	439,552	19.9
2011	14,246	156,068	555,594	399,526	28.1
2012	14,427	224,130	562,653	338,520	39.8

Table 15. Decrease in the number of underweight children (0-72 months old) in the sites. Lagangilang, Abra. 2012.

Site	Underweight (no.)		Change (%)
	Baseline	2012	
Dalaguisen	77	37	52
Pawa	50	50	0
Nagtupacan	22	11	50
Total	149	98	34

Table 16. Increase in income (PhP) of the women partners in Lagangilang, Abra. 2011.

Site	Income (PhP)	
	Baseline	2011
Dalaguisen	<1000 – 2,745	3,200 – 26,000
Pawa	<1000 – 3,840	2,500 – 18,000
Nagtupacan	<1000 – 2,716	3,000 – 9,500

Effects of Drying Methods, Storage Condition and Packaging on the Aroma of Fragrant Rice

MAU Baradi, NGT Martinez and MJC Ablaza

Fragrant rice has become popular and continues to command a higher price in the market. The 2-acetyl-1-pyrroline (2AP) had been identified as the major compound which gives rice its pleasant popcorn-like scent (Buttery et al. 1983; 1988) as described by non-orientals, and its pandan-like scent as described by orientals (Paule and Powers 1989). It showed strong correlation with the aroma quality of rice in sensory evaluation (Paule and Powers 1989). The compound, particularly in free form, is volatile and unstable. Hence, this study aimed to investigate the effects of drying methods, storage condition and packaging on the aroma quality of fragrant rice.

Highlights:

Drying Experiment

The variety Mestizo I harvested during the 2012 wet season (October 2012) at the experimental field of PhilRice in Maligaya, Muñoz, NuevaEcija was used.

Newly harvested samples with initial moisture content (MC) were dried to 13% to 14% MC, wet basis (w.b.), using three methods of drying (sun, bamboo-bin, and flatbed drying). The moisture content of the paddy samples was measured using portable digital moisture meter. The experiment was replicated three times and the treatments were laid out in a completely randomized design (CRD).

The distinctive pleasant pandan-like aroma of the rice samples were evaluated by a trained sensory panel composed of 10 members of the Rice Chemistry and Food Science at PhilRice Maligaya, Muñoz, Nueva Ecija. Both the raw and cooked rice samples were considered. The procedures described in the National Cooperative Testing Manual for Rice (PhilRice 1999) were used in the sensory evaluation.

Table 17. Aroma evaluation of Mestizo 1 rice samples subjected to different drying methods.

TREATMENT	RAW MILLED RICE		COOKED MILLED RICE	
	Rating	Aroma Level	Rating	Aroma Level
Sundried	1.9	Slight	2.5	Slight
Bamboo-bin dried (BBD)	2.3	Slight	3.2	Slight
Flatbed dried	2.4	Slight	3.2	Slight

Based on the results of the sensory evaluation (Table 17), there were no significant variations in aroma levels among the different treatments. The range of aroma levels in the raw milled rice samples was 1.9–2.4, indicating that they were all slightly aromatic. On the other hand, the cooked milled rice samples had aroma levels of 2.5–3.2. The values were higher than those of the raw milled rice samples and this indicated that there are bound forms of 2AP released during cooking as suggested by Yoshihashi et al. (2005). However, the cooked milled rice samples were also found to be all slightly aromatic.

The paddy samples subjected to the three drying methods were brought to the Grain Quality, Nutrition and Postharvest Center (GQNPC) of the International Rice Research Institute, Los Baños, Laguna for 2AP analyses using Gas Chromatograph-Flame Ionization Detector (GC-FID).
The milling potentials (brown rice, milling and headrice recoveries) and other sensory attributes (whiteness, translucency, brittleness, cohesiveness and taste) of the different samples were also determined.

Storage Experiment

The rice variety Basmati harvested during 2012 wet season (October 2012) were used in the experiment.

The paddy, brown and milled rice forms of Basmati were packed in different packaging materials and methods (ordinary sack, plastic using ordinary sealer, vacuum packed). Then the samples were stored at ambient temperature for 20 weeks starting 29 October 2012. Samples are taken bi-weekly for aroma quality evaluation (aroma level and 2AP content).

The experiment was replicated three times and was laid out in CRD.

Sustainable Production of Rice and other Crops in the Uplands through Conservation Farming in Abra and Apayao(CARFO-3)
ND Ganotisi, ML Quigao, LG Inocencio,MR Gappi, and MAU Baradi

As population increases and as lowland farmlands are rapidly being diverted to alternative uses, the uplands will have an increasing role in securing a community's food needs. But, without appropriate soil conservation techniques, upland soils become prone to erosion and could eventually become infertile as production intensifies leading to unsustainable production.

The study generally aims to enhance farmers' adoption on conservation farming techniques in the uplands through demonstration of sloping agricultural land technology components. Specifically: 1) To verify the terracing technique for rice and vegetables in the uplands; 2) To demonstrate the planting of hedgerows and cover crops, 3) To introduce mulching for vegetable production; and ultimately, 4) To develop location specific package of technologies for uplands. The study was conducted in San Isidro, Abra and Pudtol, Apayao.

Highlights:

- Soil samples were gathered from the experimental sites and were submitted at the Provicial Agriculture Office of Ilocos Norte for laboratory analysis. In Abra, the soil pH was neutral having a value of 7.30, and had low organic matter content at 0.75, and phosphorus of 12.37. While in Apayao, the soil was acidic with pH of 4.85, organic matter content of 2.4 with a trace posphorous and 30.32 ppm potasium (Table 18).

- Raingauge was fabricated and installed at the experimental area where there was no obstruction to weather parameters. Rainfall was the main factor that can affect the growth of the crop. In San Isidro, Abra, the highest rainfall was recorded at the flowering stage at 131 mm. It was observed that rainfall was very frequent from June to September 2012. In Apayao, rainfall occurred 7 times during the vegetative stage and 7 times also during the reproductive stage. At maturity, rainfall occurred 6 times as shown in Figure 7.

- A-frame was constructed and used in determining contour lines across the slope. It was the simplest and the most economic method in allocating contour lines. It was made of a carpenter level and three bamboo poles nailed in the shape of a capital letter-A, with a base of 200 cm wide. Different contour lines at different elevations were laid-out using the A-frame gadget at 3 to 5 meters apart. The laid-out contour lines were planted with hedgerow crops like pineapple, cassava, taro, ginger, napier grass, kakawate, and ipil-ipil in alternate double-row planting.

- In Abra, two modern upland rice varieties (NSIC Rc9 and NSIC Rc192) and one indigenous variety (Palawan) were evaluated and planted in space between the rows of hedgerow crops or alleys at 50 kg/ha with a planting distance of 30 x 20 cm. Seeds were dibbled on May 31, 2012.

- The yield of upland varieties ranged from 2.17 to 4.13 t/ha (Table 19). Palawan gave the highest yield and this was due to the highest number of spikelets/panicle (276), longer panicles (31.44 cm), higher percent field grains (97%), and 1,000-grain weight (34.77 g).

- Field caravan was conducted on September 25, 2012 at the experimental site in San Isidro, Abra during the maturity stage of the rice crop to showcase the agronomic and yield performance of the field trial to farmers. There were 76 participants, composed of 61 farmers from the different barangays of San Isidro, Abra, 9 LGUs headed by the Committee on Agriculture Chair, and 6 PhilRice staff.

- In Apayao, erosion gadgets were fabricated and installed at different crop combinations in the intervention model and farmers' practice. It was made of galvanized iron (GI) with 1-meter width. The lower tip part of the erosion plot was connected with a flour bag (katsa) and plastic bag. The flour bag separated the eroded soil from water and the plastic bag caught the surface run-off water. The data was gathered every occurrence of heavy rainfall. Initial erosion data in Apayao were also gathered but were not enough to establish the trend (Table 20).

- The three varieties (NSIC Rc9, Rc192, and Palawan) planted direct seeded at flat areas (2% slope) yielded higher (877-1,681 kg/ha) compared to those planted in steep areas (45% slope) which yielded lower (822-1,309 kg/ha) as shown in Table 4 and Figure 8. The flat (2% slope) area was more favorable in terms of nutrient and moisture holding capacity because the steep areas were prone to erosion during heavy rainfall. Among the three varieties, the NSIC Rc9 yielded the highest (1,309-1,681kg/ha) followed by Palawan (1,246-1,619 kg/ha), while the lowest was exhibited by NSIC Rc192 (822-877kg/ha). The low yield obtained on the NSIC Rc192 was due to damage on grains caused by the rice bug and water stress.

Table 18. Soil physical and chemical properties of the experimental areas.

ITEMS	San Isidro, Abra	Pudtol, Apayao
Texture	Light	Medium (Alaminos Clay Loam)
Organic Matter	0.75	2.4
pH	7.30	4.85
Olsen's P, ppm	12.37	Trace
Cold H_2SO_4 K, ppm	104.59	30.32

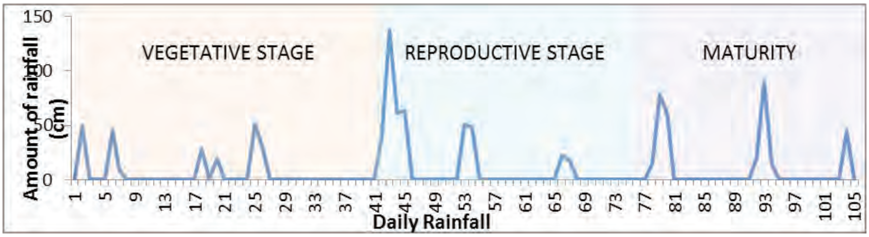

Figure 7. Daily rainfall data throughout the growing period of the rice crop (July 3 to November 8, 2012). Barangay Swan, Pudtol, Apayao.

Table 19. Yield and yield component of different upland varieties in San Isidro, Abra. 2012 WS.

Variety	Yield t/ha	Panicle Length cm	Spikelet/ panicle	Filled spikelet/panicle	Filled Grains %	1000 Grain Weight g
NSIC Rc9	2.17 *c*	24.23 *b*	168 *b*	148 *b*	88 *b*	23.25 *c*
NSIC Rc192	2.43 *b*	24.37 *b*	169 *b*	128 *b*	78 *c*	26.72 *b*
Palawan	4.13 *a*	31.40 *a*	275 *a*	266 *a*	97 *a*	31.00 *a*
Mean	2.91	26.67	204	181	88	26.99
Significance	***	*	*	*	**	***
CV (%)	0.04	3.94	2.38	2.30	0.37	0.05

Table 20. Amount of soil erosion as affected by the different crop combinations. Pudtol, Apayao.

Crop Combinations and Slope	Erosion Plot Area (m^2)	Amount of Eroded Soil (g)	
		11/1/2012	11/8/2012
rice + cassava + (pigeon pea + pineapple) 2%	6	99	318
rice + ginger + gabi + (pigeon pea + pineapple) 2%	10	45	189
cowpea + rice + sweet potato 43%	22	500	258
cowpea + cowpea + rice 43%	10	166	577
farmers' practice (rice - pineapple) 50%	5	1,431	578

Table 21. Yield and yield components of the rice varieties tested at flat (2% slope) and steep (45% slope) areas. Barangay Swan, Pudtol, Apayao. July 3-November 8, 2012.

Varieties	Slope	Plant Height (cm)	Tiller Count	Panicle Length (cm)	Filled Grains (%)	Yield (kg/ha)
Palawan	flat (2%)	138	10	29	80	1,619
	steep (45%)	125	9	27	79	1,246
NSIC Rc9	flat (2%)	95	19	22	83	1,681
	steep (45%)	83	15	23	82	1,309
NSIC Rc192	flat (2%)	81	18	19	77	877
	steep (45%)	78	11	23	74	822

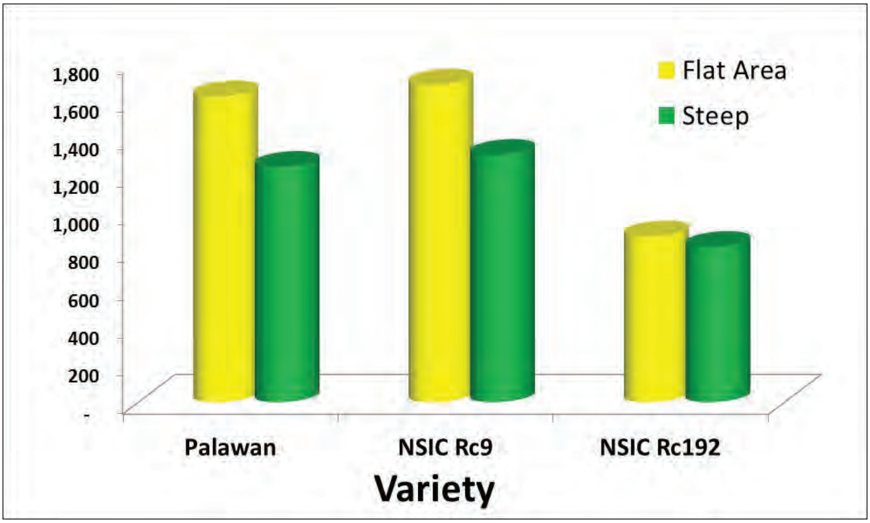

Figure 8. Grain yield of NSIC Rc192, Rc9, and Palawan at flat (2% slope) and steep area (45% slope) in different crop combination. Barangay Swan, Pudtol, Apayao. July 3-November 8, 2012.

Tillage Options for Upland Rice in the Plateaus (CARFO-4)

ND Ganotisi, ML Quigao, MR Gappi, and MAU Baradi

A study aims at evaluating the tillage techniques in maximizing available water for upland rice production was conducted in Tayum, Abra and Pudtol, Apayao during 2012 WS. The study specifically aims at determining the appropriate tillage techniques for soil moisture conservation for upland rice, and the agronomic and yield performance of upland rice as affected by the tillage techniques. The study was laid-out in Randomized Completely Block Design (RCBD) with 3 replications with plot size of 3 x 7 meters. The different tillage techniques such as minimum tillage, furrow slice, and conventional method were evaluated. NSIC Rc9 and Palawan traditional variety were tested separately in Abra while the NSIC Rc9 was tested singly in Apayao. In the no-tillage technique, seeds were sown by dibbling, dropped in the furrow sliced, and conventional technique at a seeding rate of 50kg/ha. Planting distance was 20 x 25 cm in both varieties.

Highlights:

- Soil samples were gathered from the experimental sites for physical and chemical analyses to assess the available nutrients of the soil and to determine nutrient recommendation. In Tayum, Abra, the area was medium soil with 1.61% organic matter, 6.96 ppm phosphorus, and 277 ppm of potassium with slightly alkaline having a pH value of 7.58. While in Pudtol, Apayao, the soil pH was acidic with a pH of 4.85, organic matter content of 2.4% with trace phosphorus and 30.32 ppm of potassium (Table 22).

- In Tayum, Abra, there was a good distribution of rainfall and the highest was recorded at 138.2 mm during the flowering stage of the crop (Figure 9).In Pudtol, Apayao, there were frequent rainfall during the seedling and tillering stages of the crop, but minimal rain occurred during the early flowering stage. Rainfall ranged from 5 to 192.2 mm per day (Figure 10).

- The soil moisture content (MC) was also gathered using the gravimetric method. In Tayum, Abra, soil MC ranged from 24.3 to 31.5%. During the tillering to flowering stages (49, 78, 92 DAS), soil MC was not significantly affected by tillage techniques because of the frequent rainfall in the area, which made the soil became saturated. But during the grain filling stage (113 DAS) and maturity (121 DAS), soil MC was significantly higher in minimum tillage than furrow slice and conventional in both NSIC Rc9 and Palawan (Table 23). In Pudtol, Apayao, the soil MC was not significantly affected by the tillage techniques. Soil MC ranged from 43.11 to 47.21% (Table 24).

- Tillage techniques have no significant effect on plant height, number of tillers, yield, and yield components. The plant height of NSIC Rc9 and Palawan at maturity stage in Tayum, Abra ranged from 142.18 to 168.89 cm (Table 25). In terms of number of productive tillers, NSIC Rc9 produced higher at 11 than Palawan at 9 tillers (Table 26). Yield of NSIC Rc9 ranged from 3.30 to 4.09 t/ha while Palawan ranged from 2.10 to 2.53 t/ha, respectively (Table 27a & 27b). In Pudtol, Apayao, plant height of the crop ranged from 86.5 to 88.9 cm, productive tillers of 9-10, and yield 2.46-2.55 t/h across the tillage techniques (Table 28).

- Manifestation of weed in the area was recorded from a 1-sqm quadrant as affected by the tillage techniques. In Tayum, Abra, highest weed population was observed in minimum tillage technique and was dominated by broadleaf weeds (Figure 11). The same was observed in Pudtol, Apayao where more weeds were observed in minimum tillage than in conventional and furrow slice (Figure 12). Broadleaf weeds were more predominant than grasses and sedges in the area.

- Field caravan was conducted on September 25, 2012 at the experimental site in Brgy. Cabaroan, Tayum, Abra. There were 109 participants who attended, composed of 96 farmers from the different barangays of Tayum, Abra, 4 LGU representatives headed by the Mayor, and 9 PhilRice staff including the Deputy Executive Director for Research. During the field caravan, the different tillage techniques for upland farming were showcased to the participants.

Table 22. Soil physical and chemical analysis of the experimental areas.

ITEMS	Tayum, Abra	Pudtol, Apayao
Texture	Medium	Medium
Organic Matter, %	1.61	2.40
PH	7.58	4.85
Olsen's P, ppm	6.96	Trace
Cold H_2SO_4 K, ppm	277.05	30.32

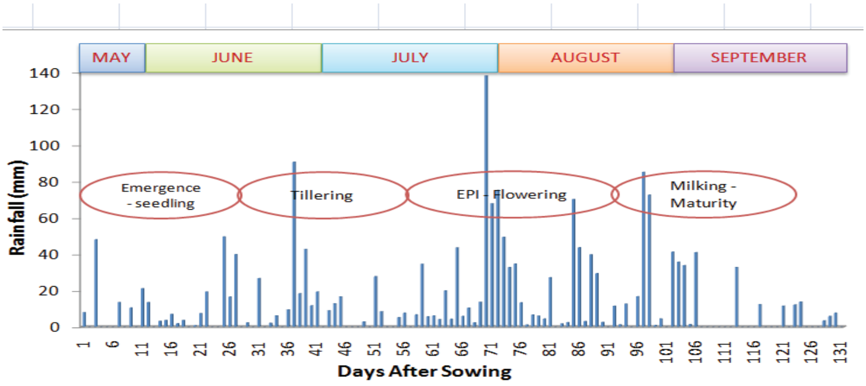

Figure 9. Daily rainfall (mm) from May – September 2012 in Tayum, Abra.

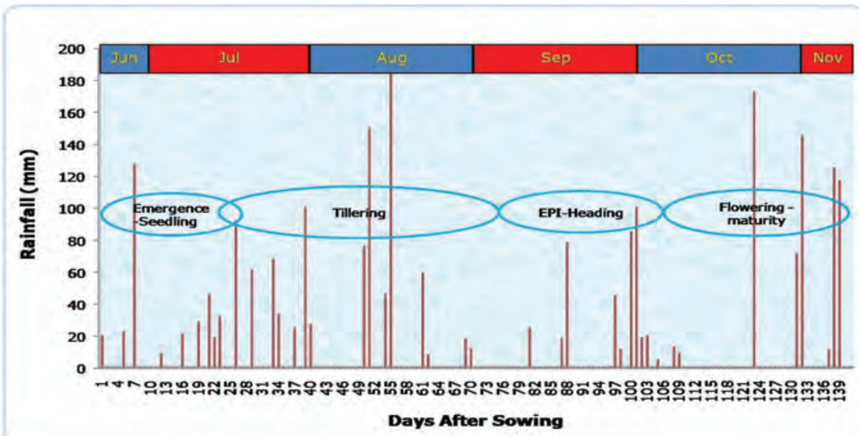

Figure 10. Daily rainfall (mm) from June to October 2012. Pudtol, Apayao.

Table 23. Soil moisture content (%) as affected by different tillage techniques at two varieties in the upland condition of Tayum, Abra. 2012 WS.

Tillage Techniques	Soil Moisture Content, %									
	49 DAS		78 DAS		92 DAS		113 DAS		121 DAS	
	NSIC Rc9	Palawan	NSIC Rc9	Palawan	NSIC Rc9	Palawan	NSIC Rc9	Palawan	NSIC Rc9	Palawan
Conventional	26.69	25.22	29.43	31.02	30.78	30.67	24.06 b	25.31 b	25.26 b	26.16 b
Furrow Slice	24.87	25.28	31.00	30.40	31.33	29.81	23.71 b	25.10 b	26.81 b	27.11 b
No Tillage	24.30	28.07	31.50	30.78	30.03	30.10	31.65 a	29.95 a	31.75 a	30.74 a
Mean	25.29	26.19	30.64	30.73	30.71	30.19	26.47	26.79	27.94	28.00
Significance	ns	ns	ns	ns	ns	ns	*	*	**	***
CV, %	0.45	0.51	0.31	0.31	0.09	0.42	0.44	0.29	0.14	0.09

Table 24. Soil moisture content (%) as influenced by tillage practices in the upland. Pudtol, Apayao. 2012 WS.

Tillage Practices	Soil Moisture Content (%)			
	34 DAS	49 DAS	63 DAS	84 DAS
Conventional	45.30	46.28	45.92	45.28
Furrow Slice	46.56	43.11	46.73	44.25
Minimum Tillage	47.21	44.37	46.43	45.24
Mean	46.36	44.59	46.36	44.92
Significance	ns	ns	ns	ns
CV,%	3.37	7.02	1.56	5.66

Table 25. Average plant height (cm) of NSIC Rc9 and Palawan at 75 DAS and 110 DAS as affected by tillage techniques in Tayum, Abra. 2012 WS.

Tillage Techniques	NSIC Rc9		Palawan	
	Plant Height (cm)		Plant Height (cm)	
	75 DAS	110 DAS	75 DAS	110 DAS
Minimum	47.27	142.18	68.08	168.89
Furrow Slice	50.61	148.74	62.81	160.69
Conventional	48.95	144.11	65.33	167.06
Mean	48.94	145.01	65.41	165.55
Significance	ns	ns	ns	ns
CV, %	1.61	0.85	1.98	1.49

Table 26. Average number of tillers of NSIC Rc9 and Palawan at 75 DAS and 110 DAS as affected by different tillage techniques in Tayum, Abra. 2012 WS.

Tillage Techniques	NSIC Rc9		Palawan	
	Number of Tillers		Number of Tillers	
	75 DAS	110 DAS	75 DAS	110 DAS
Minimum	15	11	10	9
Furrow Slice	13	11	12	9
Conventional	13	11	16	8
Mean	14	11	13	9
Significance	ns	ns	ns	ns
CV, %	1.34	3.63	0.81	0.65

Table 27a. Yield and yield components of NSIC Rc9 as affected by different tillage techniques in Tayum, Abra. 2012 WS.

Tillage Techniques	Yield kg/ha	Panicle Length cm	Spikelet/ Panicle	Filled Spikelet/ Panicle	Filled Grains %	1000 Grain Weight g
Minimum	3.49	25.22	223	180	82.50	24.22
Furrow Slice	3.30	23.06	226	175	77.61	24.28
Conventional	4.08	23.94	243	186	75.63	24.43
Mean	3.62	24.07	231	180	78.58	24.31
Significance	ns	ns	ns	ns	ns	ns
CV, %	0.32	3.83	3.16	2.60	0.66	0.06

Table 27b. Yield and yield component of Palawan as affected by different tillage techniques in Tayum, Abra. 2012 WS.

Tillage Techniques	Yield kg/ha	Panicle Length cm	Spikelet/ Panicle	Filled Spikelet/ Panicle	Filled Grains %	1000 Grain Weight g
Minimum	2.10	30.90	237	211	80.72	33.79
Furrow Slice	2.44	31.08	271	262	86.35	34.08
Conventional	2.53	29.21	244	213	86.16	34.10
Mean	2.36	30.40	251	229	84.41	33.99
Significance	ns	ns	ns	ns	ns	ns
CV, %	0.31	3.36	1.61	2.61	1.10	0.09

Table 28. Average plant height (cm), productive tillers, and yield of NSIC Rc9 as influenced by different tillage practices. Pudtol, Apayao. 2012 WS.

Tillage Practices	Plant Height cm	Number of Productive Tillers	Yield kg/ha
Conventional	88.9	9	2.49
Furrow Slice	88.6	10	2.46
Minimum Tillage	86.5	9	2.55
Mean	87.4	9	2.5
Significance	ns	ns	ns
CV,%	1.59	10.79	16.43

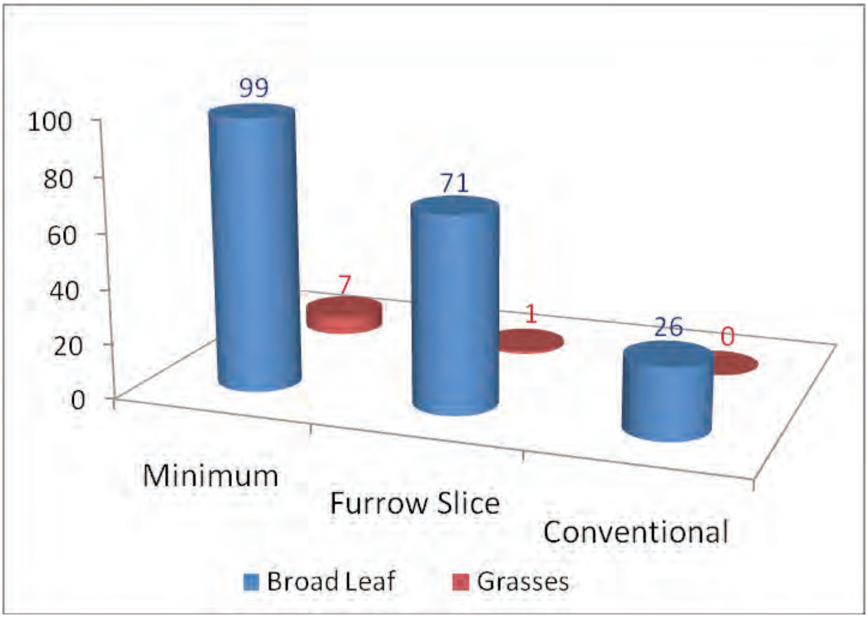

Figure 11. Weed population per quadrant as affected by different tillage techniques. San Isidro, Abra. 2012 WS.

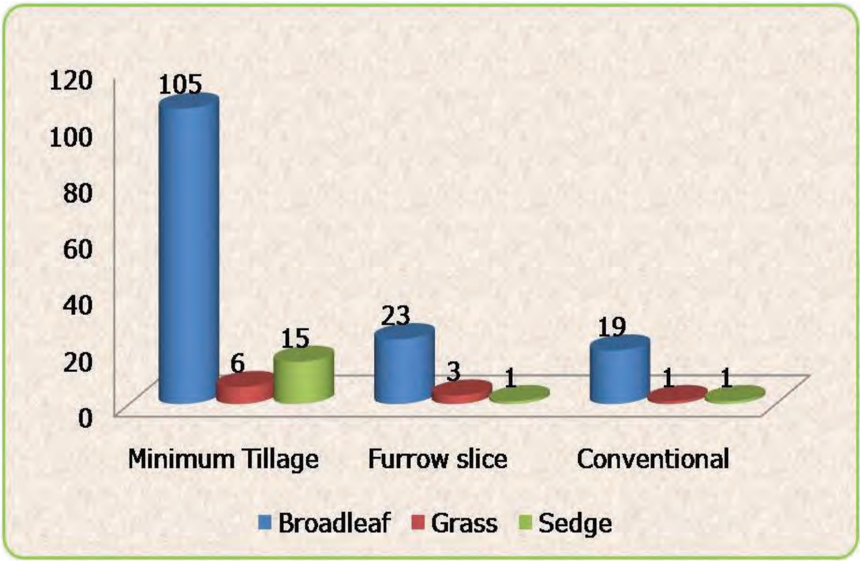

Figure 12. Density of weeds at different tillage practices per quadrant in Pudtol, Apayao. 2012 WS.

Promotion of Rice-based Knowledge Products in Northwest Luzon
AC Aguinaldo and MB Alupay

The project was implemented to provide up-to-date technologies, information and advisories to rice and rice-based stakeholders and capability enhancement to R&D personnel.

Highlights:

Capability enhancement activities. The capability enhancement trainings for students, teachers, agriculture extensions workers (AEWs) and other stakeholders were conducted for two to 5 days. These trainings include the following:

1. On-the-Job Training for Graduating Agriculture Students. Three batches with a total of 44 students from the Mariano Marcos State University (MMSU), Batac City in Ilocos Norte and the Apayao State College (ASC), in Apayao underwent on-the job-training (OJT) on rice production, off-season vegetable production, and extension methodologies, including office decorum.

   Of the 44 students, 11 were from the College of Agriculture, Food and Sustainable Development (CAFSD) of MMSU who underwent 12 days (January 31–February 11, 2012) of OJT, one was a Development Communication student (November–December 2012), and 32 were students from ASC. The ASC students underwent 43 days of training (April 12–May 25, 2012). The ASC OJTs underwent a more intensive and rigid training as their training was longer.

2. Training for NCII Assessment. Five teachers from Bukig National Agriculture Technical School (BNATS) of Aparri, Cagayan and Balagtas National Agriculture School (BNAS), Balagtas, Bulacan underwent specialized courses for Technical Education and Skills Development Authority (TESDA) NCII assessment and accreditation. Two from BNATS underwent Specialized Training on Rice Production for teachers. Another 2 teachers underwent Specialized Training on Pest Management of Vegetables. The training module used was based from the Competency Based-Curriculum provided by the TESDA for the Agro-Fishery Sector for Pest Management (Vegetables) NC II. The training is in preparation for the trainees' accreditation in Pest Management of Vegetables NC II, as their requirement to be qualified to teach the subject to Grade 11 students of their respective schools. Both theories and hands-on or actual field exercises and observations were employed in both of the trainings.

3. Season-long Training on the PalayCheck and Palayamanan System. In collaboration with the Department of Agrarian Reform, 30 Tiangians from Daguioman, Abra graduated from the Season Long Training on Rice Production.

4. Three-day Training on the PalayCheck System. In collaboration with the Local Government Unit of Calanasan, Apayao, 63 farmers, extension workers and members of the CAFGU were trained on rice production. The training was the first rice production training conducted at the area.

5. Training on Mitigating Climate Change through the Palayamanan System. A collaborative training was conducted under the Participatory Irrigation Development Project of the Ilocos Norte Irrigation Management Office, National Irrigation Administration (NIA). Two batches of trainings (April and September) attended by 4 Zanjeras or Irrigators Association in Ilocos Norte, with 160 farmers (Bonga Pump 1, Sarrat, Ilocos Norte, Irrigators Association in Sta. Maria, Piddig, Ilocos Norte, Irrigators Association in Tangid, Laoag City and Bongga Pump 2 in San Nicolas, Ilocos Norte) composed of 160 farmers were trained on Mitigating Climate Change through the Palayamanan Systems, and organic composting. Other agencies were also involved during the training, such as the Department of Environment and Natural Resources who provided technical experts on forest conservation, the Provincial Agriculture Office who provided experts on Rapid Composting, and the Agriculture Office of Solsona, Ilocos Norte that provided lectures on Vermin Composting.

6. School on the Air. A total of 473 farmers enrolled at the Sanayang Pangradyo sa Agrikultura (School on the Air on Sustainable Agriculture) at DZEA Laoag. The activity was implemented with Mariano Marcos State University (MMSU), Agriculture Training Institute and the Department of Agriculture of the different LGUs of Ilocos Norte.

Briefings. The briefings conducted were in response to requests from organization of farmers, other institutions and agencies, including those who visited the branch. These briefings included different matured technologies and services of the branch. The briefings conducted were the following:

1. Rice production technologies were briefed to the 27 Zanjera leaders of the Irrigators Association Sto. Nino de Tabtabagan, in Brgy. Valdez, Banna, Ilocos Norte. These production technologies included nutrient management, conduct of Minus One Element

Technique (MOET) and use of the Leaf Color Chart (LCC).

2. The services of PhilRice Batac were discussed during the annual meeting of the Federation of Zanjeras conducted in Talugtog, Solsona, IlocosNorte. The briefing was requested by the federation president so that other members of the irrigators association are informed of the services of PhilRice, particularly, the availability of quality seeds for sale at the branch and the trainings/briefings it is offering to farmers.

3. Technical briefings were also provided to groups of visitors of the station. The topics included technologies on rice production, the PhilRice Batac R&D projects, Modified Dry Direct Seeding (MDDST), Low Cost Drip Irrigation System (LDIS), small tools developed by the station like the grass cutter harvester, and others. The visitor's bureau of the station also provided their itineraries, coordinated the places to be visited, and provided guided tours.

These groups included the following:

- Zambales Farmer Field School on the PalayCheck System (March 2, 2012, 33 participants)

- Development Biology Field Trip of Science High School Students (March 3, 2012, 18 participants)

- Alaminos City Farmers Field School on Rice (February 2, 2012, 40pax)

- 30 extension workers from Region VI (who graduated from the training on the Palayamanan Systems conducted by ATI – Region VI) are scheduled to visit Ilocos Norte on April 15 – 21.

- 24 local legislators and other heads of the municipal offices of the Municipality of Madalag, Aklan (April 16 – 17, 2012).

- 30 extension workers who graduated from the training on the Palayamanan Systems conducted by ATI – Region VI. (April 21, 2012).

- 28 extension workers and farmers from Castillejos, Zambales. (June 11, 2012)

- 32 Extension Workers from Region IV-A who participated on the Experienced-based Training Course on Upland Rice Production by the ATI – Region IV-A (August 23, 2012)

- 38 farmers from San Gabriel, La Union (October 2012)
- 37 farmers and extension workers from Rosario, La Union (December 2012)

Exhibits & other production technology promotion activities (farm walks, field days, radio interviews and press/radio releases). Various knowledge products of PhilRice were showcased to various groups during exhibits conducted, as follows:

1. Served 110 farmers and other stakeholders during the Abrenian Festival conducted last March 6–9, 2012. Different knowledge products were showcased.

2. Farmers' Festival in Batac City. Both the traditional and the modern technologies of farming, including other knowledge products, including quality seeds for sale were showcased in the PhilRice exhibit during the Farmers' Festival. Some 120 farmers were served during the activity.

3. PhilRice Museum, Gallery and Library. New reallas were added to the Rice Museum as PhilRice Batac continue to improve the area. The books at the library were also arranged and catalogued.

4. The farm walk attended by 35 farmers was conducted at the demonstration set-up of the Cyber Village Project (CVP) in Rayuray, Batac City. Different varieties were showcased in the set-up, including the use of quality seeds. After the event, 72% of the farmers from the area bought quality seeds from the station.

5. Assisted during field days conducted by the station. During the field day conducted at the seed production area of the station in Dingras, Ilocos Norte, different varieties were showcased. While the field day conducted last April 13, 2012 in Brgy. Foz of the same town attended by farmers, provincial and LGU officials, actively evaluated newly released and promising hybrid and inbred varieties/ lines. Participants evaluated and selected the best variety or line among the 6 hybrid and 10 promising hybrid and inbred varieties tested. Mestiso 19 (NSIC Rc202H) was the farmers' choice. Their second choice was Mestiso 20 NSIC Rc204H and the 3rd and 4th choices were Mestiso 20 and Mestiso 38, respectively. Another field day at the adaptability trial on newly released varieties and lines was conducted in San Nicolas, Ilocos Norte.

6. The station's grand field day conducted last October 16, 2012 was "another tourist attraction for Batac," as Mayor Jeffrey Jubal C.

Nalupta described the activity as he welcomed the 600 participants of the activity.

7. Promoted rice and rice-based production technologies through broadcast releases and interviews, and the local tabloids. Coordinated four radio interviews on different production technologies and topics at the different local radio stations in the area; submitted broadcast releases and articles to local tabloids.

8. Upland Rice Production exhibit during the NYR 2013 launching and Usapang Palay in Lagangilang, Abra on November 22, 2012. Some 500 participants attended this.

Linkages. Trainings and other production technology promotion activities were also conducted in collaboration with other government agencies. The collaborating agencies provided the funds for these activities while the station provided the proposals and technical experts for the conduct of the activities.

1. In collaboration with the Agricultural Training Institute and the Mariano Marcos State University, the Sanayang Pangradyo sa Agrikultura (School on the Air on Sustainable Rice Production) is being conducted (until March 2013) at DZEA, Laoag. A total of 473 farmers are the captured audience, as they were enrolled by Agriculture Technologists from the different LGUs of Ilocos Norte. These are aside from those who are chance audience and regular listeners of the radio station.

2. Provided experts during trainings and briefings conducted by the Agriculture Training Institute and other DA-attached agencies. These trainings/briefings included the following:

Agriculture Training Institute

i. Techno clinics– 4 sites (Municipalities of Burgos and Alilem, Ilocos Sur; Dumalneg and Carasi, Ilocos Norte)
ii. Season-Long Training for Farmer Leaders on Rice Production
iii. Season-Long Training of Trainer's Course on Sustainable Rice Production

Cordillera Administrative Region Field Office

UsapangPalay and National Year of Rice (NYR) 2013 Launching in Lagangilang, Abra. The activity was attended by some 500 farmers and other stakeholders. PhilRice Batac did not only provide technical experts during the activity, but also conceptualized and set-up an exhibit on rice conservation and upland rice production that greatly contributed to the successful conduct of the activity.

Department of Agriculture – Region 1
160 farmers from the different barangays of Sinait, Ilocos Norte actively participated during the 2 batches of UsapangPalay forum conducted.

3. Actively participate in the different activities of ATI the Regional Agriculture, Fishery and Extension Network (RAFEN 1).
4. Provided guided tours to different LGUs and government agencies visiting the branch and the province.
5. Conceptualized and organized exhibit during the launching of the UsapangPalay and NYR 2013 of DA-CARFO.
6. Wrote and submitted a project proposal, "Development of an Integrated Farming Systems Learning Farm for More Food and Fun," to LGU San Juan, Ilocos Sur for funding in collaboration with the LGU San Juan, Ilocos Sur, the National Tobacco Administration, TMFTC, TMI and Phillip Morris.

Database Management of R&D Outputs of PhilRice Batac
BM Catudan and LMdC. Tapec

The existing file retrieval system of research and technology promotion outputs of PhilRice Batac is inefficient and time-consuming. The files of these outputs are scattered as they are saved and maintained by the concerned staff in their respective computers. More so, if the files being sought had been maintained by another staff that already left PhilRice.

This activity aims to establish database management systems to systematize data storage and ease retrieval of R&D outputs of the station. The PhilRice Batac Information System (PBIS) database program was constructed specially to store R&D data and documents. Official photos of the station were separately stored in Adobe Lightroom software.

Highlights:

- Technical reports of 221 R&D projects and studies conducted by the station from 2001 to 2010 were uploaded and can be accessed in the PBIS. Each document was tagged with relevant keywords to facilitate searching by users.

- Details of techno promo activities conducted by the station from 1999 to 2011 were uploaded in the PBIS. These include 105 trainings, 39 briefings, 27 field days, 31 cross visits and 10 workshops. The database record of each techno promo activity includes the names and profile of participants.

- Technology promotion materials uploaded in the PBIS include 20 brochures, 41 coursewares, 2 flipcharts, 11 matured technologies, 6 news articles, and 38 posters.

- The Adobe Lightroom database contains 42,317 photos of R&D studies and station activities. Each photo was properly tagged to facilitate searching of picture files of interest. The tags also acknowledged the owner of each photo whenever possible.

- E-copies of research literature downloaded from the internet by station researchers were pooled and included in the PBIS. This will allow the sharing of technical references among researchers, and save efforts from searching duplicate documents from the internet. To date, 522 files of research papers, abstracts and articles were uploaded in the PBIS.

- Raw data of 47 R&D studies conducted by the station from 2004 to 2012 were consolidated to be uploaded in the PBIS in 2013. This will provide access for researches who wish to use them for table research.

- To ease searching of references from the PhilRice Batac library, the library index of the materials were also consolidated to be uploaded in the PBIS in 2013.

The outputs of this project can further increase the efficiency and effectiveness of operation of PhilRice Batac R&D. The database systems can enhance the productivity of R&D staff through easier access to station data and documents that had been accumulated, but rather dispersed, over the years.

Figure 13. Homepage of the PhilRice Batac Information System (PBIS) database program.

Table 29. Distribution of uploaded technical reports, capability enhancement activities, and official photos of PhilRice Batac from 1999 to 2011.

Technical Papers	Capability Enhancement Activities					Photos
	Briefings	Trainings	Field days	Cross visits	Workshops	
2821	**39**	**105**	**27**	**31**	**10**	**42,317**

Enhancing the Knowledge Exchange and Decision-making among Rice Stakeholders through the Development and Promotion of Location–specific Rice Knowledge Products and Delivery System (CVP Phase II)

Alma C. Aguinaldo, Silvestre Briones, Lovely Chrisabel S. De La Cruz,MerrylineGappi, Nora Nida , NeliaAtuan, Randy Opelac, and OsmundoPastor

Highlights:

The project was implemented to test and develop approaches in solving a range of problems faced by farmers; identify Information and Communications Technology (ICT) options to make information more widely known at the village and municipal levels; and to assess the effectiveness and usability of ICT-based modalities to disseminate information and knowledge to rural farmers and extension workers at the municipal level

1. Techno Demo Establishment
- Three farmer partners in Barangay Rayuray and Baay showcased the performance of NSIC Rc192, Rc146, and Rc160 in drought prone farms, together with the yield performance of the varieties when applied with a fertilizer recommendation based on MOET + LCC, Nutrient Manager and the farmer's own practice.

1.1. Based on the data gathered, among the varieties tested by the farmers, NSIC Rc160 was the highest yielder, giving an average yield of 7.5 tons/ha followed by NSIC Rc146 at 6.3 t/ha and NSIC Rc192 at 3.03 t/ha.

1.2. On Nutrient management, varied results were obtained from the three farmer-cooperators. In Barangay Baay, farmer partners get a comparable yield of rice with fertilizer options based at MOET + LCC and the Nutrient Manager (NM) at 5.795 and 5.743 t/ha, respectively. In Barangay Rayuray, the MOET + LCC based fertilizer option outyielded both NM and farmer's practice at 5.409 t/ha to 3.542 and 3.188 t/ha, respectively.

2. Training
- Two trainings and one video conferencing were conducted for the cyber village communities. Corn production training was attended by 26 FPs from Baay and Quiling, while 40 FPs from Rayuray cyber village attended an onion and garlic production briefing. A video conferencing with IRRI staff was also done, attended by farmer-partners for all four barangays. Topics during the training include Nutrient Management and Pest and Disease Management for Rice.
- One Refresher Hands-on Training on the Use of NM Rice Application using the internet was done. Forty CVP farmers and barangay officials attended the training and appreciated the use of the Nutrient Manager. Fertilizer requirement for each farmer's respective farms was the output of the training.

3. Nutrient Manager for Rice
- Assistance was given to the Nutrient Manager for Rice, an IRRI Project in the conduct of the following:

3.1. Orientation on Nutrient manager for Rice using Smart phones. Five CVP implementers were briefed on how to recommend fertilizers but using the NMRice via internet and the tablet.

3.2. Forty CVP farmers were identified, briefed and interviewed to serve as farmer-cooperators of the one-hectare NMRice demo farm set-up in Rayuray, Baay, Quiling and Baligat, Batac City.

3.3. Established a four-hectare demofarm with 10 CVP farmers from Brgy. Baay, Quiling, Baay and Rayuray to demonstrate the possible yield variation with NM as the basis for Fertilizer Recommendation. Each farmer established a 500-sqm farm to showcase the result of the NM recommendation in comparison to the farmers' practice

4. Conduct of baseline survey and assessment
- A total of 98 farmer-partners and non-participating farmers were interviewed on their farming practices before and during the project. The result of the interview however, is presented in the national report by IRRI project implementers.

5. Conduct of Survey on NM Rice
- Interviewed 17 CVP farmers and barangay officials in Rayuray, Batac Ilocos Norte to validate if the NM recommendations were followed by the farmers who attended the "Hands-on Training on NM Rice Application Using the Internet". The survey showed that out of 40 trainees, only two farmers were able to plant rice during the dry season due to water unavailability. Both farmers used the NM recommendation and yield were increased to about 1 t/ha.

6. Internet Connectivity
- Barangay officials and CVP farmers were very amenable to pay for the monthly bill of their internet connectivity
- Negotiations with Globe, Smart, and PLDT networks were done, however, only Brgy. Quiling is possible for internet access
- SK officials of Brgy. Quiling agreed to include the internet connectivity as one of their projects for 2013.

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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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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