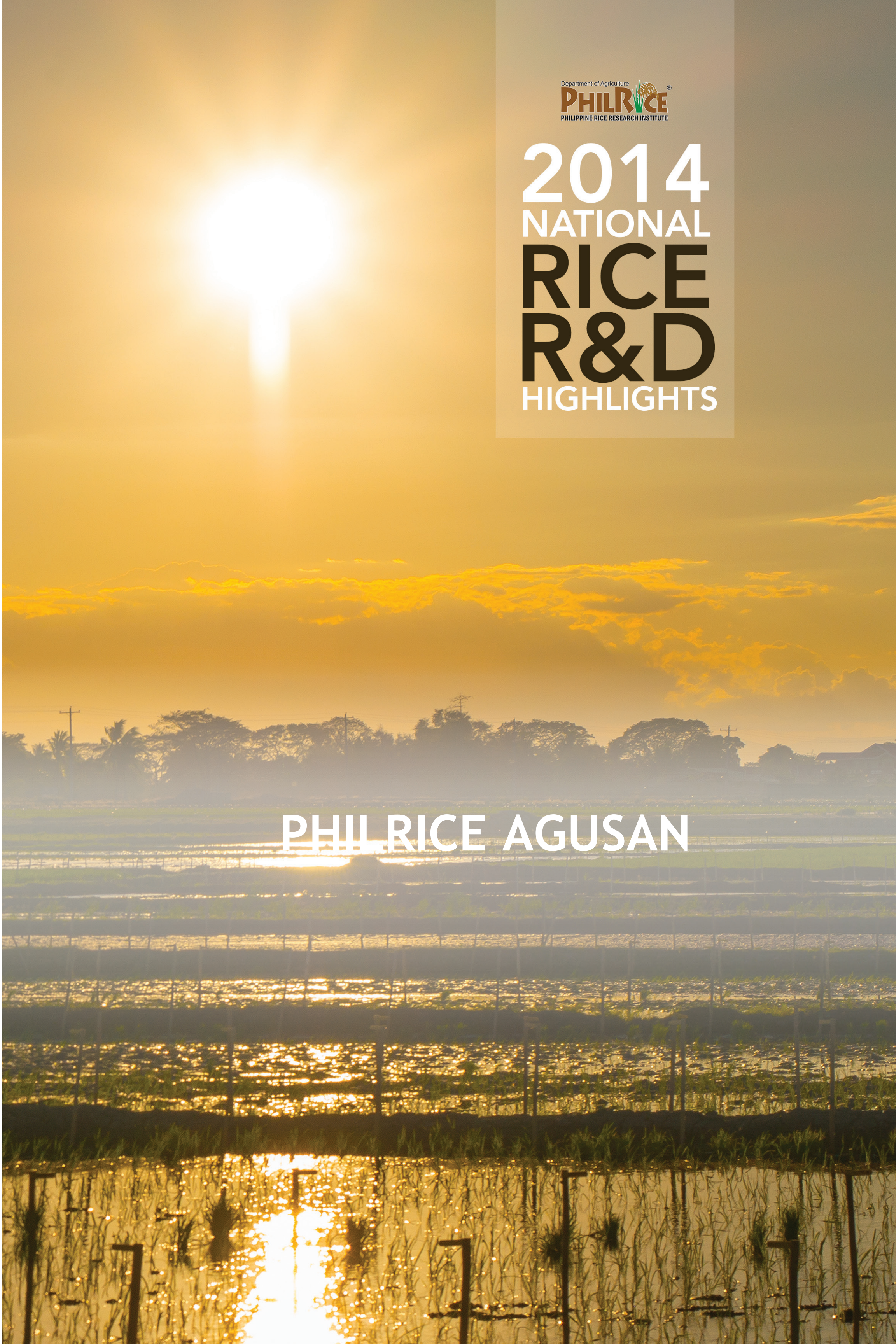
Department of Agriculture
PHILRICE
PHILIPPINE RICE RESEARCH INSTITUTE

2014 NATIONAL RICE R&D HIGHLIGHTS



PHILRICE AGUSAN

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PhilRice Agusan

Acting Branch Manager: AT Montecalvo

Executive Summary

Rice breeding research had been one of the major undertakings at PhilRice Agusan. At present, breeding activities are done in collaboration with PhilRice CES. These mainly focused on testing and evaluation of shuttle breeding lines intended to address not only the national rice production issues, but more importantly, the location-specific problems as well. Low rice productivity in Caraga region had prompted recent breeding efforts to focus on solving local rice production constraints through the development of locally-adapted rice varieties. So far, this resulted in the release of some locally-selected rice varieties such as Angelica and PJ7 which dramatically increased rice yields and farmers' income. The goal is to develop more of these varieties to give more options to farmers and ultimately address impending field problems, enhance genetic biodiversity and significantly increase rice production.

I. Rice Breeding Activities in PhilRiceAgusan

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National Rice Cooperative Testing Project for Irrigated Lowland or NCT January to June & July to December 2014 cropping

Highlights:

Thirty six rice lines were evaluated in the NCT Phase I (transplanted and direct-seeded) including check varieties, PSB Rc82 and PSB Rc18.

- January to June 2013 cropping season in NCT transplanted trial, for early maturing group,seven lines out of seventeen test entries outyielded the best check variety NSIC Rc82 (4.20t/ha) by 2 to 11 % these includes:C9301-B-2-1-2-2 (4.66t/ha), IR82572-28-3-1-1-2 (4.60 t/ha), C9270-B-3-1-3-2 (4.44t/ha), IR09A220 (NEW) (4.40 t/ha), PR37951-3B-37-1-2 (4.39t/ha), PR35769-B-1-1-2-3-4 (NEW) (4.37 t/ha and PR37273-5-16-5-2-1-2-1 (NEW) (4.29t/ha).It can be noted that 13 test entries have a yield of 4 tons/ha and above.3 lines among the top yielding entries were identified to have an excellent performance: IR82572-28-3-1-1-2, PR37951-3B-37-1-2, PR37246-2-3-2-1-1-2-1.

  For medium maturing group, nine lines out of seventeen test entries outyielded the best check variety NSIC Rc18 (4.08t/ha) by 2 to 33% these are: PR36831-31-1-1-1-1-1 (NEW) (5.38

t/ha),IR05N419 (NEW) (4.62t/ha), IR10F336 (NEW) (4.50t/ha), C9300-B-3-3-1-1 (4.39), IR79584-38-2-1-4 (4.29t/ha), IR85836-40-3-3-1-1 (4.28t/ha), IR85836-40-3-3-1-1 (4.25t/ha), PR35786-B-3-3-2-1-1 (New) (4.15t/ha) and PR37704-2B-6-1-2-1-2 (4.08t/ha). Eleven test entries noted to have a yield of 4.00 to 5.38t/ha. 7 lines among the top yielding entries were identified to have an excellent performance: PR36831-31-1-1-1-1-1 (NEW), IR10F336 (NEW), IR79584-38-2-1-4,IR85836-40-3-3-1-1, HHZ14-SAL13-L12-DT1, PR35786-B-3-3-2-1-1 (New), PR37704-2B-6-1-2-1-2 .

- July to December 2014 cropping season in NCT transplanted trial, both early and medium maturing group outyielded the best check variety NSIC Rc82 (6.17t/ha) and NSIC Rc18 (5.90t/ha) by 0.2 to 19% yield advantage. Four of the top high yielding entries includes: IR09A136 (7.37t/ha), IR82572-28-3-1-1-2 (7.19t/ha), PR37939-3B-1-2 (7.18t/ha) and PR37951-3B-37-1-2 (7.07t/ha). Twenty three entries showed also an excellent yield performance that ranges from 6.02 to 6.95t/ha and 5 test entries also yielded ranges from 5.27 to 5.95t/ha. 97% of the test entries showed an excellent yield performance and have comparable pest and disease reactions with the best check varieties. Across two cropping seasons, 2014 WS (July to December) performed well in terms of yield performance with a yield increment that ranges from 33 to 37% with the same amount of fertilizer rate at 90-40-70 (NPK)/ha.

- January to June 2014 cropping season in NCT Direct wet seeded trial, for early maturing group, six lines out of seventeen test entries outyielded the best check variety NSIC Rc82 (3.79t/ha) by 9 to 20 %, these are: C9270-B-3-1-3-2 (4.56t/ha), IR82572-28-3-1-1-2 (4.54t/ha), C9301-B-2-1-2-2 (4.42t/ha), PR37951-3B-37-1-2 (4.19t/ha), C9222-B-2-2-1-2-1 (4.13t/ha), PR40422-13-2-1-3-B-B (NEW) (4.12t/ha) and PR37942-3B-5-3-2 (3.80t/ha). 3 lines among the top yielding entries were identified to have an excellent performance and have comparable performance in terms of pest and disease reaction compared to the best check variety: C9270-B-3-1-3-2, IR82572-28-3-1-1-2, PR37951-3B-37-1-2.

  For the medium maturing group, six lines out of seventeen test entries outyielded the best check variety NSIC Rc18 (3.79t/ha) by 1 to 14% these are:C9300-B-3-3-1-1 (4.54t/ha), IR87530-105-2-3-3 (4.23t/ha), PR36831-31-1-1-1-1-1 (NEW) (4.15t/ha), IR79584-38-2-1-4 (4.12 t/ha), PR37952-B-4-1-3 (4.10t/ha), PR37704-2B-6-1-2-1-2 (3.99t/ha).3 lines among the top yielding entries were identified to have an excellent performance and have comparable performance in terms of pest and disease reaction compared to the best check variety: PR36831-31-1-1-1-1-1 (NEW), PR37952-B-4-1-3, PR37704-2B-6-1-2-1-2.

- July to December 2014 cropping season in NCT Direct wet seeded trial, both early and medium maturing groups outyielded the best check varieties PSB Rc82 (4.93t/ha) and PSB Rc18 (4.73t/ha) that ranges from 1 to 22% yield advantage these are: PR37951-3B-37-1-2 (6.00t/ha), C9222-B-2-2-1-2-1 (5.98t/ha), IR82572-28-3-1-1-2 (5.90t/ha), GSR IR1-1-D1-D1-Y1-D3 (5.75t/ha), PR40432-1-1-1-2-B-B (5.48t/ha), C9301-B-2-1-2-2 (5.47t/ha), C9270-B-3-1-3-2 (5.45t/ha), PR35788-38-2-1-4 (5.16t/ha), IR79584-38-2-1-4 (5.11t/ha) and PR37704-2B-6-1-2-1-2 (4.99t/ha). These test entries have a comparable phenotypic acceptability performance and pest and disease reactions with the best check varieties. Across two cropping seasons, 2014 WS performed well in terms of yield performance with an increment of 32 to 40% yield advantage compared to 2014 DS with the same rate of fertilizer application at 90-40-70 (NPK)/ha

National Rice Cooperative Testing Project - Hybrid Rice Selection
January to June and July to December 2014 cropping

- Forty six entries including nine check varieties were evaluated in NCT Hybrid trial during the January to June 2014 cropping season. The highest check variety yielded 4.53t/ha (NSIC Rc240) and the least yielded 3.11t/ha (IR64). Hybrid entries with Index No. 8, No. 22 and No. 1, No. 42, No. 5, No. 27 and No. 14 where the top yielders, outyielding the best check variety by 1% to 9%. Despite outyielding the check varieties this top yielding test entries showed moderately susceptible reaction to Sheath blight disease. 6 F1 hybrid entries showed comparable performance to the check varieties : Index No. 8 and No. 13, No. 23, No. 31, No. 36 and No. 42

- With the unique weather condition here in CARAGA Region only few hybrids has the ability to adapt. Even the Hybrid checks Mestiso 7 and Mestiso 19 have poor phenotypic acceptability compared to the inbred checks. Hybrids are known to have a high yield advantage over inbred varieties, but have a poor resistance when it comes to pest and diseases. Hence despite of this challenges we are still trying to identify hybrid varieties that can adapt under the Caraga weather condition.

- For July to December 2014 cropping season, 52 entries were evaluated in NCT-Hybrid including 10 check varieties. Three (3) test entries outyielded the best check variety NSIC Rc222 (7.75t/ha) with a yield advantage of 0.52 to 3% these are: PRUP 10 (UPLB) (7.99t/ha), P2014-77 (Pioneer) (7.80t/ha) and LP 205 (LONG PING) (7.79t/ha). Thirteen among other test entries also performed well with an average yield of 7.00 to 7.66t/ha comparable to Mestizo 19 (7.50 & 7.43 t/ha), NSIC Rc222 (7.43t/ha) and Mestizo 1 (7.27t/ha). Twenty two (22) test entries also performed well in terms of yield that ranges from 5.05t/ha to 6.97t/ha. Across two cropping seasons, 2014 WS performed well in terms of yield performance with an increment of 59 to 62% yield advantage compared to 2014 DS with the same amount/rate of fertilizer application at 90-40-70 (NPK)/ha. Most of the test entries showed a good phenotypic acceptability with minimal or tolerable pest and disease incidence.

Multi-Location Adaptation Trial, January to June and July to December 2014 cropping

January to June and July to December2014 cropping seasons, 17 test entries including 6 check varieties were evaluated under MAT trial (transplanted and direct seeded).

- January - June in MAT transplanted, two check varieties outyielded the eleven test entries, these are NSIC Rc222 (4.72t/ha) and NSIC Rc240 (4.68t/ha). Among the test entries only 4 test entries yielded 4 t/ha and above. These are Entries with Index No. 7 (4.59t/ha) index No. 6 (4.46t/ha), Index No. 12 (4.46t/ha) and Index No. 10 (4.32t/ha). Three test entries among the top yielding entries were identified to have an excellent performance (MAT-Transplanted): Index No. 7, Index No. 10 and Index No. 12.

- July – December 2014 cropping season (MAT-TP), four (4) out of five best check varieties outyielded all test entries (12), these are: NSIC Rc222 (7.54t/ha), NSIC Rc240 (7.14t/ha), PSB Rc82 (6.80 t/ha) and NSIC Rc122 (6.77t/ha). However, 10 test entries showed a comparable yield with the check variety NSIC Rc18 (6.25t/ha) that ranges from 5.33 to 6.76 t/ha. Index No. 11 (6.76t/ha) showed an excellent phenotypic performance and yield which is comparable to the two check varieties NSIC Rc122 and PSB Rc18. Across two cropping seasons, July to December 2014 cropping got a 30 to 63% yield advantage compared to January to June 2014 cropping season with the same rate of fertilizer application at 90-40-70 (NPK)/ha though weather conditions will greatly affect the yield performance during January – June cropping more rainfall than July – December cropping.

- January - June 2014in MAT direct seeded among the 6 check varieties the highest yielded 4.64t/ha (NSIC Rc222) and the least yielded 3.96 t/ha (PSB Rc18). Among the test entries 9 test entries yielded 4.02 t/ha to 4.48 t/ha but outyielded by NSIC Rc222 (check) These are Entries with Index No. 12 (4.48t/ha), No. 7 (4.41t/ha), No. 6 (4.39t/ha), No. 15 (4.26t/ha), No. 13 (4.24t/ha), No. 10 (4.20t/ha), No. 3 (4.12 t/ha), No. 16 (4.02t/ha) and No. 2 (4.02t/ha). 4 test entries among the top yielding entries were identified to have an excellent performance (MAT-DWSR): Index No. 7, Index No. 10, Index No. 12 and Index No. 13

- July to December 2014 in MAT direct seeded, three test entries outyielded the best check varieties PSB Rc82 (5.08t/ha) at 0.2 to 6% yield advantage these are: Index No. 2 (5.40t/ha), Index No. 10 (5.21t/ha) and Index No. 8 (5.09t/ha). Only Index No. 11 identified to have an excellent phenotypic performance with the best check varieties PSB Rc18 and NSIC Rc122. Across two cropping seasons, July to December 2014 cropping got a 30 to 38% yield advantagecompared to January to June 2014 cropping season.

Table 1a. Yield and Phenotypic Performance of NCT TP 2014 DS.

Index No.	Designation	Yield (t/ha)	PACP	REMARKS	% Yield Advantage
34	PR36831-31-1-1-1-1-1 (tpr/dsr) (NEW)	5.38	3	clean, GP, GS	28
2	C9301-B-2-1-2-2 (tpr/dwsr)	4.66	7	Mshb, Pblast	11
35	IR05N419 (tpr) (NEW)	4.62	7	Pblast, GS	10
3	IR82572-28-3-1-1-2 (tpr/dwsr)	4.60	3-5	clean, light panicle, GS	10
36	IR10F336 (tpr) 9NEW)	4.50	3	Bold grain, GP, GS	7
5	C9270-B-3-1-3-2 (tpr/dwsr)	4.44	5	GP, GS, Mshb	6
12	IR09A220 (tpr) (NEW)	4.40	5	Mblb, Mshb, GP, uniform	5
4	PR37951-3B-37-1-2 (tpr/dwsr)	4.39	5	uniform, GP, GS	5
20	C9300-B-3-3-1-1 (tpr/dwsr)	4.39	5	GP, GS, Mshb	5
16	PR35769-B-1-1-2-3-4 (tpr) (NEW)	4.37	5	NVU, long panicle, dense	4
14	PR37273-5-16-5-2-1-2-1 (tpr) (NEW)	4.29	5	Mshb, Pblast	2
23	IR79584-38-2-1-4 (tpr/dwsr)	4.29	3	tall, clean GP	2
21	IR85836-40-3-3-1-1 (tpr/dwsr)	4.28	3	GP, GS, uniform	2
29	HHZ14-SAL13-L12-DT1 (tpr)	4.25	3	clean, GP, GS	2
9	PSB Rc82 (tpr/dsr) (check)	4.20	5	Mshb, GP,	1
6	PR37942-3B-5-3-2 (tpr/dwsr)	4.19	5	Mshb, GS, sterile	
15	GSR IR1-S11-L1-Y1-D2(tpr) (NEW)	4.16	5	Mshb, GP, GS	
10	IR09A136 (tpr) (NEW)	4.16	7	light panicle, Pblast, Mshb	
18	IR09N538 (tpr) (NEW)	4.16	5	light panicle, Mshb, Mblb	
32	PR35786-B-3-3-2-1-1 (tpr/dsr) (New)	4.15	4-5	light panicle, GP, GS	
8	HHZ3-SAL13-Y1-SAL1 (tpr)	4.10	5	GS, Mshb	
19	PR37704-2B-6-1-2-1-2 (tpr/dwsr)	4.08	3	clean, GP, GS	
27	PSB Rc18 (Check) (tpr/dsr)	4.06	3-5	tall, clean, GP	
1	PR37246-2-3-2-1-1-2-1 (tpr/dwsr)	4.04	4-5	clean, late, GP, GS	
30	PR37921-B-3-4-2-1-2 (tpr/dwsr)	4.04	7	Pblast, Mshb,	
26	GSR IR1-21-Y4-Y2-Y1 (tpr)	4.00	4-5	light panicle, GP, GS	
7	C9222-B-2-2-1-2-1 (tpr/dwsr)	3.99	7	Pblast, light panicle, false smut	

Table 1b. Yield and Phenotypic performance of NCT TP 2014 WS.

Index No.	Designation	Yield (t/ha)	PACP			REMARKS
			Plants	Panicles	Grains	
14	IR09A136 (tpr)	7.37	5	5	4	BS, Mshb
6	IR82572-28-3-1-1-2 (tpr/dwsr)	7.19	5	5	4	MShb, BS
16	PR37939-3B-1-2 (tpr)	7.18	5	5	4	NBLS, NVU
1	PR37951-3B-37-1-2 (tpr/dwsr)	7.07	5	5	4	NBLS, MShb
27	IR85828-89-3-2-3-3 (tpr/dwsr)	6.95	5	3	3	clean, uniform
8	PR37942-3B-5-3-2 (tpr/dwsr)	6.95	5	5	5	MShb, Mblb
9	C9270-B-3-1-3-2 (tpr/dwsr)	6.94	4	5	5	MShb, uniform
20	PR37921-B-3-2-2 (tpr/dwsr)	6.87	4	4	5	uniform, GDC
19	IR79584-38-2-1-4 (tpr/dwsr)	6.76	5	4	3	uniform, BLS
32	IR10F336 (tpr)	6.74	4	5	5	NVU, NBLS
34	PR35786-B-3-3-2-1-1 (tpr/dsr)	6.71	4	5	3	BLS, NVU
10	IR09A220 (tpr)	6.64	5	5	5	BS, MShb, uniform
23	PR37704-2B-6-1-2-1-2 (tpr/dwsr)	6.62	5	5	4	clean, uniform
13	PR35769-B-1-1-2-3-4 (tpr)	6.61	4	5	4	BS, Mshb, Mblb
28	PR36831-31-1-1-1-1-1 (tpr/dsr)	6.56	5	5	5	BLS, NVU
26	PR37952-B-4-1-3 (tpr/dwsr)	6.52	5	5	4	BLS, uniform
35	IR10A108 (tpr)	6.50	4	5	6	uniform, GDC
29	IR05N419 (tpr)	6.47	5	5	4	NBLS, MShb
12	PR38046-PB-10-9-4-2-1 (tpr)	6.47	5	5	5	BLS, MShb, GDC
4	PR37246-2-3-2-1-1-2-1 (tpr/dwsr)	6.39	5	5	4	Uniform, NBLS
17	IR09N538 (tpr)	6.38	5	5	5	Blb, MShb, GDC
18	PR37273-5-16-5-2-1-2-1 (tpr)	6.29	5	5	4	MShb, BS, BLS
15	PR40078-B-12-2 (tpr)	6.27	4	5	5	NBLS, NVU
5	C9301-B-2-1-2-2 (tpr/dwsr)	6.20	5	5	5	Shb, GDC, NVU
2	C9222-B-2-2-1-2-1 (tpr/dwsr)	6.18	5	5	6	Blb, NBLS, 40% lodge
30	HHZ14-SAL13-L12-DT1 (tpr)	6.18	5	5	4	NU, GS
7	PSB Rc82 (tpr/dsr) (check)	6.17	5	5	4	MBlb, BLS, MShb
36	PR37921-B-3-4-2-1-2 (tpr/dwsr)	6.02	4	5	5	GDC, uniform

Table 2a. Yield and Phenotypic Performance of NCT DWSR 2014 DS.

Index No.	Designation	Yield (t/ha)	PACP	REMARKS	% Yield Advantage
5	C9270-B-3-1-3-2 (tpr/dwsr)	4.56	5	light panicle, Shb	15
20	C9300-B-3-3-1-1 (tpr/dwsr)	4.54	5	shb, GP	14
3	IR82572-28-3-1-1-2 (tpr/dwsr)	4.54	5	GS, GP	14
2	C9301-B-2-1-2-2 (tpr/dwsr)	4.42	5	GP, Mshb, P. lodge	11
29	IR87530-105-2-3-3 (dsr)	4.23	5	light panicle, Mshb, GS	7
4	PR37951-3B-37-1-2 (tpr/dwsr)	4.19	5	GP, GS, Mshb	6
34	PR36831-31-1-1-1-1-1 (tpr/dsr) (NEW)	4.15	5	GP, GS, clean	5
7	C9222-B-2-2-1-2-1 (tpr/dwsr)	4.13	5	Mshb, GP	4
17	PR40422-13-2-1-3-B-B (dsr) (NEW)	4.12	5	NU, GP	4
23	IR79584-38-2-1-4 (tpr/dwsr)	4.12	5	Tall, Mshb, Gp	4
22	PR37952-B-4-1-3 (tpr/dwsr)	4.10	3	clean, GP, GS	3
19	PR37704-2B-6-1-2-1-2 (tpr/dwsr)	3.99	3	GP, GS, clean	0.5
27	PSB Rc18 (Check) (tpr/dsr)	3.97	5	GP, GS, clean	
24	IR85828-89-3-2-3-3 (tpr/dwsr)	3.95	7	Shb, light panicle	
33	IR10A155 (dsr) (NEW)	3.87	5	GP, GS, clean	
25	PR37921-B-3-2-2 (tpr/dwsr)	3.81	7	Pblast, Mshb, GS	
28	PR37866-1B-1-4 (tpr/dwsr)	3.80	7	Shb, GP	
6	PR37942-3B-5-3-2 (tpr/dwsr)	3.80	7	Shb, GP	
9	PSB Rc82 (tpr/dsr) (check)	3.79	5	Mshb, GP, GS	
1	PR37246-2-3-2-1-1-2-1 (tpr/dwsr)	3.76	5	GP, GS, Mshb	
8	GSR IR1-1-D1-D1-Y1-D3 (dsr) (NEW)	3.75	5	GP, Mshb, partially exerted	
32	PR35788-B-3-3-2-1-1 (tpr/dsr) (New)	3.69	5	NU, GP	
30	PR37921-B-3-4-2-1-2 (tpr/dwsr)	3.68	5	Mshb, GP	
18	PR40432-1-1-1-2-B-B (dsr) (NEW)	3.64	5	Mshb, Mblb, GP	
26	GSR IR1-23-D16-D1 (dsr)	3.61	5	dense, NU, GS	
12	IR085634-15-3-3-1 (dsr)	3.61	7	NU, Pblast, Mshb	
21	IR85836-40-3-3-1-2 (tpr/dwsr)	3.61	5	Mshb, NU, GP	
13	IR07A179 (dsr) (NEW)	3.48	3	clean, GP, GS	
10	IR09N5229 (dsr) (NEW)	3.43	5	Tall, light panicle, GS	

Table 2b. Yield and Phenotypic performance of NCT-DWSR 2014 WS.

Index No.	Designation	Yield (t/ha)	PACP			REMARKS
			Plants	Panicles	Grains	
1	PR37951-3B-37-1-2 (tpr/dwsr)	6.00	4	5	4	uniform, BS, MShb
2	C9222-B-2-2-1-2-1 (tpr/dwsr)	5.98	6	5	5	BS, MShb, MBlb
6	IR82572-28-3-1-1-2 (tpr/dwsr)	5.90	5	5	4	uniform, BS, MShb
11	GSR IR1-1-D1-D1-Y1-D3 (dsr)	5.75	5	5	5	NVU, MShb, BS
17	PR40432-1-1-1-2-B-B (dsr)	5.48	5	5	5	MVU, MShb, wh
5	C9301-B-2-1-2-2 (tpr/dwsr)	5.47	6	5	5	Shb, NVU
9	C9270-B-3-1-3-2 (tpr/dwsr)	5.45	5	5	5	NVU, MShb
34	PR35788-B-3-3-2-1-1 (tpr/dsr)	5.16	5	5	5	MShb, uniform
19	IR79584-38-2-1-4 (tpr/dwsr)	5.11	4	5	5	uniform, BS, Tall
23	PR37704-2B-6-1-2-1-2 (tpr/dwsr)	4.99	5	5	5	uniform, BS
7	PSB Rc82 (tpr/dsr) (check)	4.93	5	5	3	BS, MShb
22	C9300-B-3-3-1-1 (tpr/dwsr)	4.85	7	5	6	Shb, NU, GDC
35	IR87530-105-2-3-3 (dsr)	4.78	4	5	5	NVU, GDC, MShb
16	GSR IR1-5-D7-Y3-S1 (dsr)	4.77	5	5	5	NU, GDC
25	PSB Rc18 (Check) (tpr/dsr)	4.73	4	5	5	MShn, wh, NVU
31	PR37866-1B-1-4 (tpr/dwsr)	4.69	6	5	5	NU, GDC
21	GSR IR1-23-D16-D1-D1(dsr)	4.67	6	5	6	NVU, GDC, wh
8	PR37942-3B-5-3-2 (tpr/dwsr)	4.67	5	5	4	BS, MShb
27	IR85828-89-3-2-3-3 (tpr/dwsr)	4.59	5	5	5	NVU, GDC, MShb
36	PR37921-B-3-4-2-1-2 (tpr/dwsr)	4.50	5	5	5	MShb, GDC
10	PR39566-11-3-2-1-2-B-B (dsr)	4.42	5	5	5	MShb, wh
20	PR37921-B-3-2-2 (tpr/dwsr)	4.41	5	5	5	MShb, wh, uniform
12	PR39557-2-2-3-1-3-B-B (dsr)	4.38	6	5	5	NU, MShb, GDC
32	GSR IR1-24-S6-Y1-L1-D1 (dsr)	4.36	6	5	5	NU, GDC, NBLS
33	PR40285-44-2-1-1-B-B (dsr)	4.35	5	5	5	NVU, MShb
28	PR36831-31-1-1-1-1-1 (tpr/dsr)	4.35	4	5	5	MShb, BS, uniform
26	PR37952-B-4-1-3 (tpr/dwsr)	4.30	4	5	5	BLS, MShb, uniform

Table 3a. Yield and Phenotypic Performance of NCT-Hybrid 2014 DS.

Index No.	Designation	Yield (t/ha)	PACP	REMARKS
38	43	-	-	low germ (replace with filler)
39	34	-	-	low germ (replace with filler)
2	8	4.93	5	heavy grain, WH,
22	22	4.88	5	Mshb, Mblb
5	1	4.82	5	dense, LP, WH, MShb
31	42	4.74	5	heavy grains, dense, WH
3	5	4.61	5	false smut, seed discoloration, MShb
32	27	4.60	5	dense, tip awn, WH, Mshb
6	14	4.59	5	Mshb, GP
40	NSIC Rc240 (check)	4.53	3	clean, WH, uniform
28	36	4.53	5	Long panicle, heavy grain, WH
33	37	4.45	9	WH, bls, Mshb, lodge
46	Mestizo 19 (check)	4.43	7	NVU, bls, Mshb
15	23	4.43	5	long flag leaf, MR-bb, Mshb
36	40	4.41	5	dense, heavy grain, NVU, WH
21	NSIC Rc222 (check)	4.39	5-7	NVU, WH, dense, Mshb
14	13	4.38	4	R-bb, dense type, Mshb
30	33	4.36	7	NVU, Mshb, bls, dense
10	15	4.36	9	Mshb, dense, heavy grain, bls
12	17	4.35	7	Mshb, NU, Pblast
26	31	4.34	5	NVU, WH, clean
43	NSIC Rc222 (check)	4.31	7	WH, Mblb
19	Mestizo 7 (check)	4.27	5	dense, LP, bls, MShb
23	Mestizo 19 (check)	4.22	7	NU, bls, Pblast, Mshb
24	25	4.21	5	dense, Long panicle, WH, Mshb
25	24	4.20	5-7	long panicle, WH, Mshb
45	PSB Rc18 (check)	4.18	5	clean flag leaf and seeds, WH, GS
41	PSB Rc82 (check)	4.18	9	Pblast, WH
16	20	4.17	5	short panicle, Mblb, Mshb
35	30	4.16	7	NVU, Mshb, Mshb, Mblb
1	4	4.15	7	Bls, WH, sterile MShb
17	16	4.12	4	MR-bb, Semi-erect flag leaf, Mshb
11	6	4.11	5-7	tip awn, LP, broad leaf, WH, NU
34	Local check (NSIC Rc122)	4.03	5	clean, late, GS
37	Mestizo 7 (check)	3.99	9	Pblast, seed discoloration, Mshb
27	28	3.92	7-9	WH, Mblb, NVU, Pblast
29	39	3.91	5	long awn, NVU, slender grain, WH
13	21	3.88	5-7	Mshb, partially exerted, Pblast
18	PSB Rc82 (check)	3.88	5	Mshb, WH, MBlb

Table 3b. Yield and Phenotypic performance of NCT-Hybrid 2014 WS.

Index No.	Designation	Yield (t/ha)	PACP			REMARKS
			Plants	Panicles	Grains	
1	Mestiso 7 (check)	filler	filler	filler	filler	Entry Low Germ
27	Mestiso 7 (check)	filler	filler	filler	filler	Entry Low Germ
33	PRUP 10 (UPLB)	7.99	4	5	3	Uniform, MShb
46	P2014-77 (NEW) (Pioneer)	7.80	4	5	4	GDC, BLS, MShb
9	LP 205 (Long Ping)	7.79	4	5	3	clean, uniform, wh
34	NSIC Rc222 (check)	7.75	4	4	4	BLS, MShb
16	P2013-81 (Pioneer)	7.66	4	5	4	uniform, NBLS, MShb
19	PHDR 2113 (Syngenta)	7.52	4	4	3	MShb, BLS
13	BIO 453 (Bioseed)	7.52	5	4	4	MBlb, BS
6	Mestiso 19 (check)	7.50	5	5	4	NVU, Shb, BS
3	PHDR 1900 (Syngenta)	7.50	6	4	3	clean, 40% lodge, MBlb
38	Mestiso 19 (check)	7.43	5	4	4	MShb, MBlb
22	NSIC Rc222 (check)	7.43	4	5	3	MShb, uniform
12	INH98327 (Bayer)	7.42	4	4	3	NVU, MShb
35	LP 357 (Long Ping)	7.34	5	4	3	NVU, MBlb
50	Mestizo 1 (check)	7.27	3	5	3	clean, uniform
21	LPP 937 (Philscat)	7.25	6	5	4	NVU, MBlb
23	PH 11014 (NEW) (Syngenta)	7.15	6	5	4	MBlb, 30% lodge, MShb
10	PHDR2112 (Syngenta)	7.06	5	5	5	NBLS, MShb
44	SL-19H (NEW) (SL Agritech)	7.04	5	4	5	dense, MBlb
36	PHILSCAT 8 (Philscat)	7.01	4	5	4	NVU, MShb, partly awn
29	IR82386H (NEW) (IRRI)	7.00	5	5	4	MShb, GDC
7	IR86169H (IRRI)	7.00	5	5	4	Shb, Blb, GDC
15	LP 534 (NEW) (Long Ping)	6.97	5	4	3	dense, clean, NVU
30	PHDR 2116 (Syngenta)	6.78	4	5	5	NBLS, uniform
52	Local check (NSIC Rc122)	6.77	3	5	4	clean, uniform
4	SL-12H (SL Agritech)	6.69	5	4	4	dense, NVU, Broad long flag leaf
47	IR81958H (IRRI)	6.69	5	4	4	MShb, NVU, NBLS
48	PSB Rc18 (check)	6.65	4	5	5	MShb, uniform
31	PSB Rc82 (check)	6.65	6	5	4	MBlb, MShb
42	NSIC Rc240 (check)	6.59	4	5	4	bold grains, MShb

Table 4a. Yield and Phenotypic Performance of MAT TP 2014 DS.

Index No.	Designation	Yield (t/ha)	PACP	REMARKS
11	NSIC Rc222 (check)	4.64	5	GP, GS uniform
12	12	4.48	3	clean, GP
7	7	4.41	3-5	clean, GP
6	6	4.39	5	short panicle, Mshb
1	NSIC Rc224 (check)	4.38	5	Mshb, GP
15	15	4.26	3	clean, GP
13	13	4.24	5	light panicle, GS
10	10	4.20	3	clean, GP, GS
8	NSIC Rc240 (check)	4.16	5	NVU, dense, Mshb, Pblast
5	PSB Rc82 (check)	4.13	3	clean, GP, uniform
17	LOCAL CHECK	4.13	3-5	clean, GP, GS
3	3	4.12	5	Mshb, GP
16	16	4.02	7	light panicle, Mshb, Pblast
2	2	4.02	5	NU, light panicle, Mshb
14	PSB Rc18 (check)	3.96	3	clean, GS, GP
9	9	3.72	5	Mshb, light panicle
4	4	3.66	5	seed discoloration, GS

Table 4b. Yield and Phenotypic performance of MAT-TP 2014 WS.

Index No.	Designation	Yield (t/ha)	PACP			REMARKS
			Plants	Panicles	Grains	
9	NSIC Rc222 (check)	7.54	4	4	3	MShb, NBLS
5	NSIC Rc240 (check)	7.14	5	4	4	NVU, dense, BS
1	PSB Rc82 (check)	6.80	6	5	3	MShb, MBlb, BS
17	LOCAL CHECK (NSIC RC122)	6.77	3	5	3	clean, uniform
11	11	6.76	3	5	3	clean, uniform
15	15	6.56	4	4	4	GDC, NBLS
10	10	6.48	5	5	4	NVU, BS
14	PSB Rc18 (check)	6.25	3	5	3	clean, uniform
4	4	6.00	5	5	5	NU, BS, MShb
12	12	5.96	5	5	4	MBlb, MShb
13	13	5.92	5	5	5	NU, BS, BLS
6	6	5.87	5	4	4	BS, MShb
2	2	5.62	5	5	5	MShb, GDC
3	3	5.56	7	5	4	BS, MBlb, MShb
16	16	5.33	6	5	5	BS, MShb, GDC
8	8	4.80	6	5	5	35% rat damage, MShb, NVU
7	7	4.76	5	5	4	GDC, 30% rat damage

Table 5a. Yield and Phenotypic Performance of MAT-DWSR 2014 DS.

Index No.	Designation	Yield (t/ha)	PACP	REMARKS
11	NSIC Rc222 (check)	4.16	5	GP, GS, Mshb
12	12	4.01	3	clean, GP, GS
7	7	3.95	3	clean, Uniform, GP
6	6	3.91	5	GP, partially lodge
1	NSIC Rc224 (check)	3.90	5	GP, GS, Mblb
15	15	3.79	5	Mshb, GP
13	13	3.76	3	clean , uniform, GP
10	10	3.73	3	clean, GP, GS
8	NSIC Rc240 (check)	3.70	5	dense, bold grain, Mshb
17	LOCAL CHECK (NSIC Rc122)	3.67	3	clean panicle, GP
5	PSB Rc82 (check)	3.65	3	clean, GP
3	3	3.64	7	Shb, NU, GP
16	16	3.54	7	Mshb, Panicle blast
2	2	3.54	7	Shb, NU, GP
14	PSB Rc18 (check)	3.49	3-4	clean panicle, Gp
9	9	3.25	3	clean, GP, GS
4	4	3.18	5	Mshb, GP

Table 5b. Yield and Phenotypic performance of MAT-DWSR 2014 WS.

Index No.	Designation	Yield (t/ha)	PACP			REMARKS
			Plants	Panicles	Grains	
2	2	5.40	6	5	5	Shb, NU, MBlb
10	10	5.21	5	5	5	NVU, MShb
8	8	5.09	6	5	5	NU, Shb, GDC
1	PSB Rc82 (check)	5.08	5	5	5	MShb, BLS
12	12	4.97	5	5	5	NVU, MShb
15	15	4.96	5	5	5	MShb, NBLS
3	3	4.89	6	5	5	MShb, BS, BLS
16	16	4.81	6	5	5	MShb, GDC
7	7	4.79	5	5	5	MShb, GDC, BS
9	NSIC Rc222 (check)	4.75	5	5	5	MShb, BLS
14	PSB Rc18 (check)	4.75	4	5	5	clean, uniform
6	6	4.68	6	5	5	NU, MShb, NBLS
17	LOCAL CHECK (NSIC Rc122)	4.57	3	5	4	clean, uniform
4	4	4.57	5	5	5	NVU, MShb
11	11	4.57	4	5	5	uniform, clean
5	NSIC Rc240 (check)	4.43	5	5	5	MShb, GDC
13	13	4.40	6	5	5	MShb, NVU, BLS

II. Upland Rice Farmers' CapabilityAdvancement and Resource Empowerment (Upland Rice FarmCARE): Using Palayamanan Approach

CA Mabayag, CS Estacion

To ensure and sustain food supply for the upland farming communities, highland areas are now tapped to help produce rice and other food crops to feed impoverished communities living in the rolling and mountainous terrains in the country.The Department of Agriculture believes that the development of the communities' upland rice supply chain could serve as vehicle for household food security, which might be one of the missing pieces in the rice self-sufficiency puzzle. Despite challenges posed in upland rice cultivation, the government is determined and allocated some financial support for research and development to harness the potential of upland rice ecosystemWith good policies and support in placed, this endeavor would surely increase and sustain food (rice in particular) self-sufficiency and reduce poverty and malnutrition,specifically in the highland communities. Thus, technically equipping and resource empowering the upland farming communities to become vibrant partners in improving and sustaining productivity, is one of the most appropriate and effective approaches.

This study aims to identify and characterize upland rice farming communities, document different upland rice management practices that can be included in the development and packaging of Upland Rice Cultivation Technology, conduct participatory research cum training on verification/development and evaluation of management practices (i.e. varietal evaluation, selection and purification; establishment of community seed bank; nutrient management, etc.); develop and/or test crop diversification models in the pilot site using Palayamanan system suitable in the area to improve farm productivity (income) and improve soil conservation and determine the cost-effectiveness of upland rice technology developed/verified. This project is expected to be implemented in two provinces of Region XI in collaboration with the DA-RFU XI Crops and Research Divisions, LGUs, NGOs, IPs or PO in the identified upland rice communities.

Highlights:

- In the upland areas, unavailability of planting materials has been considered as one of the limiting factors that hindered them to continually cultivate rice and other suitable crops during the most favorable time. In addition, issues on severe pest infestations, i.e., birds, rats and insects discouraged many farmers to cultivate rice. And in continuously cultivated hilly areas, low soil fertility has been their primary concern, thus nutrient management is being included in the testing and demonstration setups. In collaboration with the LGUs and ATI, trainings were conducted in these sites.

Site 1 – Cateel, Davao Oriental

- In Nov. 2013 to April 2014, an area of 1.0ha was planted with Remotes, which is the most preferred variety/line of the farmers in Sitio Yapsay, Brgy.Taytayan. It obtained 1,800kg that are all kept for household consumption and as planting material for the next cropping season. Low yield can be attributed to damage caused by neck rot and bird infestations, which are common problems in upland rice. Despite low productivity, farmers still continually cultivate upland rice because it's their staple food.

- To augment their income, we encouraged them to plant other crops such as root crops and vegetables (red bell pepper, bitter gourd, squash and eggplant), and to ensure availability of sufficient food for the family and community (Figure 1). Our farmer-partner also planted agro-forestry crop such as Falcata because the area will no longer be planted with upland rice to allow the soil to restore its fertility, which is the common practice in the area.

Figure 1. A 1.0 ha area planted with Remoletes integrated with vegetables in Sitio Yapsay, Brgy. Taytayan, Cateel, Davao Oriental.

In October 2014, the farmer-cooperator had again started preparing a 1.0ha field in another site for upland rice cultivation through slash and burn method, which is a common practice in preparing the field in the community (Figure 2). Still they planted Remoletes, which they most preferred in term of eating quality was sown on Nov. 18, 2014.

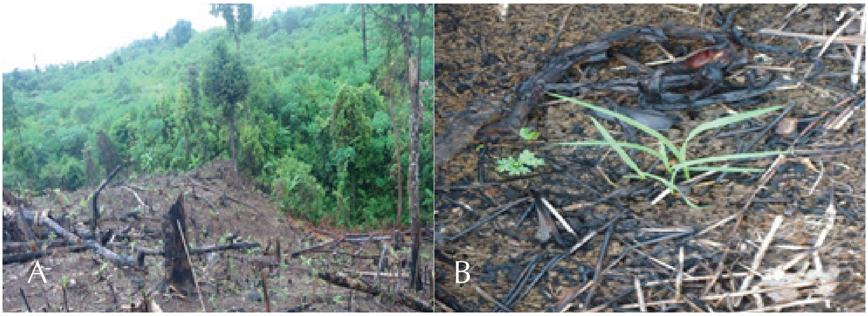


Figure 2. A) Area planted with Remoletes on 11-18-2014; B) Upland rice at seedling towards vegetative stage.

Site 2 – Marilog District, Davao City

Mr. Joel Lumanay, the farmer cooperator planted eight upland rice varieties/lines in an area of 100 sq. m per variety/line. Grain yield obtained were very low owing to bird and rat infestations: Dinorado (22kg), PSB Rc7 (40kg), NSIC Rc9 (60 kg), Mangosingkit and Davao Rice (1.5kg), Tres Marias (2.0kg). While Peria and Remoletes did not germinate.

Vegetable crops as component of the Palayamanan farm, which he also cultivated remarkably augment the income from his farm. In Jan-Dec 2013, he got P139,850 gross margins primarily from vegetable crops and perennial crops (banana and cacao) planted in the area.

Figure 3. Field experimental area in Purok A, Sitio Katipunan, Brgy. Magsaysay, Marilog district, Davao City.

Figure 4. Vegetables grown (A) bitter gourd (B) eggplant, tomato, pepper, raddish, etc. A good component of Palayamanan farming system.

In another site, Sitio Nangalid, Barangay Salumay, the farmer-cooperator Mr. Jose Dumanayos, planted Dinorado and Azucena in a area of 2,000sq.m per variety. He got a yield of 900kg from Dinorado and 600kg from Azucena. The harvested palay were just kept for family consumption. He also planted squash and harvested a total of 4,000kg (Figure 6b) sold at P5/ kilo; in which he earned PhP20,000.

On December 15, 2014, seeds were already provided to the cooperators through the City Agriculturist assigned in Marilog District.

Figure 5. A) One hectare planted with NSIC Rc9 at Sitio Nangalid, Brgy. Salumay planted last April 30, 2014, B) vegetable crop, such as squash was also planted for additional income.

Site 3 - Buda, Davao City

Mr. Rolando Lacubtan, a retired AT was the new farmer-cooperator in Buda, Davao City. He is enthusiastically planted 33 traditional varieties of upland rice that he collected from the province of Bukidnon and Davao Provinces. He has also experimented different panting patterns (square planting system and quincunx planting system) to optimize solar radiation-use efficiency to improve crop growth and get high yields. Unfortunately, because these were the only standing crops in the community, these were heavily infested by birds and rodents.

For January to May 2015 CS, the cooperator had received upland rice seeds of Dinorado, UPLRi5 and NSIC Rc9, which will be sown in February 2015. Land preparation is now on-going.

To ensure that seed will be preserved he also grow them in pots. Seeds were sown at 2 to 3 seeds per hill (Below is the list of rice collections planted).

1. Biyao
2. Sinoled
3. Kaselo
4. Buloloy
5. Hinomay
6. Talo
7. Dit Kalayag
8. Salabak
9. Salog

10. Sinamal
11. Malogon
12. Lansiyaw
13. Balis
14. Balandayon
15. Gakit
16. Bisaya
17. E.I Aleling
18. Gamao-gamao
19. Suakong
20. Mimis
21. Dalumpingan
22. Davao Dinorado
23. Cotabato Dinorado
24. Bawi
25. Bangkaleng
26. Salowi
27. Kaanonan
28. Gintawan
29. Patyokan
30. Anibong
31. Kaliakan
32. Kabilaw
33. Malagkit

Figure 6. Inspection of emerging different rice collections planted in different patterns (square planting system and quincunx planting system).

Site 3. Monkayo, Comval Province

The Palayamanan farm was planted with Dinorado (the only available viable seeds) on March 17, 2014. Owing to heavy rainfall at sowing that displaced the newly-sown seeds, the farmer-cooperator replanted thrice. While those that survived into maturity were attached by rodents and rice bugs because these were the only crops planted in the community.

We again provided upland rice seeds this (Dinorado and NSIC Rc9) plus the seed coming from ATI.

Figure 7. Identified and validated site in Inambatan, Monkayo, Compostela Valley Province.

Site 4. Kapalong, Davao del Norte

Mr. Nestor Galos, received upland rice seeds, Dinorado and NSIC Rc9 on Dec.15, 2014. Land preparation will be done this January, and seeds will be sown this coming February which is the planting season in Davao provinces.

Figure 8. Area planted with rice and vegetables at Mamacao, Kapalong, Davao del Norte.

III. Field performance trial of Macro Nutrient Dense elite lines for irrigated lowland. January to June and July to December 2014 cropping.

HA Jimenez, JB Culiao, GF Estoy, Jr., and EC Arocena

Improvement on the micro-nutrient content of the rice grain was initiated by CGIAR. At IRRI, breeding for iron-dense rice led by Dr. Dharwamansa Senadhira started in 1992. This research was influenced by the efforts of the Philippine Government to eliminate the iron malnutrition problem in the country by artificially enriching milled rice with iron (Gregorio et.al. 1999).

This project on breeding for mineral and vitamin enhancement of rice holds a great promise for making a significant, low-cost, and sustainable contribution to reducing micro-nutrient malnutrition in the country. With the thousands of rice selections with elevated mineral content generated by IRRI, evaluation of these materials for local consumption and utilization in the breeding program would be beneficial.

Yielding ability of the micronutrient–dense breeding materials is one of the major bases of selection to suit farmers' demand. However, several factors contribute to the full expression of this trait. The genetic make-up of the selected lines coupled with the biotic and abiotic stresses prevalent during the cropping season and the interaction with the environment dictates the yield performance of these selections.

Hence, to produce the desired varieties, after the series of trials to evaluate the performance of the advanced lines developed by IRRI, these should be exposed to the different target environments. This will also enable the breeders to select the most promising micronutrient-dense lines based on yield performance and other good agronomic traits those that can be included for multi-location yield trial and finally to NCT.

Field performance trial of Micro Nutrient Dense elite lines for Irrigated Lowland. January to June and July to December 2014 cropping.

Highlights:

- For January to June 2014 cropping season 22 test entries including only one check variety PSB Rc82 were evaluated. Five test entries outyielded the best check variety PSB Rc82 (3.66t/ha) by 1 to 8% yield advantage. These are: PR35015-GA-5-5-1 (3.96 t/ha), IR10M284 (3.81t/ha), IR10N255 (3.79 t/ha), IR08M118 (3.72t/ha) and IR10M210 (3.68t/ha).

- Despite the low yield of the above test entries, showed excellent phenotypic acceptability. It was observed that this five entries showed high adaptability in terms of crop stand, pest and disease reaction that is comparable to our best check variety.

- For July to Decemeber 2014 cropping season 7 test entries outyielded the best check variety NSIC Rc82 (5.38t/ha) by 3% to 24% yield advantage, these are: IR10M245 (6.66t/ha), PR35015-GA-5-5-1 (6.22t/ha), IR10N255 (6.03t/ha), IR10M238 (6.00t/ha), PR34629-B-47-1-2-2-1-1 (5.62t/ha), IR10M284 5.58t/ha and IR10M300 (5.54t/ha). It was observed that inspite of excellent yield performance and good phenotypic acceptability, there's a minimal disease infections of the above mentioned test entries though it is at tolerable level.

- Across two cropping seasons, July to December 2014 performed well in terms of yield performance with 51% to 68% yield advantage for the top yielder test entries compared to January to June 2014 cropping with the rate of fertilizer application at 90-40-70 (NPK)/ha. Another observation was the effect of weather condition between the two cropping seasons in which more rainfall during the January to June 2014 cropping which gives a lower yield performance to all the test entries.

Table 6. Yield (t/ha) and phenotypic performance of MNT 2014 DS.

Entry No.	Line Designation	Yield t/ha	Yield advantage over Rc82 (%)	PA CP	Remarks
17	PR35015-GA-5-5-1	3.96	8	3-4	GP, clean, uniform
7	IR10M284	3.81	4	4-5	dense type, semi-exposed, short flag leaf
1	IR10N255	3.79	4	5	exposed panicle, sb
8	IR08M118	3.72	2	5	short panicel, sb
12	IR10M210	3.68	1	5	bold/dense type, short panicle
20	PSB Rc82 (check)	3.66		5	GP, GS, Mshb
6	IR10M300	3.37		5	NU, sb
11	IR10M245	3.22		5	Tall, medium grain
9	IR09M113	3.17		7	NVU, Pblast, Mshb
21	IR68144-2B-2-2-3-1-166	3.15		9	NU, shb, Mblb
2	IR10M238	3.08		6-7	Pblast, Mshb, NU
15	IR84749-RIL 243-1-1-1-1	3.07		7	NU, shb, short, Mblb
16	PR35342-2B-1-3-1-3-1-5	3.06		7	NVU, long panicle, Pblast
4	IR09N481	2.98		7	short panicle, exposed, NU, Pblast
22	IR75862-206-2-8-3-B-B-B	2.93		7	shb, NU, light panicle
10	IR84832-RIL 10-1-1-1-1	2.89		7	short, light panicle, Mshb
14	IR84833-RIL 38-1-1-1-1	2.78		7	NVU, shb, light panicle
19	PR34629-B-47-1-2-2-1-1	2.71		7	purple rice
18	PR34627-B-7-4-1-1-2-1	2.67		5	NVU, GP, sb
13	IR09M106	2.64		5	bold grain, NVU, shb
3	IR10M108	2.12		5	tall, bold grain, GP
5	IR10M153	1.82		7	NVU, short panicle, bold grain

Table 7. Yield (t/ha) and phenotypic performance of MNT 2014 WS.

Index No.	Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
				Plants	Panicle	Grains	
11	IR10M245	6.66	24	5	5	4	NVU, BLS
17	PR35015-GA-5-5-1	6.22	16	4	5	5	Uniform, BLS, GDC
1	IR10N255	6.03	12	5	5	4	light panicle, NVU, BLS
2	IR10M238	6.00	12	5	5	6	MBlb, MShb, Grain discoloration (GDC)
19	PR34629-B-47-1-2-2-1-1	5.62	4	5	5	5	MShb, GDC, uniform
7	IR10M284	5.58	4	6	5	5	MShb, MBlb, BS, light panicle
6	IR10M300	5.54	3	5	5	5	light panicle, BS, MSHb
20	PSB Rc82 (check)	5.38		5	5	4	MShb, MBlb
9	IR09M113	5.30		6	5	5	NU, MShb, MBlb
14	IR84833-RIL 38-1-1-1-1	5.26		5	5	4	NVU, MShb, NBLS
12	IR10M210	5.23		6	5	5	MShb, BLS
4	IR09N481	5.01		5	5	5	NVU, MShb, light panicle, BLS
8	IR08M118	4.95		6	5	5	Blb, BS, NU, MShb
13	IR09M106	4.87		5	5	4	NU, GDC, MShb
18	PR34627-B-7-4-1-1-2-1	4.76		5	5	6	GDC, MShb
16	PR35342-2B-1-3-1-3-1-5	4.65		6	5	5	NU, MBlb, MSHb, BLS
15	IR84749-RIL 243-1-1-1-1	4.64		6	5	5	MBlb, Shb, BLS
21	IR68144-2B-2-2-3-1-166	4.36		6	6	6	Shb, MBlb, short
10	IR84832-RIL 10-1-1-1-1	4.08		6	5	5	Mblb, BLS, BS, MShb
22	IR75862-206-2-8-3-B-B-B	4.04		5	5	5	NVU, GDC, MShb
3	IR10M108	3.98		5	5	5	Bold, NVU, pigmented
5	IR10M153	3.71		5	5	5	NU, GDC

IV. Evaluation of rice Germplasm for Zinc deficienty tolerance in Caraga Region

HA Jimenez, JB Culiao, JM Niones, and LM Perez

Biotic and abiotic stresses are among the factors affecting rice production in Caraga region. Most important of the abiotic factors are low solar radiation, flooding and soil-zinc deficiency. Using tolerant varieties is an efficient and sustainable management option to counter these problems. Genetic variability in tolerance to stresses exists which can be explained by various physiological mechanisms underlying certain adaptations to unfavorable conditions. These will serve as bases in varietal selection and development of improved rice varieties.

Zinc (Zn) deficiency was first diagnosed in rice (Oryzasativa) on calcareous soils of northern India (Yoshida and Tanaka, 1969). It is currently a widespread micronutrient deficiency in Caraga Region causing low rice yields. Zinc deficiency can be corrected by adding Zn compounds to the soil or plant, but the high cost associated with applying Zn fertilizers in sufficient quantities to overcome Zn deficiency places considerable burden on resource-poor farmers and it has therefore been suggested that breeding efforts should be intensified to improve the tolerance to Zn deficiency in rice cultivars (Quijano-Guerta et al., 2002; Singh et al., 2003).

Numerous studies investigated potential mechanisms for tolerance to Zn deficiency in rice. Tolerant cultivars may have lower Zn requirements or translocate relatively more Zn from roots to shoots (Cayton et al., 1985). It was concluded that high translocation of Zn to shoots and reduced translocation of Fe, Mg, P, Mn, and Cu would be an important tolerance mechanism. How these nutrient imbalances affect plant growth remains unresolved, but one likely explanation is a disturbance of enzyme functions (Neue and Lantin, 1994). Studies on genotypic differences in the ability to increase Zn availability in the rhizosphere for subsequent uptake have focused on the active release of Zn-mobilizing substances from rice roots. Zhang et al. (1998) detected phytosiderophores in root exudates of rice, and Hoffland et al. (2006) found higher rates of organic acid excretion in genotypes tolerant to Zn deficiency.

Yet another interpretation of cause-and-effect mechanisms under Zn deficiency focuses on the negative effect of secondary stress factors, such as high bicarbonate concentrations in the soil solution, on root growth with subsequent negative effects on Zn acquisition. (Yang et al., 1994; Hajiboland et al., 2003).Hacisalihoglu and Kochian (2003) reviewed the evidence from studies conducted in a range of crops and concluded that efficient Zn utilization in the shoot was of higher importance than rhizosphere processes. These partly contradictory findings highlight the need to reinvestigate the reasons for genotypic differences in tolerance to Zn deficiency in rice.

Highlights:

- For July to Decemeber 2014 cropping season, 24 traditional varieties were screened and evaluated with and without zinc oxide and zinc sulfate application using the Standard Evaluation System in zinc deficiency scoring based on its signs and symptoms and phenotypic performance. Table 8 shows that only 3 Rice Germplasm identified with tolerance to soil zinc deficiency with good to excellent phenotypic performance with and without zinc oxide and zinc sulfate application, these are: Awot (12800A), RED RICE (DON BOSCO) (12835-A) and BLACK RICE (DON BOSCO) (12836).

- At the early stage of the crop, almost all test entries with or without zinc sulfate application have the signs and symptoms of zinc deficiency which is very clear to the naked eye these are: rust, stunted growth, poor tillering and most of the plants eventually die.

- Between late vegetative and early reproductive stages, it was noticed that some of the test entries without zinc sulfate application recovered very fast and the signs and symptoms of zinc deficiency disappear and shows a normal growth same with those treated with zinc sulfate and therefore it is the basis of making a decision that those test entries showed tolerance or tolerant to soil zinc deficiency though, soil samples were taken for chemical analysis.

- Another test, zinc deficiency simulation using the pot experiment were also done to double check the tolerance level of four test entries (IR64, NSIC Rc122, IR08A183 and IR09N540) without zinc sulfate application. Table 9 shows the agronomic data of the pot experiment of which IR08A183 showed a good performance in terms of its growth form 16 DAT up to the maturity stage with a little rust on its leaves and exhibited tolerance to soil zinc deficiency, unlike NSIC Rc122, IR64 and IR09N540 which has more rust on its leaves and stunted growth as shown also in Figure 9 to 12.

Table 8. Zinc scoring and field performance of 24 Rice Germplasm to soil zinc deficiency 2014 WS.

Collection No.	Cultivar Name	Zinc Score 25 DAT		Remarks @ 25 DAT		Zinc Score 40 DAT		Remarks @ 40 DAT		Zinc Tolerance w/o zinc application
		W/Zn	W/O Zn	W/ Zn	W/O Zn	W/ Zn	W/O Zn	W/ Zn	W/O Zn	
12383	Kalinayan (Monos)	7	filler	rust, poor tiller	filler	7	filler	poor tillering, not uniform (NU)	filler	-
12655	Malido	7	filler	rust, stunted	filler	5	filler	GS, clean	filler	-
12677-A	Binernal Red	7	9	rust, stunted	rust, stunted	5	9	rust, not uniform (NU)	Stunted, Rust, susceptible	susceptible
12678	Brillante	7	9	rust, stunted	rust, stunted	7	9	clean, NU	NU, poor tiller, rust	susceptible
12679	Binernal White	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	NU, stunted, rust	susceptible
12700	Kasagpi	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12731	Palawan	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12744-C	Galo	7	9	rust, stunted	rust, stunted	5	9	GS, clean	stunted, rust	susceptible
12745-A	Galo (Gaspang-1)	9	9	rust, stunted	rust, stunted	7	9	poor stand, NU	stunted, rust	susceptible
12795	Maria Gakit	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	NU, stunted, rust	susceptible

Table 8. Zinc scoring and field performance of 24 Rice Germplasm to soil zinc deficiency 2014 WS. (Con't...)

12796	Speaker	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12799-A	Hinumay	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	NU, stunted, rust	susceptible
12800-A	Awot	5	7	good stand, Rust	rust, stunted	5	5	GS, clean	GS, clean, Tolerant	tolerant
12801-A	Dinorado	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12802-D	Awot	9	9	rust, stunted	rust, stunted	9	9	NU, poor tillering	stunted, rust	susceptible
12808	Malay 2	5	7	good stand, Rust	rust, stunted	5	7	GS, uniform, clean	stunted, rust	susceptible
12835-A	Red Rice (Don Bosco)	3	5	good stand, Rust	good stand, Rust	3	5	GS, clean, uniform	GS, clean, Tolerant	tolerant
12836	Black Rice (Don bosco)	5	5	good stand, Rust	good stand, Rust	5	5	GS, clean, uniform	GS, clean, Tolerant	tolerant
12846-A	Kinamuros	7	9	rust, stunted	rust, stunted	5	9	GS, clean	stunted, rust	susceptible
12846-B	Kinamuros	3	9	good stand, Rust	rust, stunted	3	9	uniform, clean, GS	stunted, rust	susceptible
12848	Kabundulan	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12848-A	Kabundulan	5	9	good stand, Rust	rust, stunted	5	9	NU, GS	stunted, rust	susceptible
12849-A	Malido Red	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible
12850	Palawan	7	9	rust, stunted	rust, stunted	7	9	NU, poor tillering	stunted, rust	susceptible

Table 9. Agronomic data of the four test entries using pot experiment method (zinc deficiency simulation) 2014 WS.

Test Entry	16 DAT		23 DAT		30 DAT		37 DAT		99 DAT	
	Plant Height (cm)	Ave. No. of Tiller	Plant Height (cm)	Ave. No. of Tiller	Plant Height (cm)	Ave. No. of Tiller	Plant Height (cm)	Ave. No. of Tiller	Plant Height (cm)	Ave. Productive Tiller
IR64	28.17	4	27.67	3	39.83	6	31.83	13	65	27
NSIC Rc122	26.17	3	26.17	2	22.17	3	22.17	2	67	10
IR08A183	27.4	3	34.17	3	35.83	5	47	11	97	30
IR09N540	29.07	3	27.67	3	30.83	4	34	8	74	10

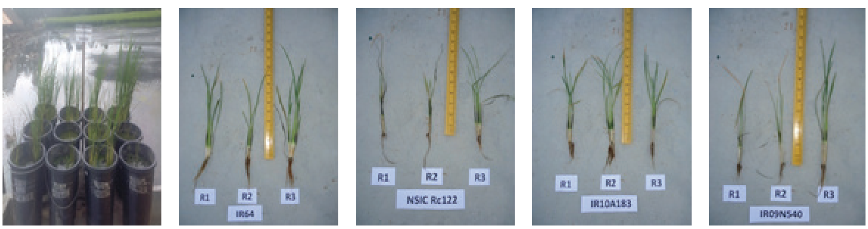


Figure 9. 16 DAT Pot Experiment.

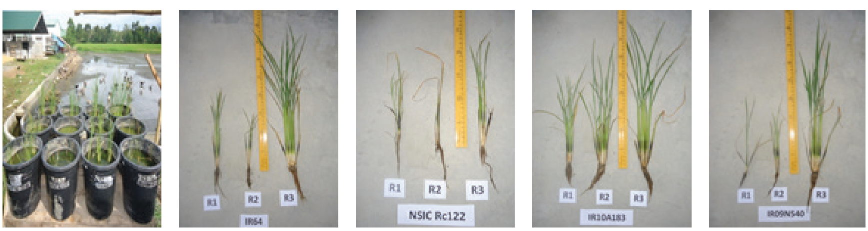


Figure 10. 23 DAT Pot Experiment.

Figure 11. 30 DAT Pot Experiment.

Figure 11. 37 DAT Pot Experiment.

V. Multi-Environment Testing for Irrigated Lowland Rice stages 1 and 2

HA Jimenez, JB Culiao, TF Padolino, A Pamplona and ED Redona

IRRI breeding programs generate fixed and stable lines each season that are identified from pedigree nurseries as well as observational and replicated trials. Eventually, elite lines are advanced to multi – environment testing (MET) conducted via breeding networks. These networks, however, presently have limited geographical coverage and face challenges in terms of germplasm movement. Moreover, the materials tested through these networks are generally in the advanced stage of varietal development.

An exhaustive MET system for early generation breeding product is so far lacking at IRRI and in the global rice breeding community. For this reason, a new MET system is being established at IRRI beginning in 2011 under the Global Rice Science Partnership (GRiSP), to be piloted for irrigated lowland rice.

The MET -IR was initially conducted in three test sites strategically located in the county, including PhilRiceAgusan, with a Type II climatic condition area with no distinct dry season, and frequent and heavy rainfall from November to February. For MET stage 0 the test entries were composed of 480 elite lines group into two maturity classes; early maturing (module 1) and medium maturing (module 2). For MET stage 1the test entries were composed of 220 elite lines also group into two maturity classes.

For MET stage 2from nine hundred (900) test entries evaluated during the 2011 cropping , only seventy four top performing lines were advance for further trial under MET 2. MET stage 2 test were group into two maturity classes; early maturing (module 1) and medium maturing (module 2). Five check varieties were used: PSB Rc82, PSB Rc10, PSB Rc18, NSIC Rc222 and NSIC Rc124H.

Highlights:

- January to June 2014 cropping. For MET stage 0 in early maturing group ,195 test enties out of the 336 total entries survived from the flood were planted for phenotypic observations only due to unequal plot size and number of hills planted.. Based on observation in terms of phenotypic acceptability, pest and disease reaction, eighteen test entries had a good performance that is comparable to the best check variety (Table 10a).

- July – December 2014 cropping.For MET stage 0 in early maturing group, Table 10b shows that 2 test entries performed well with a yield of 8.37t/ha (IR12A286) and PR39505-16-10-114 (8.25t/ha) and excellent phenotypic performance and 23% yield advantage compared to the best check NSIC Rc238 (6.81 t/ha). However, it was noted that 42 test entries got an average yield of 7.01 to 7.98t/ha of which it outyielded the four best check varities. One hundred sixty (160) test entries got a comparable yield with the best check varieties that ranges from 6.01 to 6.99t/ha, 95 test entries also yielded 5.0 to 5.99 t/ha and 16 test entries yielded 4.12t/ha to 4.98t/ha of which all of this test entries performed well compared to the previous cropping season, though minimal disease incidents were observed at tolerable level.

- January to June 2014cropping. For MET stage 0 in medium maturing group ,135 out of 168 test entries survived from the flood were tested for phenotypic observations only without a yield data gathered due to unequal plot size and number of hills being planted. Based on observation in terms of phenotypic acceptability, pest and disease reaction eighteen test entries had a good performance that is comparable to the best check variety (Table 11a).

- July to December 2014 cropping. For MET stage 0 in medium maturing group, two test entries got a comparable yield with the best check variety NSIC Rc124H (8.05t/ha) at 2% yield advantage, these are: IR13N132 (8.22t/ha) and IR12A171 (8.03t/ha) with good phenotypic performance and minimal disease infections (Table 11b). 119 test entries showed also an excellent yield performance that ranges from 6.0 t/ha to 7.90 t/ha with a good to excellent phenotypic performance which is comparable to the best check varieties. 31 test entries showed also an average yield that ranges from 4.44 to 5.99t/ha with good to excellent phenotypic performance also. The lowest yielder is only one test entry with an average yield of 3.68t/ha.

- January to June cropping. For MET stage 1 in early maturing group , table 12a shows the top five lines includes: IR11A255(4.99t/ha), IR11A151(4.83t/ha), IR12L136(4.83t/ha), IR 09N542(4.73t/ha) and IR12L130(4.67t/ha) . Among the five check varieties NSIC Rc238 yield the highest with 4.50 t/ha and the least PSB Rc10 yielded only 3.14t/ha.Ten test entries outyielded the best check variety NSIC Rc238 by 1 to 11%.54 test entries for the early maturing group obtained an average yield that ranges from 4.00 to 4.99 t/ha. Four (4) lines among the high yielding entries were identified to have an excellent performance: PR40539-B-B-16, IR 10F550, IR 11A306, PR38169-B-11-2-1-2-2-1-1.

- July to December 2014 cropping.For MET stage 1 in early maturing group, 13 test entries outyielded the best check variety NSIC Rc132H (7.17t/ha) by 7% yield advantage these are, IR11N313 (7.70t/ha), IR11N187 (7.70t/ha), IR12L235 (7.50t/ha), IR12L125 (7.48t/ha), IR11A302 (7.45 t/ha), IR10F339 (7.39t/ha), IR11A342 (7.33 t/ha), IR10F550 (7.32t/ha), IR10F548 (7.30t/ha), IR11C134 (7.24t/ha) and so on plus 6 test entries got a comparable yield with the best check variety that ranges from 7.01 to 7.14 t/ha. 130 test entries showed also an excellent yield performance that ranges from 5.03 to 6.96 t/ha with good to excellent phenotypic performance comparable to the best check varieties. Four (4) test entries yielded that ranges from 4.58 to 4.93 t/ha and the lowest is 3.71t/ha. All test entries of this season performed well with a 54% yield advantage from the top performing entries compared to the previous cropping season (Table 12b).

- January to June cropping. For MET stage 1 in medium maturing group , the top five includes IR11N205(5.39t/ha), IR11N205(5.23t/ha), IR11A493(4.95 t/ha),IR09N523 (4.93t/ha) and PR41588-JR-B-B-78(4.92t/ha). Among the four check varieties NSIC Rc222 yield the highest with 3.66t/ha and the least NSIC Rc124H yielded only 2.77t/ha. Eighteen test entries for the medium maturing group obtained an average yield of 4.01 to 4.83 t/ha. Based on observation in terms of phenotypic acceptability, pest and disease reaction most of the top yielding entries had a good performance that is comparable to the best check variety (Table 13a).

- July to December 2014 cropping. For MET stage 1 in medium maturing group, 20 test entries outyielded the best check variety NSIC Rc124H (6.71t/ha) by up to 11% yield advantage of which 7 got an excellent yield that ranges from 7.01 to 7.44t/ha. These are: IR11A193 (7.44t/ha), IR11A305 (7.35 t/ha), IR09N523 (7.34t/ha), IR11N205 (7.26t/ha), IR81958H (7.23t/ha), IR06A148 (7.12t/ha), IR11L236 (7.10t/ha), IR90876H (7.09t/ha), and PR40524-6-1 (7.01t/ha). 61 test entries got a comparable yield to the four best check varieties that ranges from 5.48 to 6.99 t/ha with a good to excellent phenotypic performance (Table 13b). Across two cropping seasons, July to December 2014 cropping season got a 38% yield advantage of the top performing test entries compared to January to June 2014 cropping with the same rate of fertilizer application at 90-40-70 (NPK)/ha.

- January - June cropping. For MET stage 2 in early maturing group only one line (PR 37787-5-3-2-3-2-B-B with 4.70 t/ha) out of 48 test entries outyielded the best check variety NSIC Rc132H (hybrid) by 2%. It can be noted that 22 test entries have a yield of 4 tons and above. Among the four check varieties NSIC Rc132H yield the highest with 4.59 t/ha followed by NSIC Rc238 (4.16t/ha) and the least PSB Rc10 yielded only 3.11t/ha. It can be noted that this identified top performing lines had an excellent phenotypic acceptability which explains its comparable performance compared to the check varieties: IR 10A314, PR37787-5-3-2-3-2-B-B, PR37165-1-2-1-1-1-1 (Table 14a).

- July – December 2014 cropping.For MET stage 2 in early maturing group, four test entries outyielded the best check variety PSB Rc82 (6.60t/ha) by up to 7% yield advantage, these are: IR85466H (7.09t/ha), HHZ 5-SAL14-SAL2-Y2 (6.86t/ha), IR08L216 (6.76t/ha) and IR04A216 (6.61t/ha).

  17 test entries got a comparable yield with the other two best check varieties NSIC Rc132H (6.32t/ha) and NSIC Rc238 (6.27t/ha) that ranges from 6.0 to 6.45t/ha and 26 test entries got an average yield that ranges from 5.0 to 5.93t/ha with good to excellent phenotypic performance and tolerable

disease infections. Only 4 test entries got a yield of 4.0 to 4.62 t/ha and 3.09 t/ha is the lowest yield (Table 14b).

- January - June cropping. For MET stage 2 in medium maturing group ,four lines out of 26 entries outyielded the best check variety NSIC Rc124H (hybrid) by 2 to 19% these includes: PR38012-3B-1-3 (SP) (5.05), IR 11A108 (4.51t/ha), IR 11A108 (4.50t/ha) and PR37252-2-1-1-1-2-3 (4.33t/ha)Among the four check varieties NSIC Rc124H yield the highest with 4.25t/ha and the least NSIC Rc158 yielded only 3.76t/ha. Twelve (12) test entries for the medium maturing group obtained an average yield of 4.0t/ha and above (Table 15a). Based on observation in terms of phenotypic acceptability, pest and disease reaction most of the top yielding entries had a good performance that is comparable to the best check variety: PR38012-3B-1-3 (SP), 12DS-GMET-20, PR37252-2-1-1-1-2-3, PR36921-B-6-1-3-1-1, IR 11A294.

- July to December 2014 cropping. For MET stage 2 in medium maturing group, best check variety NSIC Rc124H (7.26t/ha) outyielded all test entries though, the 22 test entries performed well this season in terms of yield and good to excellent phenotypic performance with tolerable disease infections. The yield ranges from 5.42t/ha (lowest) to 6.86t/ha of which 3 best check varieties has a comparable yield with the test entries (Table 15b). Across two cropping seasons, July – December 2014 cropping got a 27% yield advantage of the top yielding test entries compared to January to June 2014 cropping season with the same rate of fertilizer application at 90-40-70 (NPK)/ha.

Table 10a. Field Evaluation of MET 0 early maturing group, January – June 2014 DS.

Designation	PACP	Remarks
PR395008-5-59-2	5	clean, heavy grains GS
GSR IR2-11-R9-Y1-L2	3	clean, heavy grains, GS
IR13A229	5	clean, heavy grains, GS
14DS-GMET-4	3	clean, heavy grains, GS
GSR IR2-9-R1-SU3-R2	3	bold grains, clean, GS
GSR IR1-18-D4-Y1-SU2-L1	3	light grains, clean, GS
GSR IR2-19-Y14-L2-L2	3	dense, bold grains, clean, GS
IR13A378	3	clean, light grains, GS
PR39879-3B-B-B-15-1-2	5	clean, light grains, GS
IR12N142	5	clean, light grains, GS
GSR IR2-1-R5-N1-Y3	3	dense, bold grains, clean
IR12A181	3	clean, GS
IR12A105	3	clean, GS, GP
IR13A268	3	clean, GS, tall
IR13A254	3	clean, GS, tall
GSR IR1-6-D10-Y1-D1-L2	3	dense, clean, GS
IR12A206	3	clean, GS
IR12A288	3	light grains, GS

Table 10b. Yield (t/ha) and phenotypic performance of MET 0 early maturing group 2014 WS.

Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
			Plants	Panicle	Grains	
IR12A286	8.37	23	5	5	3	lodge, bls, shb, wh
PR39505-16-10-114	8.25	21	3	5	5	clean, wh
IR 87761-61-3-1-1	7.98	17	3	5	5	gdc, wh,nbls
GSR IR1-23-S15-Y1-Y1-D2	7.77		5	5	5	dense, wh
IR13A106	7.61		5	5	5	blb, wh
GSR IR2-9-R1-SU3-R2	7.59		5	3	3	clean, bold
PR39501-12-6-73	7.58		3	5	5	panicle exposed, wh, gdc
IR98049H	7.56		5	5	5	blb, nbls, shb
IR12A238	7.54		3	3	3	bls, uniform
IR13A479	7.54		5	7	7	gdc, wh,
PR42837-NSIC Rc222-DR-21	7.53		5	5	3	bs,hw
IR13A270	7.45		5	5	5	shb, nbls, light panicle
GSR IR1-18-D4-Y1-SU1-Y1	7.42		5	5	5	dense, wh, short panicle
IR 101465-10:7	7.34		5	5	5	wh, nbls, shb
IR12A237	7.31		5	5	3	nvu, wh
IR98054H	7.28		3	5	5	bls,
IR12N240	7.27		5	5	5	fs, blb, wh
IR12A302	7.26		5	5	5	blb, nbls
IRRI 147	7.25		5	5	3	blb, bold, uniform

Table 10b. Yield (t/ha and phenotypic performance of MET 0 early maturing group 2014 WS. (Con't...)

GSR IR1-6-S14-L3-S2-Y1	7.22		5	5	3	wh, bs,light panicle
IR13N112	7.22		3	5	3	uniform, nbls
PR38697-12-81-7	7.18		7	5	5	partly lodge, blb, gdc
IR13A213	7.18		3	5	3	mshb, partly awn bls
PR40241-B-B-B-B-12-3-1	7.17		7	5	3	blb, wh, shb
IR12T122	7.16		5	5	5	shb, wh, bs
IR 91320-12-4-1-2	7.16		5	5	3	light panicle, wh bs
IR12A206	7.16		7	5	5	blb, bs, bls
IR106616H	7.14		5	5	5	wh, nbls
PR42271	7.14		5	5	5	blb, bls, wh
IR12A282	7.13		5	5	5	dense, gdc, wh
PR41049-B-B-4	7.12		3	3	3	clean, uniform
14DS-GMET-2	7.11		3	5	3	uniform, bls,
IR12N142	7.09		5	5	5	gdc, bls
IR11T129	7.08		5	5	5	wh, gdc, nvu
IR12N207	7.08		5	5	3	clean, light panicle
IR13A147	7.07		5	3	3	partly lodge, wh
IR 101465-10:6	7.05		5	5	3	nbls, wh
IR13A273	7.05		5	3	3	wh, nbls
IR 92494-68-2-1-3	7.05		5	5	3	bold, wh, blb
IR13A386	7.04		5	5	5	nu, partly lodge
IR12N271	7.01		7	7	7	gdc, shb, bls
IR11A285	7.01		3	5	5	lfl, gdc, wh
IR13N141	7.01		3	5	5	gdc, wh,, shb
IR12N190	6.99		7	5	5	gdc, blb, shb
GSR IR2-9-R2-SU3-R2	6.98		5	3	3	wh, nvu,
GSR IR2-9-L1-L3-R2	6.97		3	3	3	clean, uniform
IR11A314	6.96		5	5	3	nbls, blb
PR395008-5-59-2	6.95		5	5	3	wh, short panicle, dense
IR96441H	6.95		5	5	3	blb, wh, shb
IR106631H	6.94		5	5	3	nbls, blb
IR12A165	6.94		5	5	3	partly lodge, blb, bls
14DS-GMET-4	6.93		5	5	5	bs, wh, bls
IR13A268	6.91		5	5	5	nvu, lodge, gdc
GSR IR1-18-D4-Y1-SU2-D1	6.90		3	5	5	dense, short panicle, nvu
IR12T125	6.90		5	5	3	blb, shb,
IR13A185	6.90		7	5	5	wh, nvu, nbls
IR11T183	6.88		5	5	5	gdc, wh, bls
IR 101465-10:2	6.88		7	5	5	mixtures, gdc, bs

Table 10b. Yield (t/ha and phenotypic performance of MET 0 early maturing group 2014 WS. (Con't...)

GSR IR2-19-Y14-L2-L2	6.87		3	3	3	bold ,nvu, clean
GSR IR1-18-D4-Y1-SU1-L2	6.85		3	5	5	wh, dense, gdc
IR98058H	6.85		5	5	3	bls, nbls,wh
IR13A221	6.83		5	5	5	gdc, wh, shb
IR 92545-10-1-1-4	6.82		5	5	5	gdc, blb, bls
IR90878H	6.82		7	5	5	blb, wh, nbls
PR39502-13-7-98	6.81		3	5	5	nu, bs
NSIC Rc238 (check)	6.81		5	5	3	blb, bls, shb
GSR IR1-6-S9-L2-Y1-Y1	6.79		5	5	3	dense, short panicle, wh
IR13A390	6.78		5	5	3	nbls, light panicle
IR13A109	6.78		5	5	3	wh, nbls, uniform
GSR IR1-3-D12-L1-S2-D2	6.78		5	5	5	wh, bs, light panicle
IR12N168	6.77		5	5	5	partly awn, nvu, bs
IR11T171	6.77		5	5	5	partly awn, shb, blb
PR41027-B-B-1	6.77		3	5	3	wh, bls
PR41519-20-5-1-ARc138-1-3-9-5	6.77		7	5	5	blb, wh, shb
IR12A199	6.75		7	5	5	blb, bls, shb
14DS-GMET-6	6.73		7	5	5	gdc, wh, shb, blb
PR39502-13-7-88	6.71		5	5	3	fs, nvu, wh, blb
IR13N104	6.71		3	5	5	nbls, gdc
IR 88965-33-3-2-1	6.70		5	5	5	wh, bls, tall
PR 40322-35-2-1-1-1-B	6.70		5	5	5	gdc, bold, wh
IR12A229	6.70		7	5	5	blb, gdc, shb, bls
PR39505-16-10-116	6.67		5	5	5	blb, wh,
IR 91298-1-1-4-2	6.66		5	5	5	wh, nbls, blb
IR13A371	6.66		5	5	3	blb, wh,n
GSR IR1-6-S15-Y1-D1-D1	6.66		5	5	3	wh, gdc
IR 88964-11-2-2-4	6.65		5	5	3	bs, light panicle, nvu
IR13A254	6.65		5	5	3	wh, light panicle
IR12N165	6.65		5	5	3	wh, partly lodge, bls
IR13A142	6.64		5	5	5	nu, wh
IR96392H	6.64		5	5	3	shb, nbls
IR12N186	6.64		7	5	5	blb, bs
IR12N177	6.63		3	3	3	clean, uniform
IR12N198	6.61		5	5	5	wh, nbls, shb
GSR IR2-12-R5-Y1-L2	6.60		5	5	5	nu, wh, gdc
GSR IR1-1-S9-D1-Y1-L2	6.60		5	5	5	dense, gdc
IR13A153	6.60		5	3	3	long panicle, wh

Table 10b. Yield (t/ha and phenotypic performance of MET 0 early maturing group 2014 WS. (Con't...)

IR13A229	6.58		5	5	3	snbls, wh
IR12A223	6.58		5	5	5	gdc, blb, bs
PR39950-B-15-B-7-2	6.57		5	3	3	blb, wh
IR12N222	6.56		5	5	3	blb, wh, bs
PR41035-B-B-2-3	6.56		3	3	3	clean, uniform
IR13A495	6.56		5	5	5	wh, nvu
PR 40759-32-1-1-1-B	6.56		5	5	5	gdc, tall, bs, blb
IR12N125	6.55		5	5	3	wh, blb
GSR IR2-8-Y14-SU3-Y2	6.55		5	5	5	wh, dense, nbls
IR12A166	6.55		5	5	5	wh, blb
IR106638H	6.54		5	5	5	nbls, wh, shb
IR13A262	6.53		3	5	3	blb, bs
IR12A105	6.53		5	5	5	partly awn, nbls
IR 101465-5:48	6.53		5	5	5	blb, bs, bls,
IR11T193	6.52		5	5	5	pnbl, nvu, shb
IR13A111	6.52		5	5	5	shb, wh, nbls
GSR IR1-1-D1-D1-Y1-D3	6.50		3	5	5	uniform, shb, dense
IR12A255	6.50		5	5	5	blb, wh
NSIC Rc132H (Mestizo 6)	6.27		5	5	3	nbls, wh
PSB Rc82	6.21		5	5	3	wh, shb
PSB Rc10	4.24		7	7	5	gdc,bls, shb

Table 11a. Field Evaluation of MET 0 medium maturing group, January – June 2014 DS.

Designation	**PACP**	**Remarks**
IR12N220	3	tall, clean
IR13A295	3	late, clean
IR11A294	3	clean, light grains, tall
IR13A294	3	clean, tall
IR13N149	3	clean, tall, light grains
IR12N232	3	heavy grains, clean, GS
IR11A341	3	tall, clean, GS
IR12A340	3	tall, clean, GS
IR 91648-B-175-B-1-1	3	clean, light grains, GS
IR13N103	3	clean, light grains, GS
IR12A258	3	tall, clean, GS
IR12F563	3	late, clean, GS
IR12N238	5	clean, tall, GS
IR12N238	5	clean, tall, GS
IR12A342	3	clean, light grains
IR 91648-B-114-B-1-B	3	clean, light grains
IR10F559	3	clean, heavy grains, tall
PR 39557-9-2-3-1-B	3	heavy grains, MBlb, shb

Table 11b. Yield (t/ha) and phenotypic performance of MET 0 medium maturing group 2014 WS.

Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
			Plants	Panicle	Grains	
IR13N132	8.22	2	5	5	3	wh, shb
NSIC Rc124H (Mestizo 4) (check)	8.05		3	3	3	clean, tall, uniform
IR12A171	8.03		5	5	5	wh, shb
IR11A292	7.90		5	5	3	nbls, blb
PR42837-NSIC Rc222-DR-41	7.78		5	5	3	nbls, shb
IR12A295	7.77		5	5	5	wh, shb, nbls
IR12N281	7.75		5	5	5	nbls, nvu
14DS-GMET-15	7.75		3	5	3	bs, bls, uniform
IR13N134	7.74		5	5	5	nvu, wh, shb
IR 101465-5:42	7.70		5	5	3	nbls, wh
IR10F559	7.70		3	5	5	gdc, tall, nbls
IR13N115	7.70		5	5	5	wh, nvu, bs
PR 41210-2-3-1-B	7.67		5	3	3	nu, nbls
IR 101465-8:23	7.61		5	5	3	nu, shb
PR42837-NSIC Rc222-DR-11	7.61		5	5	5	wh, nbls
IR13N152	7.60		3	5	5	nbls, shb
IR12A342	7.58		3	5	5	bs, wh
IR12A341	7.53		3	5	5	clean, light panicle
IR12A291	7.52		5	5	5	gdc, wh, nvu
IR12A340	7.50		3	5	5	clean,
PR42837-NSIC Rc222-DR-35	7.46		3	5	3	bls, uniform
IR12A330	7.44		5	3	3	nvu, nbls, bs
IR12N234	7.43		3	5	5	tall, clean, gdc
IR13A294	7.42		5	5	3	shb, wh, nvu
IR13N131	7.42		5	5	5	nu, wh, gdc
IR12A331	7.40		5	5	3	nbls, nvu

Table 11b. Yield (t/ha) and phenotypic performance of MET 0 medium maturing group 2014 WS. (Con't...)

IR12A329	7.40		3	5	5	gdc, nbls, uniform
IR12A136	7.34		3	5	5	wh, gdc
IR12A258	7.34		3	5	3	clean,, uniform
14DS-GMET-7	7.33		5	5	3	bold, wh
14DS-GMET-13	7.30		3	3	3	wh, uniform
IR12A334	7.28		3	5	3	uniform, nbls
IR12N191	7.27		5	5	5	nvu, gdc, bls
IR13A313	7.26		5	5	5	tall, nvu, gdc, wh
IR11A303	7.24		5	5	5	nvu, gdc
IR12N269	7.24		5	5	5	gdc, nvu
IR12T246	7.24		3	3	3	clean, late
IR12A211	7.19		3	5	5	nbls, uniform
IR 101465-12:25	7.18		5	5	5	nbls, shb
IR12T266	7.17		5	5	3	wh, clean
IR11A287	7.17		5	5	5	nvu, blb
IR12A289	7.16		5	5	5	gdc, shb
PR41825-B-109	7.16		5	5	5	gdc, wh, shb
IR12A268	7.14		5	5	5	blb, wh, nbls
IR95624-B-123-3-B-B	7.12		3	3	5	nbls,blb
IR13N128	7.12		5	5	5	gdc, nbls,
IR 101465-8:42	7.11		7	5	5	nu, wh, shb, nbls
IR13A276	7.11		3	5	3	nbls
IR13A107	7.10		5	5	5	gdc, blb, nbls
IR13A226	7.07		5	5	5	nvu, clean
14DS-GMET-20	7.06		5	5	3	wh, shb, bs
PR37925-B-3-2-1-1-1	7.03		5	3	3	long panicle, blb, shb
IR12N242	7.03		3	5	5	nbls, nvu
NSIC RC222 (check)	7.02		5	5	5	nbls, wh, bls
IR12N253	6.99		5	5	5	nu, gdc,late, nbls
PR42837-NSIC Rc222-DR-12	6.98		5	5	3	nbls, gdc
PR40853-6-1-2	6.96		5	5	5	gdc, wh, bs

Table 11b. Yield (t/ha) and phenotypic performance of MET 0 medium maturing group 2014 WS. (Con't...)

NSIC Rc158 (check)	6.96		5	5	5	wh, light panicle, uniform
IR11A294	6.95		5	5	5	wh, nbls, blb,
IR13A194	6.93		5	5	5	gdc, bls, wh
IR95610-B-67-2-B-B	6.93		5	5	5	nbls, shb
IR12A144	6.91		3	5	5	nbls, gdc
PR38577-B-6-B-B-B	6.88		5	5	3	nbls, blb
IR 91648-B-114-B-1-B	6.82		3	5	3	clean, uniform
IR 91648-B-175-B-1-1	6.80		3	5	5	clezn, light panicle
IR13T146	6.79		5	5	5	pigmente d, shb, nvu
PR41812-3B-22	6.77		5	5	3	nvu, wh
IR13N103	6.76		5	5	5	gdc, nbls
IR12F566	6.75		3	5	5	late, wh, nbls
IR13A256	6.73		5	5	5	blb,nbls
IR11A341	6.72		3	3	3	clean, uniform
IR12T195	6.71		5	3	3	nbls, uniform
IR11F186	6.70		5	5	5	gdc, very late, nbl, tall
IR 91648-B-296-B-2-1	6.69		5	7	5	wh, gdc, bs
IR12N225	6.66		5	5	3	wh light panicle
IR11F211	6.65		5	5	3	nvu, wh
IR13A218	6.64		3	5	5	gdc, shb, wh
PR39172-B-19-B-B-2	6.64		5	5	5	partly awn, nbls,,shb
IR12N189	6.63		5	5	5	nbls, wb
IR95610-B-194-3-B-B	6.62		5	5	5	nbls,wh
IR 58443-6B-10-3	6.61		7	5	5	shb, wh, nu
IR12N249	6.61		5	5	5	shb, nbls
IR13A242	6.60		3	5	3	uniform nbls
IR10F571	6.60		5	5	5	late, gdc, bls
IR12N176	6.60		5	5	5	bls, light panicle

Table 11b. Yield (t/ha) and phenotypic performance of MET 0 medium maturing group 2014 WS. (Con't...)

IR12N274	6.57		5	5	7	gdc, wh, nbls
IR12A202	6.57		3	5	5	uniform, nbls
IR95611-B-160-1-B-B	6.57		5	5	3	shb, blb
IR13A319	6.56		5	5	3	wh, nbls
IR12A194	6.56		5	5	3	blb, nbls
IR12N220	6.55		5	5	5	gdc, bs
IR13N130	6.53		5	5	3	nvu, nbls bls
IR13A176	6.52		5	5	5	gdc, wh nvu
IR13N151	6.51		5	5	5	nbls, nvu
PR42837-NSIC Rc222-DR-10	6.49		5	5	5	nvu, wh, shb
IR12N279	6.48		3	5	5	bs, nbls, nvu
14DS-GMET-14	6.46		5	5	5	bold, wh
IR95611-B-153-3-B-B	6.34		5	5	5	nbls, partly awn
IR13N149	6.32		5	3	3	nvu, wh, nbls
IR13T141	6.32		5	5	3	nu, wh
IR12A259	6.29		5	5	5	mixtures, bs, wh
IR12A230	6.26		5	5	3	wh, shb, blb
IR13N108	6.26		5	5	5	nu, gdc
PSB Rc18 (check)	6.25		3	3	5	clean, wh
IR12N149	6.24		5	5	3	bls, nu, wh
IR12N232	6.24		5	5	5	wh, gdc
IR12N238	6.23		5	5	5	nbls, light panicle
IR12N235	6.23		5	5	5	gdc, lfl
IR 101465-5:3	6.23		7	5	5	nu, wh,shb
IR11F218	6.21		3	5	5	gdc, late, uniform
IR12A184	6.21		5	3	5	nvu, gdc, nbls
IR13A269	6.20		5	5	5	gdc, wh, nvu
IR13P003	6.20		3	5	5	dense, wh, gd
IR12A185	6.20		5	5	5	blb, wh, nbls
IR12N260	6.18		5	5	5	late, nu, bls
PR38710-2B-9-2-2-2-1	6.16		5	5	5	shb, bs
IR12T147	6.16		5	5	3	partly lodge, blb, nbls

Table 11b. Yield (t/ha) and phenotypic performance of MET 0 medium maturing group 2014 WS. (Con't...)

IR12A287	6.15		7	5	3	blb, wh, shb, nvu
14DS-GMET-16	6.14		5	5	5	wh, nu, bs
IR12N267	6.13		5	5	5	gdc, nu
IR09M113	6.13		5	5	5	nu, shb,wh
IR12N193	6.07		5	5	3	nvu, wh
PR39222-2B-28-2-1-3	6.05		7	5	5	nu, blb, wh, blb
IR13A295	6.00		5	5	5	gdc, shb, nvu
IR 11C199	5.99		5	5	5	shb, wh, wh

Table 12a. Grain Yield and Field Evaluation of top yielding entries MET 1 early maturing group, January to June 2014 DS.

Designation	Yield (t/ha)	PACP	Remarks	Yield Advantage (%)
IR 11A255	4.99	5	clean, light grains, GS	11
IR 11A151	4.83	'5-7	heavy grains, clean, NVU	7
IR12L136	4.83	5	NBLS, MShb, MBlb	7
IR 09N542	4.73	3, 7	heavy grains, MShb	5
IR12L130	4.67	5-7	heavy grains, NBLS, MBlb	4
IR 11N313	4.65	5-7	MBlb, light grains	3
IR12L144	4.59	5-7	light grains, KShb, MBlb	2
PR38169-B-11-2-1-2-2-1-1	4.54	5	bls, heavy grains	1
IR 11A410	4.52	5	light grains, MShb	
PR40058-(PSB Rc68/ICRL)-2008WS-11-4-7	4.52	5-7	bls, MBlb, NBLS	
IRRI 156 (Rc238)	4.50	5	awn, Pblast, NU, MShb	
IR 11A162	4.50	5-7	clean grains, light grains, MShb	
PR39870-3B-5	4.47	7	bls, MSHb, Mblb, seed discoloration	
IR 11A201	4.46	5-7	heavy grains, MShb	
IR 11N187	4.44	5-7	Pblast, NVU, MShb	
IR 10F548	4.38	5-7	dense, short grains, MShb	
HHZ 14-DT12-LI1-LI1	4.37	5	dense, heavy grains, MBlb	
12WS-PYT-1	4.36	5	dense, NU, MShb	
IR 11A306	4.36	5-7	clean, light grains, GS	
PR40539-B-B-16	4.35	7-Mar	clean, light grains, GS	
PR38086-B-31-B-B-B	4.33	5-7	NVU, WH, heavy grains, NU, MBlb	
NSIC Rc132H (hybrid)	4.28	3	awn, Pblast, NU	
IRRI 123 (Rc82)	4.13	5	light grains, MShb	
IRRI 104 (Rc10)	3.14	7	seed discoloration, Blb, Shb, Pblast	

Table 12b. Yield (t/ha and phenotypic performance of MET 1 early maturing group 2014 WS.

Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
			Plants	Panicle	Grains	
IR 11N313	7.70	7	5	5	5	NBLS, tall
IR 11N187	7.70	7	5	5	5	BLS, NBLS
IR12L235	7.50	5	5	5	5	bls, MBlb, wh
IR12L125	7.48	4	5	5	5	wh, MShb
IR 11A302	7.45	4	3	3	3	clean, uniform
IR 10F339	7.39	3	5	5	5	MBlb
IR 11A342	7.33	2	5	3	3	clean, tall, partly lodge
IR 10F550	7.32	2	3	3	3	clean, uniform
IR 10F548	7.30	2	3	3	3	clean, uniform
IR 11C134	7.24	1	5	5	3	MBlb, light panicle
IR 90872H	7.20	0.4	3	5	3	clean, uniform
IR 11A162	7.20	0.4	5	3	3	clean, tall, NVU
IR 11A410	7.20	0.4	3	5	3	BS, uniform
NSIC Rc132H (hybrid)	7.17		5	3	3	wh, dense, MBlb
IR 11A473	7.14		3	3	3	clean, long panicle
IR 11A293	7.14		3	3	3	uniform, clean, Long flag leaf
HHZ 23-DT16-DT1-DT1	7.11		3	5	3	clean, dense
IR 08N159	7.09		5	5	5	NBLS, wh
IR12L144	7.03		5	3	3	wh, bls
PR40524-2-1	7.01		3	5	3	uniform, clean
IRRI 156 (Rc238)	6.96		5	5	3	MBlb, BLS
IR 10A270	6.95		5	5	5	BS, awn
IR12L136	6.91		5	5	5	wh, MShb
IR 11N400	6.89		5	5	3	BKS, NBLS, MShb
IR 11A106	6.89		5	5	5	MBlb, MShb
HHZ 14-SAL13-LI2-DT1	6.88		5	3	3	wh, MShb
HHZ 6-DT8-LI1-LI1	6.87		3	5	5	BS, wh
IR12L159	6.86		5	5	5	wh, BS, BLS
PR40058-(PSB Rc68/ICRL)-2008WS-11-4-7	6.81		5	5	5	BLS, wh
HHZ 15-SAL13-Y1	6.81		3	5	5	wh, dense
IR 11A429	6.79		3	3	3	clean, uniform
DINORADO-5kR-38-3-2-3	6.78		5	5	5	wh, bold grains
IR 11A516	6.77		3	3	3	uniform, BS

Table 12b. Yield (t/ha and phenotypic performance of MET 1 early maturing group 2014 WS. (Con't...)

IR 10F365	6.77		5	3	5	BLS, uniform
IR11L327	6.76		5	5	5	NVU, wh, NBLS
IR 11A501	6.75		5	5	3	NBLS, MBlb
HHZ 10-DT7-Y1	6.75		3	3	3	clean, dense
HHZ 15-SAL13-Y3	6.74		3	5	3	clean, uniform
PR40858-NSIC Rc9-M4R-345	6.73		5	5	3	BLS, BS, tall
PR40858-NSIC Rc9-M4R-354	6.73		5	5	5	wh, MShb
IR 11N121	6.71		5	5	3	MBlb, NBLS
IR 11A306	6.68		3	3	3	clean, uniform
IR 11A151	6.68		3	3	3	clean, uniform
IR12L232	6.68		5	5	5	wh, BLS
IR 06N209	6.67		5	5	3	MBlb, light panicle
IR 10M126	6.66		5	3	5	BLS, uniform
IR12L130	6.63		5	5	5	wh, NBLS
HHZ 21-Y4-Y2-Y1	6.63		5	5	5	clean, light panicle
IR 11A445	6.62		5	5	3	NBLS, NVU
PR40092-2-1-1	6.62		5	5	3	NVU, BLS
IR 11A534	6.62		5	5	3	MShb, wh, NVU
IR 10N382	6.61		3	3	3	clean, uniform
PR38121-B-1-B-B-B	6.61		5	5	5	BLS, NBLS, light panicle
IR 96449H	6.61		5	3	3	Mshb, uniform
PR40523-1--2	6.56		3	3	3	clean, uniform
IR11L384	6.55		5	5	5	NBLS, uniform
IR 11N180	6.54		3	5	5	clean, awn
HHZ 4-DT6-LI2-LI1	6.51		5	3	3	NBLS, uniform
IR12L152	6.47		5	5	5	bls, wh, NBLS
IR09L226	6.46		5	5	5	NBLS, MShb
PR37770 (Fe)-B-1-2-2-2-2-1-2-1-1	6.43		5	3	5	partly awn, long panicle
IR 11A584	6.42		5	5	3	NVU, NBLS, MSHb
12WS-PYT-19	6.41		5	5	3	BLS, MBlb
PR30952-AC10 SSD-24	6.41		3	3	3	clean, long panicle
IR 11C138	6.41		5	5	5	BS, MShb
HHZ 24-DT11-LI1-LI1	6.41		3	5	3	wh, NVU
IR 04N155	6.40		7	5	5	BS, MBlb, partly lodge
IR 11N169	6.40		5	5	5	Mshb, uniform
IR12L248	6.39		5	5	5	wh, BLS, MShb
IR 11A296	6.38		3	3	3	clean, uniform
IR 09N542	6.37		3	3	3	NBLS, uniform
HHZ 10-DT8-DT1-DT1	6.36		3	5	3	dense, clean
IR 96433H	6.35		7	5	5	Shb, wh, NBLS

Table 12b. Yield (t/ha and phenotypic performance of MET 1 early maturing group 2014 WS. (Con't...)

PR40525-6-1	6.35		3	3	5	clean, long panicle
PR 39152-17-2-1-1-1-B	6.35		5	3	3	BS, wh
HHZ 4-SAL5-LI1-LI1	6.34		5	5	3	dense, wh
IR 11A581	6.33		5	5	5	wh, NU
PR38086-B-31-B-B-B	6.29		5	5	5	NBLS, MShb
IR12L201	6.29		5	5	5	wh, NVU
HHZ 4-SAL5-Y2-Y1	6.28		3	5	3	clean, uniform
IR 11N304	6.28		5	5	3	wh, NBLS, tall
IR12L225	6.26		5	5	3	MBlb, BLS
IR 11A255	6.25		5	5	3	wh, BS
IR12L251	6.24		5	5	5	BLS, wh, Shb
PR37911-1B-1-1-1	6.23		5	5	5	NVU, MBlb
PR30245-(IR64) ID 18-1-4	6.23		5	5	5	NVU, BLS
IR 96418H	6.23		5	3	3	wh, dense, NVU
HHZ 6-Y2-Y1-DT1	6.22		5	5	3	uniform, BLS
PR40527-1-2	6.20		5	5	5	MSHb, NVU, NBLS
PR39206-2B-47-1-2-2	6.20		3	3	3	clean, uniform
PR42971-B-2-1-1-1-1	6.19		5	5	5	NBLS, MShb
HHZ 21-SAL13-Y1-Y1	6.19		5	5	5	wh, light panicle
PR40218-B-29-3-1-1	6.15		5	5	5	NBLS, BS, Mblb
PR40613-AB-70	6.12		5	5	5	NVU, BS
IR 11A479	6.11		5	5	5	NBLS, MShb
IR 11A201	6.11		5	3	5	NBLS, MShb
IR88338-2-AJY1-B	6.09		5	5	5	BLS, MShb, partly awn
HHZ 3-SAL6-Y1-Y1	6.08		5	5	5	BS, MShb, wh
IR 96450H	6.07		5	5	5	NBLS, MShb
12WS-PYT-1	6.05		5	5	5	wh, MShb
IR 90875H	6.04		5	5	3	MShb, NBLS
PR30025-99AC (WSAL-1086)	6.03		5	5	3	NBLS, MShb
PR39248-2B-B-B-67-1	6.02		5	3	3	MBlb, uniform
PR40093-29-2	6.00		5	5	5	BLS, uniform
HHZ 3-SAL4-Y1-Y1	5.99		5	5	5	MBlb, wh
IR 11N239	5.98		5	5	5	wh, NBLS
HHZ 3-SAL13-Y1-SAL1	5.97		5	5	5	wh, NBLS
PR42967-B-B-5-1-3	5.97		5	5	5	NBLS, MShb, light panicle
HHZ 1-DT3-Y1-Y1	5.97		3	3	5	BS, dense
PR38075-B-2-B-B-B	5.93		5	5	5	wh, MShb, MBlb
IR 10N264	5.89		5	5	3	MBlb. BLS
IR 11A506	5.89		5	5	5	BS, partly awn
PR40146-B-14-1-4-2	5.85		5	5	5	wh, BLS

Table 12b. Yield (t/ha and phenotypic performance of MET 1 early maturing group 2014 WS. (Con't...)

PR40094-45-2	5.84		5	5	3	BS, MShb, NVU
PR40613-AB-8	5.84		5	5	5	BLS, wh
IR 05N113	5.83		5	5	5	NBLS, MShb
PR40858-NSIC Rc9-M4R-435	5.82		5	5	5	NVU
IR 81255H	5.81		5	5	3	NBLS, BS, Mblb
IR 09N296	5.78		5	3	5	BLS, MShb
PR38429-B-17-5-B-B	5.78		7	5	5	Shb, wh
PR38075-B-4-B-B-B	5.77		5	5	5	bls, MShb
PR38169-B-11-2-1-2-2-1-1	5.76		5	3	3	wh, BS
PR39870-3B-5	5.75		5	5	3	MBlb, MShb
PR40214-B-5-1	5.75		5	5	5	wh, dgc
PR40858-NSIC Rc9-M4R-437	5.69		5	5	5	NBLS, MShb
PR38121-B-26-B-B-B	5.69		5	5	5	BLS, NBLS
PR 39149-33-1-3-3-1-B	5.68		5	5	5	BS, MShb
PR40613-AB-58	5.68		5	5	5	wh, MBlb, MShb
PR34350-2-Pokkali-AC-24-M5R-8 (DrS 87)	5.67		5	5	5	Blb, NVU, wh
IR11L412	5.66		5	5	5	NVU, MBlb, wh
IRRI 123 (Rc82)	5.66		5	5	3	MBLB, BLS
PR40096-9-1-1	5.65		5	5	3	NVU, wh
IR 11A583	5.65		5	5	3	Tall, BLS
IR 10M300	5.65		5	5	5	BLS, MShb
IR 11C114	5.62		5	5	5	MShb, light panicle
PR40858-NSIC Rc9-M4R-384	5.61		5	5	5	wh, light panicle, BLS
HHZ 4-SAL12-LI1-LI1	5.54		5	5	5	BS, wh
IR 09N535	5.53		5	5	3	MBlb, bls
IR 04A381	5.52		5	5	5	partly awn, MShb
HHZ 14-DT12-LI1-LI1	5.51		5	5	3	NVU, wh, light panicle
PR38640-B-1-1-1-1	5.50		5	5	5	bls, wh, MBlb
IR 09N481	5.48		5	5	5	BLS, MShb
HHZ 18-Y3-Y1-Y1	5.46		3	5	5	wh, clean
PR40094-35-1	5.41		5	5	5	wh, MBlb, MShb
PR40539-B-B-16	5.35		5	5	5	wh, MBlb
HHZ 14-SAL19-Y1	5.32		3	5	5	wh, clean, dense
HHZ 14-SAL10-DT1-DT1	5.31		5	5	3	Wh, light panicle
PR41455-B-B-1	5.31		5	5	5	wh, BLS, NVU
IR 08N133	5.24		7	5	5	BS, MShb
HHZ 6-DT1-LI1-LI1	5.12		5	5	3	wh, BS
HHZ 26-SAL12-Y1-Y1	5.03		3	3	3	uniform, BLS
PR40149-2B-19-3	4.93		5	5	5	NBLS, NVU, MSHb
C9305-B-9-1	4.90		5	5	5	bls, wh, awn, NVU

Table 12b. Yield (t/ha and phenotypic performance of MET 1 early maturing group 2014 WS. (Con't...)

PR 39144-25-1-3-3-1-B	4.90		7	5	5	wh, BLS, MBlb, MShb
IR86385-170-1-1-B	4.58		7	5	5	MShb, 50% rat damage, NBLS
IRRI 104 (Rc10)	3.71		7	5	5	60% rat damage, NBLS, MShb

Table 13a. Grain Yield and Field Evaluation of top yielding entries MET 1 medium maturing group, January – June 2014 DS.

Designation	Yield (t/ha)	PACP	Remarks	Yield Advantage (%)
IR 11N205	5.39	5	long panicle, awn, bls, MShb	21
PR38003-B-3-3-2-1	5.23	5	dense, clean grains, WH	17
IR 11A493	4.95	5	heavy grains, MShb, NU	11
IR 09N523	4.93	5	awn, long panicle, clean	10
PR41588-JR-B-B-78	4.92	5	awn, clean, heavy grains, leafy	10
PR 39142-10-3-2-1-1-B	4.81	5-7	NVU, MShb, WH	8
IR 11A475	4.8	5	clean, light grains, GS, late	7
IR 90876H	4.67	5	clean, heavy grains, GS	4
IR 11N315	4.64	5	heavy grains, MShb	4
PR41395-NSIC Rc9-IVM2009DS 50-2-2	4.63	5	awn, MShb, light grains	4
IR 11N231	4.61	5	heavy grains, NVU, clean	3
IR 11N298	4.61	5	light grains, Mshb	3
PR38963 (Fe)-B-5-4-2-1-1	4.56	5	dense, clean grains, WH, late,	2
IR 11A193	4.55	5	awn, long panicle, clean	2
PR38807-2B-40-1-1-1	4.54	5	late, WH, MShb	2
IR11L236	4.5	3-5	heavy grains, MShb	1
NSIC Rc124H (hybrid)	4.5	5-7	awn, dense, heavy grains, clean	1
IRRI 154 (Rc222)	4.47	5	light grains, Shb, MBlb	
IRRI 146 (Rc158)	4.26	5	light grains, NBLS	
NSIC Rc124H (hybrid)	3.95	3	awn, heavy grains, clean	
IRRI 105 (Rc18)	3.54	5	heavy grains, MShb	

Table 13b. Yield (t/ha and phenotypic performance of MET 1 medium maturing group 2014 WS.

Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
			Plants	Panicle	Grains	
IR 11A193	7.44	11	3	5	5	tall, clean
IR 11A305	7.35	10	3	5	3	clean, uniform, light panicle
IR 09N523	7.34	9	5	5	3	NVU, partly awn, light panicle
IR 11N205	7.26	8	3	3	3	clean, partly awn
IR 81958H	7.23	8	5	3	3	NBLS, MBlb
IR 06A148	7.12	6	3	3	3	clean, uniform
IR11L236	7.10	6	3	3	5	NBLS, long panicle
IR 90876H	7.09	6	5	3	3	MShb, BS
PR40524-6-1	7.01	4	3	5	3	BS, uniform
IR 11A300	6.99	4	3	3	3	clean uniform
IR 11A457	6.96	4	3	3	3	clean, uniform
IR 11A493	6.96	4	3	3	3	clean, uniform
IR 11N298	6.96	4	5	5	5	NBLS, NVU
PR40524-3-1	6.84	2	3	5	5	uniform, wh
IR 05N304	6.78	1	5	5	5	BLS, uniform
IR 11N138	6.78	1	3	5	5	tall, clean, NVU
IR 11A316	6.77	1	5	5	3	BS, uniform
IR 10M179	6.76	1	3	5	3	clean, uniform
PR38807-2B-40-1-1-1	6.75	0.6	3	3	3	clean, uniform
IR 11A281	6.73	0.3	3	5	3	clean, uniform
NSIC Rc124H (hybrid) (check)	6.71		3	3	3	clean, uniform
IR 12A109	6.70		3	5	5	clean, uniform
IR 11A280	6.69		3	3	3	BS, uniform
IR 11A322	6.69		5	3	3	NBLS, MBlb
IR 11A546	6.69		5	5	5	tall, BS
IR 11A310	6.68		3	3	3	NBLS, uniform
PR38168-2B-3-1-3-1-1-1-2	6.68		3	5	3	BLS, uniform

Table 13b. Yield (t/ha and phenotypic performance of MET 1 medium maturing group 2014 WS. (Con't...)

IR 12N110	6.67		3	3	3	clean, uniform
IR 11A346	6.66		5	3	3	NVU, clean
PR41588-JR-B-B-78	6.65		3	5	5	clean, uniform
PR38003-B-3-3-2-1	6.63		5	5	3	BLS, uniform
IR 11N216	6.62		5	3	3	BLS, wh
IR 11N293	6.60		5	5	3	MShb, NVU
IR 11N307	6.54		3	5	3	clean, uniform
PR40139-B-11-1-8-2	6.54		5	5	5	NBLS, uniform
PR38963 (Fe)-B-5-4-2-1-1	6.52		3	5	3	NBLS, uniform
IR 11A307	6.52		3	5	5	NBLS, uniform
PR40523-2-2	6.51		3	3	3	clean, uniform
IR 11N334	6.48		3	5	5	clean, uniform
IR 10F608	6.45		3	5	5	clean, long panicle, late
IR 11A511	6.42		3	3	3	clean, uniform, late
IR 11N399	6.41		5	5	5	wh, BS, MShb
NSIC Rc158 (qTSN4)	6.40		5	5	5	BLS, light panicle
IR 11N285	6.35		3	5	5	clean, uniform
PR 39150-3-2-2-3-1-B	6.35		5	5	3	NU, bold grains
IRRI 146 (Rc158) (check)	6.30		5	5	5	wh, BLS
PR 39142-10-3-2-1-1-B	6.30		5	5	3	NVU, wh
IR 11N231	6.28		3	3	3	clean, uniform
IR 11C170	6.28		5	5	5	wh, MShb, NBLS
PR41395-NSIC Rc9-IVM2009DS 50-2-2	6.27		5	5	5	MShb, wh, BS
C9290-B-9-2	6.26		5	5	5	BS, long panicle

Table 13b. Yield (t/ha and phenotypic performance of MET 1 medium maturing group 2014 WS. (Con't...)

IR 11A475	6.21		5	5	5	clean, NVU, long panicle
PR39206-2B-47-1-2-1	6.20		5	5	3	NVU, BLS
IR 05A235	6.19		5	5	3	NBLS, NVU
PR37954-2B-5-2-1-3	6.18		5	5	5	BLS, BS
IR 11N173	6.18		7	5	5	NU, wh
IRRI 105 (Rc18) (Check)	6.16		3	5	3	clean, wh
IR 11N191	6.13		3	5	5	bls, NBLS
PR38991 (Fe)-B-17-1-1	6.10		3	3	3	clean, uniform
IR 11C169	6.09		5	5	3	wh, NVU
PR 40334-61-1-1-B	6.04		5	5	5	uniform, BS
PR40138-2B-28-2-1	5.99		5	5	5	wh, uniform
IR 09F146	5.95		3	5	5	tall, broad leaf, late
PR 40432-14-2-1-B	5.92		5	5	5	NVU, NBLS, MShb
IR 11N294	5.87		3	5	5	clean, uniform
IR 10M240	5.77		5	5	5	NBLS, uniform
IR 11N315	5.76		5	5	3	NVU, BS
IR 11N137	5.64		5	5	5	NVU, wh
PR37704-2B-6-1-2-1-1	5.57		5	5	5	NVU, NBL
IR 11A289	5.55		5	5	5	BS, uniform
PR40057-PSB Rc14-IVC2008DS 21-1-2	5.48		7	5	5	Blb, MShb
IRRI 154 (Rc222) (check)	5.28		5	5	3	NBLS, wh

Table 14a. Grain Yield and Field Evaluation of top yielding entries MET 2 early maturing group, January to June 2014.

Designation	Yield	PACP	Remarks	Yield Advantage (%)
PR 37787-5-3-2-3-2-B-B	4.70	5-7	light grain, clean, uniform	2
NSIC Rc132H (hybrid)	4.59	3	awn, heavy grain, MShb	
IR85466H	4.56	4	light grain, MShb, Mblb, NBLS	
PR37942-3B-5-1-2	4.51	5	MShb, MBlb, light grain	
PR37165-1-2-1-1-1-1	4.36	5	clean, light grain, uniform	
IR 10A314	4.35	5	light grains, clean, GS	
HHZ 5-DT20-DT3-Y2	4.20	5	heavy grains, P. lodge	
IR 09N540	4.20	5	NVU, MShb, light grain, MBlb	
IR 10A199	4.19	5	heavy grain, NBLS, NVU	
IR09L324	4.17	5	light grain, Pblast, BLB	
IRRI 156 (Rc238)	4.16	5	short panicle, heavy grain, Shb	
IR 11A314	4.15	5	NVU, NBLS, light grain	
PR37160-1-1-1-1-1-1	4.14	5	clean, light grain, GS	
IRRI 123 (Rc82)	4.12	5	light grain, MShb, uniform	
PR38729-B-B-1-1	4.10	5	heavy grain, NBLS, Blb, MShb	
IR 04A216	4.09	5	Pblast, heavy grain, NVU, MShb	
HHZ 5-SAL14-SAL2-Y2	4.08	5	light grain, NU, clean	
IR 09N537	4.07	5-7	seed discoloration, MShb, MBlb	
IRRI 104 (Rc10)	3.11	7	short, light grain, Shb	

Table 14b. Yield (t/ha and phenotypic performance of MET 2 early maturing group 2014 WS.

Designation	Yield (t/ha)	% Yield Advantage	PACP			Remarks
			Plants	Panicle	Grains	
IR85466H	7.09	7	3	3	3	clean, uniform, wh
HHZ 5-SAL14-SAL2-Y2	6.86	4	3	5	3	clean, uniform
IR08L216	6.76	2	5	5	5	nbls, uniform
IR 04A216	6.61	0.2	5	5	5	wh, nbls
IRRI 123 (Rc82)	6.60		5	5	5	mblb, uniform
IR 09N126	6.45		5	5	5	NU, nbls, light panicle
IR 10N375	6.40		3	3	3	clean, long panicle, late
IR 10A231	6.39		3	3	3	clean, uniform, long flag leaf
IR 07A137	6.35		5	5	5	MShb, nbls
NSIC Rc132H (hybrid)	6.32		3	3	3	clean, dense, uniform

Table 14b. Yield (t/ha and phenotypic performance of MET 2 early maturing group 2014 WS. (Con't...)

PR30658-3B-B-1-1	6.32		7	5	5	mblb, mshb, NVU
IR 10A199	6.30		5	5	5	light panicle, uniform
IRRI 156 (Rc238)	6.27		5	5	5	nbls, mblb
PR39141-11-2-2-B	6.24		5	3	5	light panicle, wh, long flag leaf
IR 05A272	6.24		5	5	5	light panicle, uniform
IR 09N540	6.18		7	5	5	blb
IR 11A314	6.16		5	5	3	uniform, nbls
IR 07A257	6.16		5	3	5	nbls, long panicle
IR 09N127	6.13		5	5	5	mblb, uniform
PR37165-2-2-1-1-1	6.11		5	3	3	mblb, uniform
PR38854-30-2-3-1-B	6.10		5	5	5	light panicle, uniform
PR37942-3B-5-1-2	6.09		5	3	5	mblb
Elite81	6.07		7	5	5	mblb, mshb, NVU
IR 10A314	6.01		5	5	5	wh, nbls
IR81955H	6.00		5	5	5	bls, nbls, MShb
HHZ 5-DT20-DT3-Y2	5.93		3	3	5	uniform, wh
IR 09N537	5.92		7	7	7	mblb, 40% lodge
IR 10C146	5.91		5	5	5	wh, nbls, mshb
PR36723-B-1-3-3-3-2	5.80		5	5	5	nbls, wh, partly awn
PR37165-1-2-1-1-1-1	5.75		3	5	5	wh, uniform
PR8-5-50	5.74		5	5	5	NVU, mshb
IR 10A136	5.72		7	5	5	blb, mshb
IR 10F221	5.68		5	5	5	light panicle, mblb
IR09L324	5.65		5	5	5	mblb, nbls
IR 09N516	5.62		7	5	7	nbls, mblb, gdc
IR 10G105	5.62		7	5	5	Mblb, nbls
IR85471H	5.54		5	5	5	mblb, wh
IR 10A237	5.50		5	5	5	nbls, wh
IR 10A323	5.48		5	5	5	NVU
PR37956-3B-44-1	5.47		5	5	5	mblb, nbls, wh
PR37942-3B-5-1-1	5.46		7	5	5	bls, shb
IR10L185	5.43		5	5	5	wh, mblb
PR 37787-5-3-2-3-2-B-B	5.42		5	5	5	nbls, wh
Elite68	5.34		7	5	5	mblb, NVU, wh

Table 14b. Yield (t/ha and phenotypic performance of MET 2 early maturing group 2014 WS. (Con't...)

IR 11A257	5.34		5	5	5	wh, uniform
IR 08N210	5.30		5	5	5	nbls, mblb, light panicle
IR 09A130	5.14		7	5	5	mblb, 40% rat damage, wh
PR38729-B-B-1-1	5.13		5	5	5	mblb, wh
IR 09A138	5.12		5	5	5	mblb, dense
IR 09N501	5.11		5	5	5	light panicle
PR37160-1-1-1-1-1-1	5.00		5	5	5	mblb, NVU
IR 08N194	4.62		7	5	5	blb, nbls
Elite74	4.42		7	5	5	mblb, 40% rat damage, NVU
IR10L139	4.28		7	5	5	blb, 50% rat damage
IR 10G104	4.00		7	5	5	40% rat damage, nbls
IRRI 104 (Rc10)	3.09		7	5	5	95% rat damage, mshb

Table 15a. Grain Yield and Field Evaluation of top yielding entries MET 2 medium maturing group, January to June 2014.

Designation	Yield (t/ha)	PACP	Remarks	Yield Advantage (%)
IR 11N205	5.39	5	long panicle, awn, bls, MShb	21
PR38003-B-3-3-2-1	5.23	5	dense, clean grains, WH	17
IR 11A493	4.95	5	heavy grains, MShb, NU	11
IR 09N523	4.93	5	awn, long panicle, clean	10
PR41588-JR-B-B-78	4.92	5	awn, clean, heavy grains, leafy	10
PR 39142-10-3-2-1-1-B	4.81	5-7	NVU, MShb, WH	8
IR 11A475	4.8	5	clean, light grains, GS, late	7
IR 90876H	4.67	5	clean, heavy grains, GS	4
IR 11N315	4.64	5	heavy grains, MShb	4
PR41395-NSIC Rc9-IVM2009DS 50-2-2	4.63	5	awn, MShb, light grains	4
IR 11N231	4.61	5	heavy grains, NVU, clean	3
IR 11N298	4.61	5	light grains, Mshb	3
PR38963 (Fe)-B-5-4-2-1-1	4.56	5	dense, clean grains, WH, late,	2
IR 11A193	4.55	5	awn, long panicle, clean	2
PR38807-2B-40-1-1-1	4.54	5	late, WH, MShb	2
IR11L236	4.5	3-5	heavy grains, MShb	1
NSIC Rc124H (hybrid)	4.5	5-7	awn, dense, heavy grains, clean	1
IRRI 154 (Rc222)	4.47	5	light grains, Shb, MBlb	
IRRI 146 (Rc158)	4.26	5	light grains, NBLS	
NSIC Rc124H (hybrid)	3.95	3	awn, heavy grains, clean	
IRRI 105 (Rc18)	3.54	5	heavy grains, MShb	

Table 15b. Yield (t/ha) and phenotypic performance of MET 2 medium maturing group 2014 WS.

Designation	Yield (t/ha)	PACP			Remarks
		Plants	Panicle	Grains	
NSIC Rc124H (hybrid) (check)	7.26	3	5	5	clean, long flag leaf
IR 09A133	6.86	5	5	5	awn, mblb
IR 03N137	6.74	3	3	3	clean, uniform, long flag leaf
PR36905-B-1-11-2-1-1-1	6.74	3	5	5	wh, uniform
PR37252-2-1-1-1-2-3	6.69	3	5	3	clean, light panicle
IR 11A108	6.67	5	5	5	NVU, mshb
IR 11A294	6.60	3	5	3	uniform, nbls
IR 07N128	6.38	5	5	5	NU, light panicle,
IRRI 154 (Rc222) (check)	6.25	5	5	5	wh, nbls, bls
IRRI 105 (Rc18) (check)	6.18	5	3	3	NVU, clean
PR36921-B-6-1-3-1-1	6.17	3	5	5	clean, uniform
IR 80814 H	6.10	5	5	7	NU, light panicle, mshb, gdc
IR 10N396	6.02	5	5	5	wh, uniform
IR 09N261	5.88	5	5	5	wh, nbls, NVU
IR 08A172	5.86	7	5	5	mshb, nbls
IR 86204-189-3-2-1-3	5.85	5	5	5	NVU, wh, nbls
IR 10N305	5.79	7	5	5	wh, mblb, awn,
PR38012-3B-1-3 (SP)	5.78	3	3	5	clean, long flag leaf
12DS-GMET-20	5.78	5	5	5	wh, long flag leaf
IRRI 146 (Rc158) (check)	5.74	5	5	5	uniform, light panicle
PR33282-B-8-1-1-1-1-1(SP)	5.73	3	5	5	clean, long flag leaf
12DS-GMET-5	5.55	7	5	5	mblb, bold grains
12DS-GMET-25	5.53	5	5	5	wh, nbls, long flag leaf
12DS-GMET-15	5.51	5	5	5	wh, nbls
IR 10F364	5.50	3	5	5	bls, uniform
IR 10F365	5.42	5	5	5	nbls, uniform

VI. Field evaluation of Rice Crop Manager: A comprehensive decision support tool for increasing yield and income for farmers in the Philippines

RJ Buresh (IRRI), MJC Regalado, WB Collado

Rice Crop Manager (RCM) can be accessed at http://webbapps.irri.org/ph/rcm through a web browser using a computer or smartphone. RCM replaces Nutrient Manager and includes all the capabilities of the previous Nutrient Manager plus customized guidelines on crop management practices best suited for the specific rice-growing conditions of a farmer.

RCM aims to provide a recommendation that increases the net income of a farmer by PhP 4500 per hectare per crop. Like other decision tools, RCM must undergo field evaluation and improvement based on the results of field evaluation.

Field trials where conducted to collect essential data for verifying and improving the performance of RCM. The data are then compared relative to farmer's practice at two levels of attainable (target) yield for RCM.

Highlights:

- In January to June (VeryWet) and July to December (Wet) 2014 cropping seasons, on-farm field trial was conducted in one pilot location in Caraga region particular in Jabonga, Agusan Del Norte. There were 20 farmer cooperator per site selected for field trial in each season. The project involved in the following steps: (a) identified locations in farmer's field for the conducted field trials, (b) Interviewed farmers at the selected locations with RCM, (c) conducted on-farm field trials for testing the RCM recommendation relative to the farmer's management practice and (d) used results from field trials in refining the improvement of RCM. The two RCM plots were superimposed in the field of each farmer cooperator. Farmer managed area outside the RCM plots without influenced from the researcher.

- Superimposed the three treatments in the farmer's field: (FFP) Farmers fertilizer practice, (RCM) RCM recommendation, and (RCM-E) RCM –Enhanced with alternative yield target (see picture in Figure 12) showing standing crop before harvest. Each site has an area of about 1000m^2 with a minimum of 300 m^{2}to a maximum of 700 m^2 per plot. The farmer selected has limited exposure to technologies and projects. The (LGU) local partners helped in identifying the farmers. Thus, a pre-season interview was conducted of each farmer partner in the two pilot sites. Likewise, an agreement were developed with farmers composed of the area to be use, management of RCM experimental area, inputs provided for the management of RCM field trial, and on monitoring the field.

- In addition, all field activities and observation were recorded. Specifically, the following data were collected during the conduct of the field trial in each site: area for each plot, amount of fertilizer applied in each plot, date of application for each fertilizer used, farm gate price of each fertilizer source, transplanting or seeding date, harvest date, palay yield, land and crop management practices, frequency of irrigation, pesticide usage (kind,amount,method of application, frequency and date of application), frequency of weeding (manual and agrochemical use), observed injuries caused by animal pest and diseases.

- Yield was determined by marking the three replicate of 2 meter by 2.5 meter or 5m² harvest areas in each of the three plots. After harvest the grain samples were threshed and cleaned. Each palay samples were weighed (fresh weight) to determine the total grain fresh weight of each sample in kilograms to at least one decimal place and further measured the moisture content one time for each sample using a moisture meter to determine the grain yield at 14% moisture content.

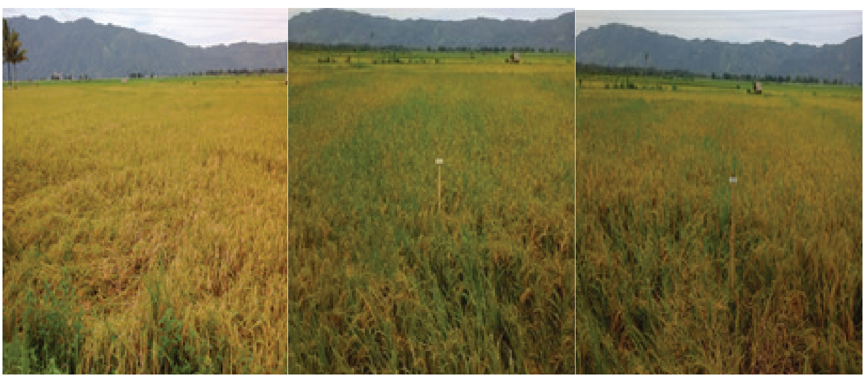
- In January to June 2014 cropping season, result shows (Figure 14) that hybrid variety NK5017 and Bigante plus attained a highest average yield (6.66 t/ha) when managed with RCM-E and 6.67 t/ha when managed with RCM while FP got a bit higher of 6.89 t/ha.
- The inbred varieties (PSB Rc18,NSIC Rc226, Rc214) and farmers selections 18Red and Diamond obtained slightly higher yields of 5.47t/ha when managed with RCM and 5.64t/ha when managed with RCM-E, while the FP only got 5.13t/ha.

- During this season, some sites were affected by flood cause by typhoon “Caloy” after early fertilizer application stage. Plant injuries cause by army worm was also observed damaging almost 50-100% of the leaves (Figure 13).

- On the other hand, in July to December 2014 cropping season, a much lower yield were obtained compared with the previous season (Figure 15), the FP obtained 3.72t/ha yield which slightly higher than RCM-E 3.69t/ha while RCM got a yield of 3.55t/ha.

- Lower yield obtained this season could be attributed to unstable weather condition (heavy rainfall causing flash flood) during early to active tillering stage, and plant injuries cause by pest and disease (rat, BLB) (Figure 16).

T1- FFP (C. Camacho) T2 – RCM (C. Camacho) T3- RCM-E (C. Camacho)



T1- FFP (R. Jimenez) T2- RCM (Jimenez) T3- RCM-E (R. Jimenez)

Figure 12. Field experimental set up at maturity stage, hybrid (1a, 1b, 1c) and inbred (2a, 2b, 2c) variety.

Figure 13. Army worm damage in (a) RCM and (b) RCM E plots.

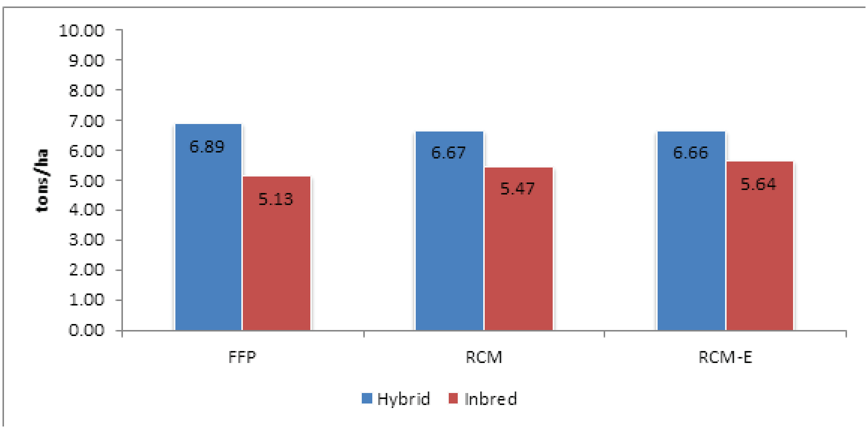


Figure 14. Grain Yield (t/ha) of farmers applied with different farmers' fertilizer management practices (FFP), Rice Crop Manager (RCM) and Rice Crop Manager –Enhanced Recommendation. January to June 2014 cropping season. Jabonga, Agusan Del Norte.

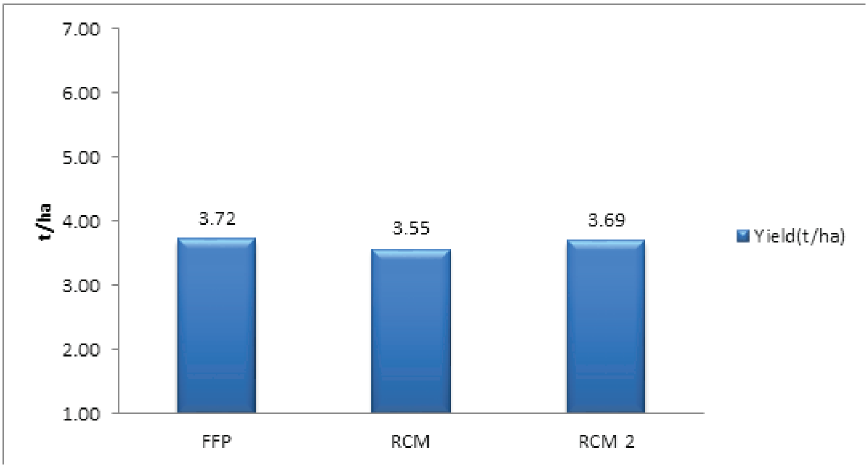


Figure 15. Grain Yield (t/ha) of farmers applied with different farmers' fertilizer management practices (FFP), Rice Crop Manager (RCM) and Rice Crop Manager –Enhanced Recommendation. July to December 2014 cropping season. Jabonga, Agusan Del Norte.

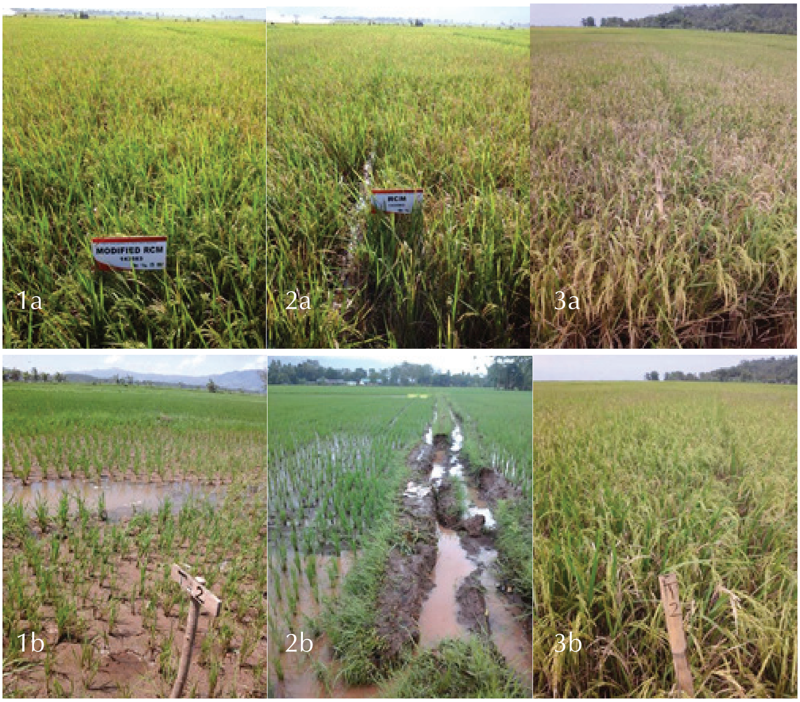


Figure 16. Damage (1a,1b) flood during early to active tillering stage, (2a,2b) Rat and BLB (3a,3b).

VII. Rice-prescription experiment for PhilRice Agusan

AA Ortiz, GF Estoy, Jr., GS Arida and JVilla (IRRI)

One of the components of the DA PhilRice-IRRI R&D Project in support of the Rice Self –Sufficiency Plan is the characterization of production environments, production situations, and crop health. This focused on preventing risks in rice crop health and will complement the efforts of other countries in rice pest surveillance system and risk management. The rice crop system is so complex that a large number of descriptors are, on principle required for its characterization. Each rice field can be seen as a unique realization of one combination of many attributes. These attributes encompass a growing crop, its physical environment, its pests, and farmers' action which influence the whole system. The number of rice pests (diseases, insects, weeds and rodents) to be considered and the levels at which they vary from field to field reflect this diversity (Teng 1990); Litsinger 1992).

The cropping systems practiced by local farmers were examined to determine the yield variability among different rice growing municipalities, explain the effects of climate and crop management on rice yields, understand how disease and pest incidence is related to crop management and environmental conditions, identify yield constraints of rice production, and define possible approaches to remove those constraints. This in turn has multifaceted practical applications, as improved yields would benefit the nutrition and living standards of the predominantly rural living in CARAGA region.

Results of the surveys during the year of 2011 to 2012 revealed that 15 farmers in irrigated lowland and 5 farmers in rainfed lowland ecosystem were tabulated and observed. Farmers' practices were variable. The choosing of the best farmer practices were selected and validated hence the study were conducted to test the effect of a RICE-PRE prescription treatment on rice crop health and yield when compared to local farmers' practices and primitive yield treatments in PhilRice Agusan.

The experiment was conducted in the research area in PhilRice Agusan, January to June 2014 cropping season. Treatments were laid out in Randomized Complete Block Design (RCBD) with three replications. Each treatment was consisted 25m x 30m per plot, and seedlings was transplanted at 21 days after sowing (DAS) at 3 to 4 seedlings per hill with planting distance of 20 x 20cm. The treatments were as follows;

Highlights:
Stem borers Scirpophaga innotata (Walker), Green leafhoppers Nephotettix virescens (Distant), whiteback planthopper Sogatella furcifera , whorl maggot Hydrellia philippina and Leaf folders Cnaphalocrosis medinalis were observed major pests in the crop and population of natural enemies also recorded. Detail of their population on crop is given in Table 1 and 2. However, bacterial leaf blight and sheath blight are the major diseases observed in the experimental area.

- Stemborer. The result indicate that no significant difference were observed in the adult WSB population in all treatments both in maximum telliring and booting stage with an average of 0.33 adult population/5sweeps (Table 16).

- Green leafhopper. No significant difference was observed in population of GLH at maximum tillering and booting stage. However, Primitive yield treatment showed highest (12.00 and 17.33 GLH/5sweeps) population at vegetative and booting stage but did not affect the growth and development of the rice crop respectively.

Table 16. Average population of WSB and GLH,/5sweeps as affected by the different treatments. PhilRice Agusan January to June 2014 cropping season.

Treatment	Ave. Population of WSB/5 sweeps		Average population of GLH/5 sweeps	
	Maximum Tillering	Booting stage	Max. Tillering	Booting Stage
Rice Pre	0.33±0.58 a	0.33±0.58 a	11.00±1.73 a	16.67±1.15 a
Primitive	0.33±0.58 a	0.33±0.58 a	12.00±2.00 a	17.33±0.58 a
Farmer's Practice	0.33±0.58 a	0.33±0.58 a	11.67±2.08 a	15.33±2.52 a
R^2	0.33	0.33	0.99	0.41

- Whiteback planthopper (WBPH). Population of WBPH was observed at maximum tillering and booting stage. However, no significant difference was observed in average population of WBPH at maximum tillering stage range from 5.00 populations to 5.67 population/5 sweeps. However, at booting stage, lowest population of WBPH (8.67 adult/hill) was noted in primitive yield treatments at booting stage (Table 17).

- Whorl maggot. Minimal population of whorl maggot was observed at maximum tillering stage and has no significant different among treatments with average population ranging from 5.33 populations/5 sweeps to 6.33 population/hill respectively.

Table 17. Average populations of WBPH and Whorl maggot/ 5sweeps as affected by the different treatments. PhilRice Agusan January to June 2014 cropping season.

Treatment	Average population of Whiteback Planthopper/5 sweeps		Average Population of Whorl Maggot/5 sweeps
	Maximum Tillering	Booting Stage	Maximum Tillering
Rice Pre	5.00±1.00 a	11.67±2.08 a	6.33±1.15 a
Primitive	5.67±0.58 a	8.67±1.00 a	5.67±0.58 a
Farmer's Practice	5.33±1.15 a	12.67±3.06 a	5.33±0.58 a
R^2	0.55	0.82	0.92

- Leaf folder. Population density of leaf folder during maximum tillering was low and no significant difference noted among treatments. However, population of leaf folder was increased with the increasing the amount of nitrogen applied as noted during booting stage, highest population (13.33 adult leaf folder/5sweeps) of leaf folder was observed in rice prescription treatment (Table 3).

- Natural Enemies. Spiders, mirid bugs, wasps, dragonfly, cocciniled beetles, long horned grasshopper and ground beetle were the most dominant natural enemies observed in all treatments. The average population of natural enemies has no significant different at maximum tillering stage ranging in 21.67 NE's, to 22.63 NE's/5sweeps. However, at booting stage, primitive yield showed significantly higher population (35.33 population/5 sweeps) of natural enemies but not comparable to rice prescription (32.67 population/5 sweeps). Lowest population of natural enemies was noted in farmers practice treatments (25.33 population/5 sweeps) due to the application of insecticides that affect the build-up population of natural enemies. The results indicate that as the crop is mature, population of natural enemies were build up in undisturbed ecosystem. However, the application of pesticide in farmers practice and primitive yield was resulting in comparable number in population of natural enemies (Table 18).

Table 18. Average number of natural enemies and leaffolder/5sweeps as affected by the different treatments PhilRice Agusan January to June 2014 cropping season.

Treatment	Average population of natural enemies/5 sweeps		Average Population of Leaf folder/5 sweeps	
	Maximum Tillering	Booting Stage	Maximum Tillering	Booting Stage
Rice Pre	21.67±2.08 a	32.67±3.06 b	5.00.±1.00 a	13.33±1.15 b
Primitive	22.33±1.53 a	35.33±3.06 b	4.33±0.58 a	9.33±1.53 a
Farmer's Practice	22.00±2.00 a	25.33±2.52 a	4.33±1.53 a	10.33±0.58 a
R^2	0.42	0.77	0.21	0.90

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average number of tiller/panicle. In terms of average of tiller number, no significant difference was observed during maximum tillering stage. However, at booting stage, rice prescription treatment showed highest average tiller number/ hill (22.87tiller/10hill) but did not significantly different in farmers practice (20.13 tillers/hill). Moreover, rice prescription treatment obtained the highest average number of panicle/ hill at milking (18.40 panicles/hill) and maturity stage 16.07 panicle/hill. Further, due to uncontrolled weeds that affect the tillering ability of the rice plant and nutrient competition, primitive yield treatments had the lowest average number of panicle at milking (6.13 panicle/10hill) and maturity stage (6.10 panicle/hill) respectively.

Table 19. Average number of tillers and panicles as affected by the different treatments. PhilRice Agusan January to June 2014 cropping season.

Treatment	Average No. of tiller / hills		Average No. of panicles / hills	
	Maximum Tillering	Booting Stage	Milking Stage	Maturity
Rice Pre	22.07±3.67 a	22.87±0.21 b	18.40±0.53 c	16.07±0.85 b
Primitive	16.27±1.84 a	12.87±0.76 a	6.13±1.08 a	6.10±1.04 a
Farmer's Practice	18.77±1.43 a	20.13±0.45 b	15.83±1.63 b	14.57±0.38 b
R^2	0.72	0.99	0.97	0.98

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average number of leaves/tiller. Average number of leaves/hill was counted and tabulated in four stages of the crop. Results revealed that no significant difference was observed in average number of leaves from vegetative to maturity stage (Table 20).

Table 20. Average number of leaves as affected by the different treatments. PhilRice. Agusan. January to June 2014 cropping season.

Treatment	Ave. No. of leaves/hill			
	Maximum tillering	Booting	Milking stage	Maturity stage
Rice Pre	4.43±0.06 a	4.83±0.06 a	3.13±0.06 a	2.13±0.06 a
Primitive	4.30±0.10 a	4.67±0.23 a	3.00±0.10 a	2.03±0.06 a
Farmer's Practice	4.47±0.06 a	4.73±0.12 a	3.00±0.10 a	2.10±0.10 a
R^2	0.58	0.75	0.78	0.63

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Incidence of Leaf folder. Fertilizer rate applied in all treatments was significantly affected the percent infestation of leaf folder damage in all treatments at different stages of plants. At booting stage, highest (18.72%) damage was noted in Primitive yield treatment. However, increasing application of nitrogen (N) in rice prescription treatment during booting stage was resulting in significantly increased of incidence of leaf folder damage at milking (45.46%) and maturity stage (31.23%) respectively (Table 20). This percent damage was affected the development of the crop and particularly at milking stage which the damage was directly affected the flag leaf of the rice plant during grain filling development.

- Damage of defoliators. Highest incidence of defoliators' damage was observed in Primitive yield treatment both in maximum telliring and booting stage. This is due to closer canopy of the rice plants and the weeds which favorable to insects defoliators for harborage. However, this damage was tolerable and did not significantly affect the yield of the crop (Table 21).

Table 21. Incidence (%) of Leaf folder and defoliators damage as affected by different treatments. PhilRice Agusan January to June 2014 cropping season.

Treatment	% infestation of Leaf folder			% infestation of defoliators	
	Booting stage	Milking stage	Maturity stage	Max. Tillering	Booting Stage
Rice Prescription	9.48±0.54 a	45.46±2.81 b	31.23±2.88 c	6.25±0.10 a	6.97±0.53 a
Primitive	18.72±2.60 b	16.78±0.32 a	21.83±1.88 b	7.65±1.00 a	10.25±1.39 b
Farmer's Practice	12.58±2.04 a	16.30±1.53 a	12.51±1.26 a	6.82±0.39 a	7.00±0.34 a
R^2	0.86	0.99	0.95	0.61	0.86

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Percent infection of bacterial leaf blight. Percent infection of bacterial blight was low in all treatments due to low disease pressure. Result indicated that no significant different was observed among treatments and percent damage was ranging from 1.54% to 2.67 % respectively.

- Percent infection of sheath blight. The incidence of sheath blight was high in primitive yield treatments consistently from booting to flowering stage was observed. The disease incidence increased with the increase of N application. The first symptoms observed in the weeds (Echenocloa sp.) and disease started to colonized the plant at booting stage (11.54%) and later it was spread to the rice plant due to closer canopy of the weeds and rice plants at flowering (24.02%) to maturity stage (32.22%) respectively. However, incidence of sheath blight both in rice prescription and farmers practices were tolerable due to the fungicide (Kocide) applied in both treatments and control the infection of the disease to the rice plant.

Table 22. Average of disease infection (%) as affected by different treatments. PhilRice Agusan. January to June 2014 cropping season.

Treatment	% infection of Sheath Blight			% infection of Bacterial Leaf Blight
	Booting Stage	Flowering Stage	Maturity Stage	Maturity Stage
Rice Pre	5.75±0.10 a	10.55±4.32 a	7.24±0.59 a	2.15±0.27 a
Primitive	11.54±1.57 b	24.02±5.45 b	32.22±4.67 b	2.67±1.53 a
Farmer's Practice	6.92±1.72 a	9.26±1.43 a	6.74±1.40 a	1.54±0.42 a
R^2	0.90	0.91	0.97	0.66

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Incidence of White stemborer. The result indicate that the lowest deadheart damage was noted in the rice prescription treatment (6.16%) at maximum tillering and booting stage(5.75%) but not significantly different in farmers practice at maximum tillering(6.75%) and booting stage (6.34%). Primitive yield treatment had 8.05% damage at maximum telliring and 9.73% damage at booting stage but damage was tolerable. At reproductive stage, rice prescription treatment showed the lowest whiteheads damage at milking (4.88%) and repining stage (2.15%) but did not comparable to farmers practice treatment (Table 23).

- Yield (t/ha). The result reveals that the yield difference between rice prescription, farmers practice and primitive yield treatment were significant. The different fertilizer rates application of all treatments was affect the yields among treatments. Though rice prescription treatment had high percent infestation of leaffolder damage but still obtained the highest yield (4.17 t/ha) but not comparable to farmers practice treatment (Table 24). However, lowest (1.72 t/ha) yield was obtained by primitive yield treatment. Rice prescription treatment had the highest yield with yield difference of 41% to primitive yield.

Table 23. Average of stemborer damage (%) and yield (t/ha) as affected by different treatments. PhilRice Agusan January to June 2014 cropping season.

Treatments	% damage of Deadheart		% Whiteheads		Yield (t/ha)
	Maximum Tillering	Booting Stage	Milking Stage	Ripening stage	
Rice Prescription	6.16±0.17 a	5.75±0.10 a	4.88±0.37 a	2.15±0.27 a	4.17±0.39 a
Primitive	8.05±1.08 b	9.73±0.57 b	7.51±0.92 b	4.28±0.46 b	1.72±0.30 b
Farmer's Practice	6.75±0.41 a	6.34±0.37 a	4.72±0.92 a	3.06±0.38 a	4.16±0.61 a
R^2	0.77	0.98	0.91	0.97	0.90

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average weight (grams/10m^2) of collected dry weeds in 10m^2. Results indicated that due low water holding capacity of the soil in the area and difficulty of water impounding was resulted in uncontrolled weeds growth and significantly had the highest population of weeds in primitive yield treatment. The most serious weeds observed in primitive yield treatment were classify as broadleaves such as Ludwigia spp., Hydrolea zylanica, Eclipta prostrata and Sphenochlea zeylanica with dry weight of 266.92 grams/10m^2, sedges such as Cyperus difformis, C. iria, Fimbristylis spp. and Scirpus maritimus with dry weight of 541.11 grams/10m2 and the grasses are Echinochloa spp. Ischaemum rugosum and Leptochloa chinensis with 1506.90 grams/10m^2. The high population of weeds in primitive yield treatments was significantly contributed to yield loss comparable to rice prescription and farmers practice treatment respectively.

These results are in accordance to Johnson D. E. 2013 yield losses due to uncontrolled weed growth for transplanted lowland rice approximately 50%. Weeds compete with the rice crop and lead to a substantial loss in production. Weeds compete severely with rice and owing to yield loss depending on weed species and their population. Weed infestations in irrigated rice are frequently exacerbated by poor land leveling and preparation, inadequate water management, irrigation water and rice seed contaminated with weed seeds, direct seeding, and no crop rotation.

Table 24. Average weight of dry weeds (grams/10 m^2) as affected by different treatments. PhilRice Agusan January to June 2013 cropping season.

Treatments	**Wt. (grams) of dry weeds collected in 10m^2**		
	Broadleaves	Sedges	Grasses
Rice Pre	5.07 a	0.00 a	0.00 a
Primitive	266.92 b	541.11 b	1506.90 b
Farmers Practice	12.21 a	0.00 a	0.00 a

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

July to December 2014 cropping season

- Stemborer. The result indicate that no significant difference were observed in the adult WSB population in all treatment in maximum telliring stage with an average of 0.33 adult population/5sweeps (Table 10). However, at booting stage, high population of adult WSB observed in all treatments ranged from 6.33 adult WSB to 7.33 adult WSB/5sweeps but no significant different was observed among treatment.

- Green leafhopper. No significant difference was observed in population of GLH at maximum tillering and booting stage. However, Primitive yield treatment showed highest (11.00 and 11.67 GLH/5sweeps) population at vegetative and booting stage but did not affect the growth and development of the rice crop respectively.

Table 25. Average population of WSB and GLH,/5sweeps as affected by the different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	Ave. Population of WSB/5 sweeps		Average population of GLH/5 sweeps	
	Maximum Tillering	Booting stage	Max. Tillering	Booting Stage
Rice Pre	0.33±0.58 a	7.33±1.15 a	11.67±2.08 a	10.67±1.15 a
Primitive	0.33±0.58 a	6.67±0.58 a	11.33±1.15 a	11.67±1.53 a
Farmer's Practice	0.33±0.58 a	6.33±0.58 a	11.00±1.73 a	10.33±0.58 a
R^2	0.33	0.32	0.29	0.40

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Whiteback planthopper (WBPH). Population of WBPH was observed at maximum tillering stage. However, no significant difference was observed in average population of WBPH at maximum tillering stage range from 5.00 populations to 5.33 population/5 sweeps (Table 26).

- Whorl maggot. Minimal population of whorl maggot was observed at maximum tillering stage and has no significant different among treatments with average population ranging from 12.00 adult population/5 sweeps to 12.33 population/hill respectively.

Table 26. Average population of WBPH and Whorl maggot/5sweeps as affected by the different treatments. PhilRice. Agusan. July to December 2014 cropping season.

Treatment	Average population of Whiteback Planthopper/5 sweeps	Average Population of Whorl Maggot/5 sweeps
	Maximum Tillering	Maximum Tillering
Rice Prescription	5.33±1.15 a	12.33±1.53 a
Primitive	5.00±1.00 a	12.33±3.21 a
Farmer's Practice	5.33±1.15 a	12.00±2.00 a
R^2	0.94	0.45

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Leaf folder. Population density of leaf folder during maximum tillering was low and no significant difference noted among treatments (Table 12). However, population of leaf folder was increased with the increasing the amount of nitrogen applied as noted during booting stage, highest population (8.67 adult leaf folder/5sweeps) of leaf folder was observed in rice prescription treatment.

- Natural Enemies. Spiders, mirid bugs, wasps, dragonfly, cocciniled beetles, long horned grasshopper and ground beetle were the most dominant natural enemies observed in all treatments. The average population of natural enemies has significant affected by the nitrogen rate applied at maximum tillering stage. Highest (24.00 NE's population/5sweeps) population was noted in rice prescription treatment. However, at booting stage, primitive yield showed significantly higher population (40.33 population/5 sweeps) of natural enemies but not comparable to rice prescription (36.33 population/5 sweeps). Lowest population of natural enemies was noted in farmers practice treatments (31.67 population/5 sweeps) due to the application of insecticides that affect the build-up population of natural enemies. The results indicate that as the crop mature, populations of natural enemies were build up in undisturbed ecosystem. However, the application of pesticide in farmers' practice and rice prescription was resulting in comparable number in population of natural enemies (Table 27).

Table 27. Average number of natural enemies and leaffolder/5sweeps as affected by the different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	Average population of natural enemies/5 sweeps		Average Population of Leaf folder/5 sweeps	
	Maximum Tillering	Booting Stage	Maximum Tillering	Booting Stage
Rice Prescription	24.00±2.00 a	36.33±1.53 ab	3.00±1.00 a	8.67±1.15 a
Primitive	21.00±1.00 b	40.33±2.52 a	2.33±0.58 a	6.33±1.15 ab
Farmer's Practice	20.67±0.58 b	31.67±1.53 b	2.33±0.58 a	5.67±1.15 b
R^2	0.68	0.85	0.57	0.94

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average number of tiller/panicle. Application of high amount of nitrogen (124N-32P-51K) rate was resulting in higher average tiller number (21.17 tiller/hill) at maximum tillering stage in rice prescription treatment. However, at booting stage, rice prescription treatment showed highest average tiller number/hill (21.57tiller/hill) but did not significantly different in farmers practice (19.33 tillers/hill). Moreover, rice prescription treatment obtained the highest average number of panicle/hill at milking (19.77 panicle/hill) and maturity stage 18.13 panicle/hill. Further, due to uncontrolled weeds that affect the tillering ability of the rice plant and nutrient competition, primitive yield treatments had the lowest average number of panicle at milking (11.53 panicle/hill) and maturity stage (10.50 panicle/hill) respectively.

Table 28. Average number of tillers and panicles as affected by the different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	Average No. of tiller / hills		Average No. of panicles / hills	
	Maximum Tillering	Booting Stage	Milking Stage	Maturity
Rice Prescription	21.17±0.49 a	21.57±0.55 a	19.77±1.07 a	18.13±1.00 a
Primitive	15.50±1.41 b	15.93±2.11 b	11.53±0.95 c	10.50±0.78 c
Farmer's Practice	17.13±0.07 b	19.33±0.21 a	15.83±0.45 b	14.73±1.56 b
R^2	0.90	0.91	0.97	0.96

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average number of leaves/tiller. Average number of leaves/hill was counted and tabulated in four stages of the crop. Results revealed that no significant difference was observed in average number of leaves from vegetative to maturity stage (Table 29).

Table 29. Average number of leaves as affected by the different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	Ave. No. of leaves/hill			
	Maximum tillering	Booting	Milking stage	Maturity stage
Rice Prescription	4.00±0.00 a	5.00±0.00 a	4.47±0.12 a	2.93±0.06 a
Primitive	4.00±0.00 a	5.00±0.01 a	4.00±0.06 a	2.80±0.20 a
Farmer's Practice	4.00±0.00 a	5.00±0.00 a	4.07±0.06 a	2.83±0.06 a
R^2			0.92	0.36

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Incidence of Leaf folder. Fertilizer rate applied NPK in all treatments was significantly affected the percent infestation of leaf folder damage in all treatments at different stages of plants. The high (124N-32P-51K) amount of fertilizer rate applied in rice prescription treatments was resulting in significant increased of incidence of leaf folder damage at booting (27.31%), milking stage (31.13%) and maturity stage (31.81%) respectively. The high amount of nitrogen (N) applied in rice prescription treatment was resulting in favorable of leaf folder for harborage and feeding due to closer canopy of the rice plants. Feeding of larvae was reducing the photosynthesis area of leaves. So vegetative and reproductive growth stage was finally yield is hampered and resulting in yield loss when flag leaf is damaged.

  This percent damage was affected the development of the crop and particularly at milking stage which the damage was directly affected the flag leaf of the rice plant during grain filling development. Results of the study of Bautista et al., (1984) have clearly shown that yield loss due to rice leaf folder is positively related to percentage of damage leaves. In their studies, yield was significantly decreased at 17.5% damage leaves resulting in 16.5% yield loss and a 21.3% yield loss occurred with 26.6% damage leaves. However, minimal amount of fertilizer rate applied (24N-14P-44K) in farmers practice and primitive yield treatment, low incidence of leaf folder damage was observed ranging from 1.89 to 12.14% respectively (Table 30).

Table 30. Incidence (%) of Leaf folder damage as affected by different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	% Infestation of jeaf folder		
	Booting stage	Milking stage	Maturity stage
Rice Prescription	27.31±5.48 a	31.13±3.53 a	31.81±5.88 a
Primitive	2.34±0.54 b	10.09±0.57 b	12.14±2.48 b
Farmer's Practice	1.89±2.05 b	7.40±1.63 b	10.86±0.48 b
R^2	0.94	0.98	0.95

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Percent Infection of Bacterial Leaf Blight. Percent infection of bacterial blight was low in all treatments due to low disease pressure (Table 16). However, bacterial leaf blight infection was slightly high in rice prescription treatment at milking (6.12%) and maturity stage (5.35%). Result indicated that high amount of nitrogen (N) rate applied in the rice crop was significantly affected the development of the disease.

- Percent Infection of Sheath Blight. The incidence of sheath blight in rice prescription treatment was consistently high from booting to flowering stage was observed (Table 31). Disease incidence increased with increasing the amount (124N-32P-51K) of nitrogen (N) application. The first symptoms of the disease was observed at booting stage (2.01%) and the disease started to colonized the plant at milking (16.55%) to maturity stage (32.22%) due to closer canopy of the rice plant. However, incidence of sheath blight in farmers practices were tolerable due to the fungicide (Kocide) applied in the treatment and control the disease infection in the rice plant. The minimal amount of fertilizer applied in primitive yield treatment did not affect the development of the sheath blight disease.

Table 31. Average of disease infection (%) as affected by different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatment	% Infection of sheath blight			% Infection of bacterial leaf blight	
	Booting Stage	Flowering Stage	Maturity Stage	Milking stage	Maturity Stage
Rice Prescription	2.01±0.32 a	16.55±0.95 a	25.79±4.77 a	6.12±1.80 a	5.35±0.58 a
Primitive	0.00±0.00 b	7.23±0.30 b	9.19±1.11 b	3.77±0.57 b	3.16±0.30 b
Farmer's Practice	0.00±0.00 b	4.02±2.32 b	5.85±0.45 b	2.11±0.42 b	3.64±0.49 b
R^2		0.96	0.97	0.82	0.87

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Incidence of White stemborer. The result indicate that no significant difference were observed in the incidence of deadheart damage among treatments at maximum tillering and booting stage ranging from 1.5 to 2.59% respectively. However, at reproductive stage, variable results were observed among treatment. Highest percent damage was observed in rice prescription treatment at milking stage (27.61%) and maturity stage (39.06%). The high amount of fertilizer rate application in rice prescription treatment affects the maturity of the rice crop. Due to asynchronous maturity of the crop, a variable result in incidence of white stemborer damage was observed. The farmers practice and primitive yield treatments obtained the exact maturity days while rice prescription treatments was delayed 10 days by its exact maturity. During the peak population of WSB the crop status of the farmers practice and primitive yield treatment were at flowering stage while the rice prescription treatment was at booting stage.

This phenomenon was resulting in the moderately infestation of the farmers practice and primitive yield treatment. However, rice prescription treatment was severely affected by high incidence of white stemborer damage. Percent infestation of white stemborer in farmers practice at milking stage was affected by application of insecticide (BRODAN 5EC) resulting in lowest (13.77%) incidence of WSB damage. However, primitive yield treatment had 23.70% damage at maturity stage but not significantly different to farmers practice (23.68%). Highest (39.06%) percent damage was noted in rice prescription treatment and significantly contributed to yield loss.

- Yield (t/ha). The result reveals that the yield (t/ha) between rice prescription, farmers practice and primitive yield treatment were significant. The different fertilizer rates applied in all treatments were affecting the yields among treatments. Highest (3.77t/ha) yield was obtained in farmers practice treatment followed by primitive yield (2.62t/ha) treatment. Due to high percent infestation of white stemborer and leaffolder damage, rice prescription treatment obtained the lowest yield (1.62t/ha).

Table 32. Average of stemborer damage (%) and yield (t/ha) as affected by different treatments. PhilRice Agusan July to December 2014 cropping season.

Treatments	% damage of Deadheart		% Whiteheads		Yield (t/ha)
	Maximum Tillering	Booting Stage	Milking Stage	Ripening stage	
Rice Prescription	2.05±0.25 a	1.55±0.71 a	27.61±1.64 a	39.06±0.68 a	1.62±0.12 c
Primitive	2.59±0.23 a	1.91±0.26 a	18.80±0.37 b	23.70±1.13 b	2.62±0.07 b
Farmer's Practice	2.14±0.67 a	1.55±0.50 a	13.77±5.06 c	23.68±2.18 b	3.77±0.19 a
R^2	0.47	0.42	0.98	0.98	0.98

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

- Average weight (grams/10m2) of collected dry weeds in $10m^2$. Results indicated that due low water holding capacity of the soil in the area and difficulty of water impounding was resulted in uncontrolled weeds growth even though herbicide (Rouge 5EC) was applied in primitive yield treatments and significantly had the highest population of weeds. The most serious weeds observed in primitive yield treatment were classify as broadleaves such as Ludwigia spp., Hydrolea zylanica and Sphenochlea zeylanica with dry weight of 44.25 grams/$10m^2$, sedges such as Cyperus difformis, C. iria, Fimbristylis spp. and Scirpus maritimus with dry weight of 5.01 grams/$10m^2$ and the grasses are Echinochloa spp.

  Ischaemum rugosum and Leptochloa chinensis with 28.52 grams/$10m^2$. The high population of weeds in primitive yield treatments was significantly contributed to yield loss comparable to rice prescription and farmers practice treatment respectively.

Table 33. Average weight of dry weeds (grams/10 m^2) as affected by different treatments. PhilRice Agusan January to June 2013 cropping season.

Treatments	Wt. (grams) of dry weeds collected in $10m^2$		
		Sedges	Grasses
Rice Prescription	6.76 b	0.00 b	0.05 b
Primitive	44.25 a	5.01 a	28.52 a
Farmers Practice	4.47 b	0.00 b	0.09 b

Means values based on 3 replication. In a column, means followed by similar letter are not significantly different at 5% level of probability using DMRT.

VIII. Pest Monitoring and Surveillance System in PhilRice Agusan

ZM Palo, GF Estoy Jr.

Monitor the population of insect pests and natural enemies using the light trap in PhilRice Agusan. The light traps were installed at PhilRice Agusan Experiment Station. These were provided with collecting pails containing soap solution and were switched-on from 6pm to 6am using the 20 watts florescent lamps, Philips brand (Figure 17). Light traps and pheromone trap catches were collected and brought to the laboratory for sorting and identification. Population of major insect pests and natural enemies were identified, counted and recorded.

Figure 17. Light trap installed at PhilRice Agusan Experiment Station.

Highlights:

- Daily light trappings. As shown in Table 34, the population peak of the white stem borer (WSB) was in the months of May and June for the first cropping season. It was moved, because in the previous years it was in April and May. This is due to the availability of food, the rice plant as their host plant. For the second cropping season it was in the months of October, November and December.The Green leafhopper (GLH) was high in the month of March but with a lesser count compared to the month of September. The population peak of the brown plant hopper (BPH) was high in January – June cropping season, it was in the month of April, and was having a higher count compared to the month of September for the 2nd cropping season. Among the major insect pests of rice that were trapped in the daily light trappings rice black bug (RBB) got the highest count of more than 245,000 last January, and again was high in the month of June. Then in the 2nd cropping season it was high in the months of July And December. But it was not alarming because during that months, mostly of the farmers in our place have already harvested their rice crop. This is already the time for land preparation. The population peak of the rice bug (RB) in the first cropping season was in the month of May, because this was the time that almost all the rice crop in this place is at reproductive phase. It is not alarming because its population count was low. In the 2nd cropping season it was in October, but of a very low count.

Rice grain bug (RGB) is already present in PhilRice Agusan farms, but on a low count only. It had a highest count of 523 last May, for the 1st cropping season; and a highest count of 337 in the month of December for the 2nd copping season of 2014. About the natural enemies (useful insects), wasps and ants were leading in count in almost all the months. The wasp had the highest count of 2,575; it was in the month of October. For the ant, it was in the month of May, a count of 1,172. Mirid bug had a highest count of 3,541 last September. Next high in counts were the diving beetle, last September it had a count of 1,746, and cricket had a highest count of 690 last July.

- Weekly light trappings. Installations of the weekly light trappings started in the month of February 2014; using the three farm sites of PhilRice Agusan. These were in Basilisa farm, Los Angeles farm, and Gatchalian farm. The results were shown in Tables 35 to 39.

- Monthly light trappings. Pheromone trappings were installed in the station weekly to monitor the population of the male white stem borer.

Table 34. Monthly total count of insect catches from daily light trapping in Basilisa farm.

	January - June cropping season						July - December cropping season					
BASILISA FARM	Vegetative phase			Reproductive phase	Ripening phase		Vegetative phase			Reproductive phase	Ripening phase	
Insect Pests	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14
White stem borer	64	29	978	415	5,174	2,496	109	285	832	3,228	2,579	2,850
Green leafhopper	53	64	3,354	2,702	1,184	1,232	423	1,515	15,584	1,324	753	646
Brown plant hopper	31	50	5,124	17,014	112	105	102	332	10,275	133	145	100
White-backed plant hopper	4	5	186	96	24	25	51	497	759	30	36	17
Zigzag leaf hopper	24	2	31	319	339	522	87	52	534	133	263	188
Rice black bug	245,664	468	122	2,307	26,934	208,327	157,680	203	33	71	4,697	282,797
Rice bug	39	2	2	71	1,244	896	102	26	48	361	189	54
Rice grain bug	60	2	41	62	523	501	131	57	157	77	268	337
Mole cricket	81	57	85	43	20	56	103	51	61	26	12	40
Corcyra	21	22	73	70	75	116	47	6	42	74	30	32
Short-horned grass hopper	148	2	0	1	1	4	34	9	11	9	9	8
Cofanna	128	5	106	442	376	506	204	63	523	264	283	320
Whorl maggot	35	42	93	42	2,561	202	778	431	970	146	631	126
Leaf folder	27	27	208	356	336	235	89	125	199	241	151	145
Similar to Rice grain bug	244	16	133	163	340	319	140	268	362	85	209	161
Moth similar to Corcyra	0	0	0	1,306	689	167	45	11	120	741	112	5
Pink moth	0	0	143	378	281	249	46	28	50	92	112	113
Natural Enemies												
Coccinelid beetle	57	1	2	58	35	9	40	3	15	15	3	3
Ground beetle	21	9	6	96	43	57	42	3	29	32	98	93
Diving beetle	394	199	8	600	999	217	694	564	1,746	691	218	344
Spider	53	16	106	39	29	37	9	6	57	29	24	38
Dragon fly	257	78	41	17	33	106	234	49	21	9	1	29
Damsel fly	33	1	0	3	9	7	29	4	1	1	0	2
Wasps	415	655	470	396	1,738	1,567	1,064	1,173	2,356	2,575	1,884	432
Ants	509	506	184	215	1,172	616	761	684	733	355	768	592
Crickets	230	180	65	237	227	667	690	152	57	82	562	1084
Ear wig	22	5	3	8	23	19	47	6	11	20	28	41
Water strider	30	7	52	29	18	21	27	27	35	17	25	11
Mirid bug	3	1	7	517	320	43	2	36	3,541	71	4	0
Long-horned grass hopper	7	0	0	1	2	3	11	1	3	0	10	10

Table 35. Weekly total count of insect catches from daily light trapping in Basilisa farm.

	January - June cropping season																				
BASILISA FARM	Vegetative phase						Reproductive Phase						Ripening phase								
	Feb-14				Mar-14				Apr-14				May 2014					Jun-14			
Insect Pests	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	5th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.
White stem borer	0	0	0	0	0	1	18	118	2	10	10	16	47	432	117	105	34	59	87	124	96
Green leafhopper	1	5	1	2	2	78	6	725	8	52	299	30	19	32	62	87	6	20	76	61	78
Brown plant hopper	3	13	2	0	2	156	70	357	40	456	285	32	6	21	4	2	0	3	4	3	10
White-backed plant hopper	0	4	0	0	2	3	0	17	1	2	2	2	2	1	0	0	0	1	1	0	2
Zigzag leaf hopper	0	0	0	0	0	0	0	4	0	2	1	5	23	34	12	13	0	3	21	14	66
Rice black bug	9	10	0	0	0	0	0	5	0	3	124	2	0	12	5,313	50	6	40	13,416	578	14
Rice bug	0	0	0	0	0	0	0	1	0	0	4	4	1	2	2	7	15	8	26	13	87
Rice grain bug	0	0	0	0	0	6	1	1	1	2	2	3	1	15	4	16	10	44	11	73	20
Mole cricket	4	3	4	1	3	4	0	4	0	2	0	2	2	0	1	1	0	1	2	4	4
Corcyra	0	2	0	1	0	2	2	2	5	6	0	3	0	0	2	0	2	4	0	5	0
Short-horned grass hopper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Cofanna	0	0	0	0	1	0	4	10	0	19	16	18	3	25	0	13	7	31	23	15	8
Whorl maggot	0	0	5	0	2	9	2	1	1	1	2	4	1	1	0	0	992	1	1	0	136
Leaf folder	0	2	0	3	0	6	4	6	9	12	3	3	16	19	3	9	20	6	6	6	5
Similar to Rice grain bug	0	4	0	1	0	12	2	8	0	2	5	3	0	12	3	11	2	24	17	29	3
Moth similar to Corcyra	0	0	0	0	16	25	33	25	0	0	34	59	13	41	19	22	16	8	11	12	1
Pink moth	0	0	0	0	0	9	4	9	0	18	4	6	6	13	4	11	9	14	2	6	19
Natural Enemies																					
Coccinellid beetle	0	0	0	0	0	0	0	0	0	2	8	1	0	0	0	0	0	1	1	0	4
Ground beetle	0	0	0	0	0	0	5	0	1	0	65	0	0	2	4	0	0	3	11	0	1
Diving beetle	2	3	2	14	3	67	3	45	1	53	12	4	46	41	9	21	8	13	1	8	50
Spider	1	0	0	1	3	5	0	9	1	0	1	0	1	3	0	2	1	1	0	0	0
Dragon fly	8	2	0	0	1	2	1	2	0	0	0	1	0	0	3	2	1	1	1	3	8
Damsel fly	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0
Wasps	174	10	1	4	2	17	6	29	7	7	3	14	45	29	19	94	63	124	30	92	49
Ants	163	7	3	3	1	12	1	14	2	9	2	4	15	39	10	77	48	72	5	87	13
Crickets	9	24	1	2	0	4	0	3	2	12	11	3	4	8	7	3	12	17	29	61	14
Ear wig	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	1	2	0
Water strider	0	0	0	0	0	1	0	0	0	0	7	0	1	2	4	0	1	1	1	0	0
Mirid bug	0	0	0	0	0	0	0	0	5	10	9	25	10	14	4	16	54	9	0	0	0
Long-horned grass hopper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 36. Weekly total count of insect catches from daily light trapping in Basilisa farm.

January - June cropping season																					
LOS ANGELES FARM	Vegetative phase						Reproductive Phase					Ripening phase									
	Feb-14				Mar-14				Apr-14				May 2014					Jun-14			
Insect Pests	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	5th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.
White stem borer	6	18	1	4	5	22	41	10	6	13	23	26	45	100	456	53	37	40	369	217	50
Green leafhopper	2	27	2	1	2	274	44	18	1	1	604	9	1	2	12	10	5	0	107	5	1
Brown planthopper	1	16	18	10	1	13,125	36	24	18	24	840	9	1	9	0	2	0	2	6	0	1
White-backed planthopper	1	6	0	0	0	137	0	0	3	1	21	1	2	0	0	1	0	1	1	0	0
Zigzag leafhopper	0	0	0	0	0	0	1	0	0	0	105	0	1	1	3	4	1	1	32	3	3
Rice black bug	0	0	0	0	0	0	23	5	0	4	17	1	0	0	124	4	3	1	60	8	0
Rice bug	0	0	2	4	5	4	0	14	0	7	15	1	3	6	0	1	0	1	18	3	11
Rice grain bug	0	1	0	0	0	6	1	0	0	0	14	2	0	0	0	7	2	0	4	0	1
Mole cricket	0	0	0	2	1	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	1
Corcyra	2	1	1	0	0	3	2	6	2	0	0	0	0	0	0	0	0	0	0	0	0
Short-horned grass hopper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cofanna	0	0	0	0	1	0	4	10	3	0	32	7	4	14	1	4	1	6	2	13	6
Whorl maggot	0	3	0	1	1	0	0	3	5	3	7	1	1	0	0	5	0	1	117	1	557
Leaf folder	8	12	2	8	14	3	14	1	3	4	4	5	10	14	3	2	1	4	2	5	0
Similar to Rice grain bug	0	0	0	1	1	6	1	0	0	0	39	0	0	5	5	6	0	0	3	3	0
Moth similar to Corcyra	0	0	0	0	0	0	0	0	0	49	38	15	4	3	8	31	6	5	0	4	0
Pink moth	0	0	0	7	0	0	2	2	1	4	5	9	7	17	0	12	0	11	11	5	1
Natural Enemies																					
Coccinelid beetle	0	0	0	0	0	0	0	1	0	3	3	1	0	0	0	1	0	0	0	1	1
Ground beetle	0	0	0	0	0	3	1	1	0	2	117	2	5	3	4	1	0	3	8	1	0
Diving beetle	12	10	4	9	14	6	45	56	0	1	1	2	4	0	1	0	0	2	10	4	16
Spider	0	0	0	0	0	0	1	4	4	2	0	1	1	0	2	0	0	1	0	1	1
Dragon fly	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	0	0
Damsel fly	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Wasps	10	8	2	5	2	1	16	30	3	5	3	5	2	2	5	41	36	10	14	33	8
Ants	8	0	2	5	0	3	2	10	1	2	1	0	0	8	0	52	18	9	5	9	0
Crickets	0	0	0	0	0	0	4	1	0	1	12	0	1	3	1	4	1	7	5	10	3
Ear wig	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0
Water strider	0	0	1	0	0	0	11	1	1	0	3	0	0	0	3	1	0	0	0	0	0
Mirid bug	0	0	0	0	0	0	0	16	0	52	18	107	23	19	0	20	9	2	0	0	0
Long-horned grass hopper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0

Table 37. Weekly total count of insect catches from daily light trapping in Basilisa farm.

January - June cropping season																					
GATCHALIAN FARM	Vegetative phase						Reproductive Phase					Ripening phase									
	Feb-14				Mar-14				Apr-14				May 2014					Jun-14			
Insect Pests	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	5th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.
White stem borer	0	0	0	1	0	0	15	23	9	10	13	16	38	220	58	29	29	24	43	161	92
Green leafhopper	0	2	5	21	71	120	98	1,302	39	28	936	5	4	9	30	28	3	9	32	41	51
Brown planthopper	5	7	4	7	6	216	43	2,050	96	506	504	17	1	11	9	4	1	0	5	0	5
White-backed planthopper	0	3	0	1	7	6	0	46	2	3	2	1	1	1	1	0	1	0	1	0	0
Zigzag leafhopper	9	0	0	0	1	0	0	4	0	2	12	3	1	1	3	0	0	4	2	0	6
Rice black bug	0	16	0	0	0	1	4	0	0	8	357	6	0	0	1,242	3	0	5	658	52	2
Rice bug	0	0	0	0	0	0	0	0	0	1	1	5	5	7	1	10	0	1	13	11	226
Rice grain bug	4	1	3	0	0	1	2	1	1	0	6	3	0	21	7	22	1	3	4	25	18
Mole cricket	1	4	0	1	0	0	0	2	2	1	1	0	3	0	0	0	0	0	0	0	1
Corcyra	0	0	0	0	0	0	0	0	7	2	2	0	2	2	3	2	0	10	0	1	3
Short-horned grass hopper	0	0	0	1	0	0	0	2	0	0	0	0	0	1	0	0	0	1	1	0	1
Cofanna	1	0	0	0	0	0	1	9	2	10	34	4	3	5	2	2	5	7	16	15	3
Whorl maggot	0	1	0	0	0	0	2	1	7	0	0	1	2	0	0	2	0	0	0	0	100
Leaf folder	0	4	3	1	0	0	8	0	7	5	8	9	14	15	8	12	10	11	3	8	7
Similar to Rice grain bug	0	0	0	0	0	1	9	3	13	0	16	3	0	13	3	12	0	3	2	7	2
Moth similar to Corcyra	0	0	0	0	0	0	0	0	0	0	28	17	3	8	11	9	3	0	3	3	0
Pink moth	0	0	0	0	0	0	0	9	0	1	5	12	3	13	4	5	3	8	6	16	40
Natural Enemies																					
Coccinelid beetle	0	0	0	0	3	0	0	1	0	2	6	4	0	0	0	0	1	0	0	2	0
Ground beetle	3	0	0	0	1	1	0	1	0	1	29	6	0	0	6	6	0	21	30	22	1
Diving beetle	7	2	4	30	18	80	41	19	10	6	14	6	2	3	9	2	2	1	2	11	111
Spider	0	0	0	0	0	0	1	0	4	0	1	1	2	1	1	1	1	0	0	0	0
Dragon fly	7	1	0	1	1	2	0	3	3	0	1	0	0	0	0	0	0	0	0	0	2
Damsel fly	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Wasps	20	5	12	14	40	22	5	113	6	7	2	6	10	38	10	69	29	8	8	54	51
Ants	96	0	5	6	5	8	0	10	12	1	1	2	0	9	7	45	14	18	7	98	2
Crickets	13	8	1	0	2	1	5	5	4	5	30	1	1	4	7	8	1	27	32	49	9
Ear wig	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	3	0	0	0	15	0
Water strider	0	0	0	0	1	0	3	2	0	0	30	1	1	0	2	0	0	0	2	0	0
Mirid bug	0	0	0	0	0	0	0	29	1	65	6	5	19	11	15	22	12	1	0	0	0
Long-horned grass hopper	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	1	2

Table 38. Weekly total count of insect catches from daily light trapping in Basilisa farm.

July - December cropping season																										
BASILISA FARM			Vegetative phase								Reproductive Phase					Ripening phase										
	July 2014					Aug-14				Sep-14				October 2014					Nov-14				Dec-14			
Insect Pests	1st wk.	2nd wk	3rd wk	4th wk	5th wk	1st wk	2nd wk	3rd wk	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	5th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.
White stem borer	18	1	1	0	1	3	6	6	13	25	23	4	3	6	7	102	220	157	39	35	55	250	195	286	46	1
Green leafhopper	67	9	1	7	8	2	35	16	73	207	201	425	165	34	16	10	6	50	65	5	5	18	159	18	4	2
Brown plant hopper	0	6	0	0	1	4	11	1	6	132	1,032	477	29	5	2	2	1	18	3	2	1	10	10	11	5	0
White-backed plant hopper	2	8	1	0	2	5	20	7	4	50	5	18	15	5	0	0	2	7	2	1	0	0	2	1	1	0
Zigzag leafhopper	4	10	0	0	0	1	0	0	1	8	9	15	11	7	5	6	0	6	9	3	1	21	12	9	0	0
Rice black bug	32	337	3,896	13	10	28	1	0	1	2	2	0	1	0	15	0	0	1	710	6	2	0	3791	6,410	42	175
Rice bug	2	1	0	0	0	0	0	0	0	1	0	2	0	0	1	4	4	44	4	0	8	54	0	5	1	3
Rice grain bug	7	2	0	1	0	0	0	1	0	3	5	5	4	3	0	0	2	18	26	0	2	9	31	7	2	16
Mole cricket	6	6	10	7	3	4	0	3	2	1	1	0	1	0	1	2	1	1	1	1	0	1	1	2	4	3
Corcyra	4	3	0	1	0	0	0	0	0	0	0	0	1	0	2	1	1	5	2	3	0	0	0	0	7	0
Short-horned grass hopper	0	0	12	2	0	0	0	1	1	1	0	2	1	0	0	0	0	0	0	2	1	0	0	1	0	0
Cofanna	29	8	4	0	0	1	2	1	3	15	3	15	18	6	3	6	2	8	8	5	8	2	8	22	8	8
Whorl maggot	0	2	5	3	0	3	6	2	16	6	0	10	2	1	2	2	2	5	2	0	0	556	0	1	1	1
Leaffolder	2	5	3	4	1	2	2	4	4	4	6	4	9	2	8	13	13	5	2	8	6	6	3	5	5	2
Similar to Rice grain bug	4	5	1	2	0	2	0	3	1	24	14	8	3	5	2	0	0	7	36	1	1	3	34	4	2	7
Moth similar to Corcyra	3	7	0	0	0	0	0	0	0	0	0	0	13	83	37	38	15	24	4	0	0	0	0	0	0	0
Pink moth	6	0	0	0	1	0	0	0	2	0	0	0	1	0	0	1	2	10	2	5	2	8	2	14	6	0
Natural Enemies																										
Coccinelid beetle	0	1	3	0	0	0	0	0	0	3	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0
Ground beetle	3	0	2	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	8	0	1	0	10	4	1	3
Diving beetle	9	3	81	33	95	21	37	31	37	42	56	23	52	33	37	37	46	15	2	2	2	43	5	3	14	29
Spider	2	0	0	0	0	0	0	0	1	1	1	1	1	3	1	1	1	0	0	0	2	0	2	0	0	0
Dragon fly	9	9	1	9	9	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	6
Damsel fly	0	1	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wasps	14	201	39	10	54	6	10	286	11	182	27	48	340	45	28	110	8	48	92	7	13	20	29	54	7	5
Ants	9	40	60	4	34	54	8	22	4	1	29	21	29	22	23	18	11	29	177	2	5	3	80	52	13	17
Crickets	41	11	40	30	30	3	2	3	1	4	2	2	2	2	1	0	2	9	15	6	4	13	65	41	34	8
Earwig	1	1	6	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	2	2	0	3
Water strider	0	2	3	0	0	1	0	0	0	1	1	0	1	0	2	0	0	0	0	0	0	0	1	0	0	0
Mirid bug	0	0	0	0	0	0	0	0	0	43	16	39	55	6	9	0	0	2	0	0	0	0	0	0	0	0
Long-horned grass hopper	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 39. Weekly total count of insect catches from daily light trapping in Basilisa farm.

July - December cropping season																										
LOS ANGELES FARM			Vegetative phase								Reproductive Phase					Ripening phase										
	July 2014					Aug-14				Sep-14				October 2014					Nov-14				Dec-14			
Insect Pests	1st wk	2nd wk	3rd wk	4th wk	5th wk	1st wk	2nd wk	3rd wk	4th wk	1st wk	2nd wk	3rd wk	4th wk	1st wk	2nd wk	3rd wk	4th wk	5th wk	1st wk	2nd wk	3rd wk	4th wk	1st wk	2nd wk	3rd wk	4th wk
White stem borer	12		3	6	13		1	1	19	101	25	17	1	0	142	99	300	143	29	13	28	141	1,028	262	9	6
Green leafhopper	14		53	14	243		15	28	5	41	76	448	13	11	5	3	2	103	16	3	4	0	116	0	0	3
Brown planthopper	7		12	0	22		0	2	1	101	391	176	1	1	3	1	1	11	12	4	4	0	1	0	0	1
White-backed planthopper	2		7	0	3		3	0	0	19	26	14	1	0	2	0	0	4	4	2	0	0	1	0	0	0
Zigzag leafhopper	3		13	0	2		2	1	0	8	21	31	1	0	12	1	6	41	33	1	0	0	0	0	0	1
Rice black bug	60		43	1	0		0	0	0	0	1	0	0	0	3	0	0	0	4	3	0	14	799	42	1	1
Rice bug	2		0	0	0		0	3	1	7	1	87	6	4	61	32	21	286	3	1	0	1	1	0	0	1
Rice grain bug	0		5	2	0		1	8	1	15	3	11	0	0	23	0	0	33	22	0	0	5	4	2	15	2
Mole cricket	5		1	0	2		0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	2	3	2	2	1
Corcyra	0		0	0	0		0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Short-horned grass hopper	0		0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cofanna	22		31	1	3		11	3	2	15	10	2	7	2	12	2	23	27	0	6	0	1	4	6	0	1
Whorl maggot	1		6	0	20		0	5	5	9	2	12	1	86	7	3	3	1	0	1	0	0	0	0	0	0
Leaffolder	2		0	0	2		0	2	0	3	3	0	1	1	6	0	0	5	0	0	2	0	1	0	0	0
Similar to Rice grain bug	1		30	14	4		0	1	0	20	5	57	0	2	23	0	1	41	12	1	0	0	3	0	3	0
Moth similar to Corcyra	0		5	0	0		0	0	0	2	0	0	27	8	39	0	2	1	0	0	0	0	0	0	0	1
Pink moth	6		0	0	0		0	2	0	0	0	1	0	4	7	3	6	8	2	1	3	0	0	0	0	0
Natural Enemies																										
Coccinelid beetle	1		0	0	1		2	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
Ground beetle	14		55	0	0		0	0	0	2	5	0	2	1	1	0	5	16	12	7	12	1	14	2	0	9
Diving beetle	10		2	0	6		742	3	9	5	37	61	19	2	3	6	1	2	1	1	0	2	1	0	64	14
Spider	2		0	0	2		1	1	0	2	2	3	1	1	0	2	1	1	0	0	0	0	0	0	0	0
Dragon fly	3		3	1	1		0	1	0	1	0	1	2	2	0	0	0	0	0	0	0	0	0	0	4	11
Damsel fly	0		0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0
Wasps	9		10	7	8		1	10	6	5	9	3	9	4	3	22	2	18	2	11	129	3	32	9	2	0
Ants	4		27	5	3		5	37	2	0	21	8	17	0	1	1	0	31	0	7	20	0	23	4	0	0
Crickets	58		5	6	9		0	1	0	3	3	0	0	1	1	1	3	6	7	3	2	59	15	28	2	3
Earwig	0		1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Water strider	0		2	1	0		0	5	0	0	1	2	0	0	1	0	0	2	0	2	0	0	0	0	0	1
Mirid bug	1		0	0	0		0	0	3	7	35	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-horned grass hopper	0		0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

IX. National Cooperative Testing for Resistant to White Stemborer, Sheath Blight and Bacterial Leaf Blight in Agusan Del Sur

AAOrtiz , GF Estoy, Jr. PhD and GC Santiago

The use of improved rice varieties with resistance to major insect pests and diseases is the most simple and economical means of minimizing crop damage and losses. Besides, it can be combined with other management strategies with minimal detrimental impact on the environment.

Before a line or selection is recommended as a commercial variety, it should pass a series of screening process such as yield performance, insect and disease screening under field, screenhouse and greenhouse conditions and grain quality evaluation to avoid recommending those selections that are highly susceptible to major insect pest and diseases, poor grain quality and low yield.

In PhilRice Agusan, screening for insect and disease resistance started in 1994 under natural field occurrence. Since Caraga Region has a unique climatic condition having wet and very wet seasons, from January to June, it is considered as a very wet season while wet season during July to December so farmers in Caraga usually experienced higher rice yield during the July to December cropping season because of higher solar radiation and lower rainfall. Since Caraga Region has a very wet and wet season climatic condition, it is expected that higher insect and disease problem occur in this kind of environment thus problem on white stemborer, bacterial blight, sheath blight and blast are endemic in the area. Hence, this activity is continuously undertaken to determine the reaction of different NCT lines/ selections to white stem.

Highlights:

- All selections screened during July to December 2014 cropping season in all ecosystems were resistant to white stem borer at vegetative stage; 35 DAT (Tables 40 to 46). At the reproductive phase, they resulted in different reactions (Tables 40 to 46). In NCT I IL TPR, 9 entries were resistant, 4 entries were moderately resistant 2 entries had intermediate reaction, 2 moderately susceptible and 19 entries susceptible to WSB. However, 3 entries were resistant and 13 entries were susceptible to WSB in NCT I DWSR. For MAT entries, 4 entries were resistant, 1 entry was moderately resistant, 2 entries were moderately susceptible and 9 entries were susceptible to WSB. Out of 51 hybrid rice entries evaluated, 23 entries were resistant, 4 entries were moderately resistant and 1 entries had intermediate reaction 2 entries were moderately susceptible and 20 entries were susceptible to WSB. Moreover, Special purpose rice entries, 11 entries were resistant, 4 entries moderately resistant, 1 entry was intermediate reactions, 4 entries were moderately susceptible and 18 entries were susceptible to WSB. For RLDS, 8 entries were resistant, 2 entries moderately resistant, 6 entries were moderately susceptible and 9 entries were susceptible to WSB.

- Upland rice had 8 entries were resistant, 1 entry moderately resistant, 1 entry was intermediate reaction and 7 entries were susceptible to WSB. For major rice diseases, all rice entries in the NCT IL TPR and NCT IL DWSR, HYBRID and SPECIAL PURPOSE, RLDS and UPLAND were observed resistant reaction to Sheath Blight at vegetative stage (Table 40 to 46). However at reproductive phase of the crop, different entries in seven ecosystems had a variable reaction to sheathblight.

- NCT IL TPR, 35 entries showed resistant reaction and 1 entry had intermiciate reaction to ShB. All entries in NCT 1 DWSR were resistant to ShB. For MAT, 14 entries showed resistant reaction and 2 entries had intermediate reaction to ShB. For HYBRID, 50 entries had resistant reaction and 1 entry showed intermediate reaction to ShB. However, all entries in SPECIAL PURPOSE showed resistant to ShB with (2.76 to 28.89% damage). For RLDS, 21 entries showed resistant and 4 entries had intermediate reaction to ShB. Further, all entries in UPLAND rice evaluated had resistant reaction to ShB. For bacterial blight (BB), among the 36 NCT IL transplanted entries evaluated, 19 entries rated resistant and 17 entries obtained intermediate resistant reaction to BB (Table 40).

- NCT IL DWSR, 10 entries had resistant and 17 entries had intermediate reactions to BB (Table 41). For MAT, 11 entries had resistant and 5 entries were intermediate reaction to BB. For hybrid rice entries, 21 lines exhibited resistant and 30 had intermediate resistant reaction to BB. Further, in Special Purpose, 29 entries were resistant and 9 entries had intermediate reaction to BB. For RLDS, 7 entries shwoed resistant, 16 entries were intermediate resistant and 2 entries were susceptible to BB. For UPLAND rice, 10 entries had resistant and 7 entries showed intermediate reaction to BB infection under natural field occurrence.

Table 40 (6). Reaction of NCT I IL (TPR) entries to white stemborer, sheath blight, and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season.

	White Stemborer							
	35 DAT		**10 Days Before Harvest**					
	% Deadheart		**% Whiteheads**		**% Sheath Blight**		**% BLBlight**	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	3.68	R	57.58	S	4.77	R	4.84	R
2	2.46	R	5.75	R	3.39	R	5.67	R
3	4.11	R	60.44	S	4.66	R	9.66	I
4	2.11	R	37.71	S	13.13	R	9.02	I
5	4.00	R	35.16	S	6.00	R	5.44	R
6	3.25	R	5.71	R	4.02	R	5.76	R
7	3.42	R	5.13	R	3.28	R	4.66	R
8	2.18	R	62.28	S	5.42	R	6.62	I
9	3.42	R	6.19	MR	5.18	R	4.82	R
10	3.17	R	62.38	S	5.09	R	6.15	I
11	2.94	R	59.40	S	4.37	R	7.92	I
12	1.98	R	80.38	S	4.02	R	5.59	R
13	4.19	R	6.06	MR	3.87	R	4.69	R
14	4.96	R	79.40	S	4.61	R	7.70	I
15	1.91	R	53.70	S	4.82	R	6.33	I
16	3.80	R	74.34	S	27.39	R	14.95	I
17	3.00	R	4.70	R	4.26	R	13.22	I
18	2.70	R	5.60	R	4.71	R	4.56	R

Table 40 (6). Reaction of NCT I IL (TPR) entries to white stemborer, sheath blight, and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season. (Con't...)

TN1	4.16	R	84.98	S	24.03	R	37.03	S
TKM6	2.37	R	9.90	MR	4.78	R	5.21	R
19	2.37	R	52.33	S	4.63	R	5.09	R
20	2.99	R	50.70	S	5.24	R	6.27	I
21	3.14	R	47.64	S	7.86	R	7.79	I
22	1.96	R	45.18	S	3.77	R	6.18	I
23	3.52	R	19.26	MS	4.37	R	5.80	R
24	3.92	R	48.10	S	3.98	R	21.63	I
25	3.83	R	6.00	MR	6.36	R	5.55	R
26	5.27	R	11.83	I	2.83	R	3.83	R
27	4.11	R	73.06	S	13.48	R	12.35	I
28	3.54	R	12.62	I	11.23	R	4.86	R
29	3.81	R	5.38	R	3.40	R	3.86	R
30	3.34	R	5.63	R	32.94	I	6.47	I
31	3.97	R	5.65	R	4.02	R	6.80	I
32	3.78	R	7.08	MR	5.16	R	5.70	R
33	3.83	R	72.75	S	4.67	R	4.81	R
34	2.99	R	19.12	MS	5.94	R	5.44	R
35	2.42	R	4.89	R	5.70	R	5.38	R
36	2.61	R	55.93	S	4.40	R	7.01	I
TN1	5.73	R	87.97	S	30.23	R	38.64	S
TKM6	4.76	R	8.90	MR	3.93	R	5.54	I

[1]*Ave.of 3 reps.*

Table 41. Reaction of NCT I IL (DWSR) entries to white stemborer, sheath blight, and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season.

	White Stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
3	3.37	R	48.54	S	4.24	R	6.89	I
10	2.56	R	75.42	S	3.87	R	3.93	R
11	1.87	R	39.52	S	4.87	R	14.92	I
12	4.06	R	5.25	R	5.69	R	25.36	I
13	2.43	R	91.69	S	4.22	R	5.82	R
14	3.36	R	5.24	R	16.33	R	5.67	R
15	3.06	R	82.45	S	6.48	R	6.48	I
16	3.34	R	37.64	S	4.39	R	4.90	R
17	2.92	R	37.22	S	4.07	R	8.17	I
18	3.50	R	75.57	S	3.00	R	5.56	R
21	1.93	R	68.78	S	3.46	R	5.02	R
29	3.08	R	36.15	S	4.07	R	4.47	R
30	3.30	R	32.60	S	4.72	R	8.15	I
32	2.68	R	5.78	R	2.66	R	3.95	R
33	2.94	R	28.97	S	3.82	R	3.92	R
35	2.94	R	68.70	S	5.08	R	5.56	R
TN1	4.35	R	81.85	S	20.87	R	36.98	S
TKM6	4.23	R	6.86	MR	5.45	R	5.93	I

[1]Ave.of 3 reps.

Table 42. Reaction of MAT entries to white stemborer, sheath blight, and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season.

	White Stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	3.05	R	47.64	S	32.87	I	6.65	I
2	3.78	R	4.55	R	8.66	R	4.12	R
3	2.97	R	18.03	MS	3.82	R	4.34	R
4	1.52	R	43.06	S	5.27	R	14.22	I
5	2.75	R	85.62	S	27.38	R	6.80	I
6	5.71	R	4.80	R	14.73	R	5.63	R
7	2.72	R	79.37	S	5.41	R	4.44	R
8	3.79	R	77.06	S	25.44	R	4.68	R
9	2.82	R	54.90	S	36.07	I	6.77	I
10	3.20	R	5.06	R	5.63	R	5.04	R
11	3.02	R	77.51	S	5.17	R	5.12	R
12	4.77	R	4.73	R	13.11	R	7.55	I
13	3.19	R	25.00	MS	3.33	R	4.25	R
14	3.36	R	8.59	MR	3.93	R	4.91	R
15	3.10	R	76.24	S	4.91	R	5.98	R
16	3.48	R	70.20	S	5.30	R	5.83	R
PSB Rc82	4.47	R	61.43	S	5.49	R	5.27	R
TN1	5.03	R	89.26	S	29.20	R	43.82	S
TKM6	3.16	R	7.20	MR	3.38	R	5.30	R

[1]Ave.of 3 reps.

Table 43. Reaction of HYBRID entries to white stemborer, sheath blight, and bacterial blight under natural field condition. PhilRice Agusan, July to December 2014 cropping season.

Index No.	White Stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	1.00	R	29.74	S	1.54	R	1.54	R
2	4.51	R	4.24	R	4.27	R	4.22	R
3	3.41	R	73.02	S	4.19	R	7.24	I
4	2.90	R	3.38	R	3.25	R	7.22	I
5	4.99	R	4.69	R	6.23	R	21.88	I
6	3.72	R	4.98	R	5.42	R	5.51	R
7	4.15	R	4.58	R	2.91	R	7.43	I
8	3.75	R	80.67	S	24.31	R	5.34	R
9	3.37	R	37.97	S	4.43	R	7.12	I
10	5.29	R	15.90	I	3.05	R	6.09	I
11	2.89	R	28.96	S	4.98	R	9.86	I
12	3.22	R	72.82	S	4.76	R	5.63	R
13	4.13	R	42.40	S	3.98	R	8.92	I
14	4.18	R	5.23	R	3.91	R	6.01	I
15	3.70	R	41.18	S	2.69	R	6.38	I
16	3.45	R	80.39	S	27.88	R	6.82	I
17	2.42	R	39.00	S	3.12	R	4.61	R
18	3.19	R	5.85	R	5.85	R	6.85	I
19	3.37	R	44.41	S	6.82	R	4.10	R
20	2.85	R	5.51	R	10.40	R	5.50	R
21	1.42	R	17.37	MS	3.14	R	6.29	I
22	3.29	R	5.19	R	3.69	R	3.41	R
23	2.38	R	4.58	R	27.17	R	6.70	I
24	3.35	R	4.84	R	4.93	R	5.89	R
25	1.80	R	55.51	S	6.97	R	5.79	R

Table 43. Reaction of HYBRID entries to white stemborer, sheath blight, and bacterial blight under natural field condition. PhilRice Agusan, July to December 2014 cropping season. (Con't...)

TN1	5.27	R	84.37	S	28.60	R	36.97	S
TKM6	4.07	R	9.61	MR	4.16	R	4.85	R
26	4.29	R	5.05	R	3.79	R	6.57	I
27	1.19	R	1.96	R	1.47	R	1.96	R
28	2.77	R	5.19	R	4.33	R	3.96	R
29	2.84	R	5.38	R	4.79	R	6.17	I
30	3.31	R	56.47	S	7.87	R	12.29	I
31	3.44	R	40.99	S	4.78	R	4.86	R
32	2.90	R	5.55	R	4.51	R	7.56	I
33	3.49	R	5.27	R	3.35	R	3.81	R
34	4.38	R	30.58	S	3.42	R	5.73	R
35	3.48	R	4.29	R	2.87	R	4.72	R
36	3.38	R	86.99	S	4.25	R	5.12	R
37	5.12	R	4.82	R	4.32	R	7.70	I
38	3.16	R	5.11	R	4.57	R	6.28	I
39	4.36	R	8.49	MR	3.40	R	6.51	I
40	2.38	R	5.35	R	2.71	R	5.51	R
41	2.86	R	45.38	S	5.41	R	25.33	I
42	2.90	R	71.97	S	17.02	R	6.22	I
43	2.87	R	9.63	MR	36.34	I	5.14	R
44	1.80	R	51.95	S	2.53	R	6.78	I
45	2.70	R	7.09	MR	2.15	R	6.98	I
46	3.96	R	78.23	S	5.19	R	6.69	I
47	1.84	R	4.15	R	2.30	R	7.83	I
48	3.34	R	4.55	R	4.42	R	4.05	R
49	4.85	R	23.02	MS	6.20	R	6.25	I
50	3.07	R	90.82	S	5.99	R	10.62	I
51	3.37	R	6.95	MR	6.49	R	6.27	I
PSB Rc82	3.97	R	55.38	S	5.99	R	4.52	R
TN1	4.67	R	91.08	S	27.24	R	37.89	S
TKM6	2.91	R	7.50	MR	2.82	R	5.16	R

[1]Ave.of 3 reps.

Table 44. Reaction of SPECIAL PURPOSE entries to white stemborer, sheath blight and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season.

	White stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	3.77	R	5.22	R	3.77	R	3.91	R
2	3.28	R	77.69	S	4.31	R	5.15	R
3	3.57	R	34.54	S	5.32	R	7.89	I
4	3.43	R	36.97	S	4.62	R	12.32	I
5	3.83	R	70.91	S	8.14	R	5.39	R
6	4.14	R	4.40	R	2.76	R	2.76	R
7	5.00	R	9.93	MR	6.53	R	4.50	R
8	3.17	R	21.39	MS	5.47	R	5.19	R
9	4.52	R	49.79	S	5.62	R	13.90	I
10	3.85	R	66.66	S	7.22	R	8.76	I
11	4.92	R	4.33	R	3.88	R	3.88	R
12	3.92	R	64.26	S	5.21	R	5.38	R
13	4.03	R	14.18	I	4.08	R	4.59	R
14	2.76	R	77.36	S	4.83	R	8.18	I
15	4.29	R	4.44	R	3.82	R	2.93	R
16	4.47	R	5.09	R	3.90	R	4.22	R
17	4.01	R	75.70	S	7.26	R	5.58	R
18	3.12	R	4.87	R	4.39	R	3.82	R
19	3.58	R	50.93	S	4.76	R	4.44	R
20	3.23	R	3.30	R	3.86	R	3.30	R
TN1	4.68	R	81.92	S	28.89	R	35.06	S
TKM6	3.56	R	9.82	MR	5.48	R	5.54	R
21	3.75	R	9.92	MR	5.16	R	4.92	R

Table 44. Reaction of SPECIAL PURPOSE entries to white stemborer, sheath blight and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season. (Con't...)

22	no seeds for this entry							
23	4.52	R	24.51	MS	4.60	R	4.64	R
24	3.27	R	34.03	S	5.28	R	5.72	R
25	5.36	R	50.21	S	4.14	R	8.31	I
26	4.82	R	57.95	S	10.86	R	4.96	R
27	4.33	R	64.30	S	4.59	R	6.19	I
28	4.40	R	70.95	S	4.44	R	5.48	R
29	4.50	R	64.73	S	4.81	R	4.79	R
30	3.69	R	4.81	R	4.91	R	4.23	R
31	3.88	R	68.39	S	3.23	R	5.95	R
32	2.72	R	4.87	R	3.92	R	5.41	R
33	4.27	R	5.67	R	5.05	R	4.68	R
34	not germinated							
35	4.27	R	55.10	S	4.25	R	6.26	I
36	0.94	R	19.27	MS	2.08	R	1.04	R
37	3.90	R	9.43	MR	4.55	R	5.06	R
38	3.84	R	19.58	MS	5.77	R	6.82	I
39	4.11	R	6.79	MR	4.65	R	4.46	R
40	3.87	R	4.44	R	4.40	R	4.47	R
TN1	3.50	R	85.25	S	26.01	R	45.58	S
TKM6	2.73	R	9.12	MR	4.65	R	5.58	R

[1]Ave.of 3 reps.

Table 45. Reaction of RLDS rice entries to white stemborer, sheath blight and bacterial blight under natural field condition.PhilRice Agusan, July to December 2014 cropping season.

	White Stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	4.31	R	22.31	MS	6.44	R	4.34	R
2	4.08	R	40.35	S	6.87	R	14.86	I
3	4.25	R	5.78	R	5.27	R	6.91	I
4	3.87	R	33.67	S	6.46	R	23.78	I
5	2.02	R	65.19	S	6.88	R	7.42	I
6	5.36	R	24.43	MS	6.66	R	8.46	I
7	3.57	R	33.72	S	29.51	R	18.98	I
8	2.86	R	73.69	S	4.06	R	15.91	I
9	4.66	R	25.28	MS	31.80	I	13.59	I
10	3.70	R	9.06	MR	32.98	I	19.43	I
11	3.50	R	58.09	S	32.87	I	40.96	S
12	3.86	R	4.80	R	4.69	R	6.37	I
TN1	4.67	R	81.09	S	29.61	R	30.26	S
TKM6	3.68	R	8.86	MR	5.74	R	5.67	R
13	4.03	R	32.13	S	5.48	R	5.07	R
14	4.49	R	5.40	R	4.00	R	6.48	I
15	4.25	R	41.86	S	4.86	R	6.51	I
16	4.00	R	22.08	MS	4.43	R	3.86	R
17	4.68	R	4.43	R	4.41	R	4.92	R
18	4.23	R	5.65	R	4.08	R	15.47	I
19	2.32	R	5.40	R	4.94	R	5.75	R
20	4.16	R	38.16	S	32.11	I	25.18	I
21	4.33	R	25.17	MS	5.02	R	7.44	I
22	4.60	R	5.84	R	4.31	R	14.44	I
23	4.37	R	16.90	MS	6.76	R	32.36	S
24	3.19	R	4.61	R	5.80	R	5.24	R
25	3.82	R	8.21	MR	3.62	R	4.66	R
PSB Rc82	4.02	R	67.43	S	7.10	R	6.47	I
TN1	6.03	R	84.39	S	29.06	R	45.51	S
TKM6	3.38	R	6.63	MR	5.09	R	5.09	R

[1]*Ave.of 3 reps.*

Table 46. Reaction of UPLAND entries to white stemborer, sheath blight, and bacterial blight under natural field condition1. PhilRice Agusan, July to December 2014 cropping season.

	White stemborer							
	35 DAT		10 Days Before Harvest					
	Deadheart		% Whiteheads		% Sheath Blight		% BLBlight	
Index No.	Rating	Reaction	Rating	Reaction	Rating	Reaction	Rating	Reaction
1	3.69	R	5.19	R	4.62	R	5.76	R
2	4.45	R	13.34	I	4.80	R	8.02	I
3	4.18	R	5.86	R	3.42	R	7.82	I
4	4.06	R	3.76	R	5.38	R	4.78	R
5	3.77	R	5.16	R	4.03	R	4.50	R
6	4.04	R	74.98	S	7.85	R	19.01	I
7	4.64	R	43.77	S	4.38	R	12.47	I
8	5.09	R	4.39	R	18.85	R	4.93	R
9	3.88	R	6.08	MR	6.04	R	4.82	R
10	4.60	R	5.19	R	3.46	R	5.15	R
11	3.66	R	72.84	S	6.35	R	4.77	R
12	4.71	R	46.01	S	3.54	R	6.08	I
13	3.93	R	54.52	S	5.13	R	15.18	I
14	4.09	R	5.00	R	3.33	R	5.03	R
15	4.91	R	5.87	R	5.80	R	5.87	R
16	2.97	R	46.02	S	18.07	R	6.73	I
17	3.39	R	53.12	S	3.17	R	5.47	R
PSB Rc82	2.98	R	46.38	S	5.48	R	4.94	R
TN1	5.02	R	79.30	S	28.95	R	36.13	S
TKM6	3.81	R	7.79	MR	5.62	R	7.35	I

[1]*Ave.of 3 reps*

Legend

R – Resistant
MR – Moderately Resistant
I – Intermediate
MS – Moderately Susceptible
S – Susceptible

X. Development of Best Formulation and Utilization of Croton tiglium for Storage Insect Pests Management

GF Estoy Jr., RL Tabudlong and JD Basug

The average trend in rice yield in the Philippines is increasing from 2.7 to 3.2t/ha (Status of rice; global and Philippines; PhilRice, 2002). However, there are fundamental rice production problems that need to be addressed, such as pests, nutrient deficiency and post harvest grain losses that caused reduction in grain yield/quality.

Among these problems, post harvest loses which ranged from 10 to 37% that were due to a combination of damages from insects, diseases, rodents, birds and other factors are believed to be responsible for low income of the rice farmers, seed growers and grain millers.

In the present weather condition, where there is no definite dry and wet season, stored rice is always at risk. Stored rice is continuously attacked by stored product pests especially in unsanitary conditions. Losses due to these pests ranged from 10 to 30% (PRPC, 2003). Many farmers control these pests by the use of pesticides.

The disadvantages of continued use of pesticides lead to the discovery of alternate pest control. The use of plants with pesticidal properties (botanicals) could be the answer to this need. Botanicals are used in many ways to manage pests (Rejesus, 1987). Therefore, a sound management system should be developed for rice with emphasis on the use of botanicals.

Highlights:

- Activity I : Development of promising Indigenous botanical formulation as seed protection against rice insect pests. Ripened seeds of C. tiglium were collected from the research area beside PhilRice Agusan Guest House were the croton trees were planted. Seeds were dried and grounded into powdery form (Figure 18b) with a corm mill attached into an electric motor. Grounded seeds were brought into the laboratory and weighed into 25, 50 and 100 grams with two sets (Figure 18). The treatments were T1= water alone, T2=25 grams+1Liter of water, T3=50 grams+1Liter of water, and T3=100 grams+1Liter of water.

Figure 18. Ripened croton seeds (A), grounded (B), fine textured grounded seeds (C) and weighed grounded seeds (D).

- Activity II. Method of application of formulated C. tiglium as seed protection against storage insect pests. Empty sacks labeled with permanent ink pilot pentel pen were treated with the three different dosages of C. tiglium in soaked and sprayed methods of application (Figure 19). The control treatments were applied with water alone.

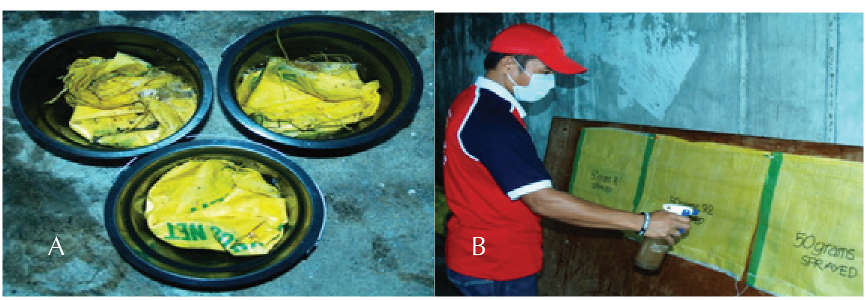


Figure 19. Empty sacks soaked (A), and Sprayed with the different dosages of C. tiglium (B).

After the treatment application, the 18 empty sacks were air dried, filled with 10 kilograms rice seeds and placed inside the screen cage (Figure 20) at PhilRice Agusan warehouse.

Figure 20. Treated sacks placed inside the screen cage in the warehouse to protect from rats damages.

- Activity III. Dosage/rate determination for maximum utilization of C. tiglium as seed protection against storage insect pests. Three different dosages, 25g, 50g and 100g of powered croton seeds mixed with 1 liter of water were prepared prior to the application into the seed sacks in the warehouse of PhilRice Agusan.

- January to June 2014 Insect Density (Ave. no.). There were five common stored grain insect pests recorded during the data collection. These include the Lesser Grain Borer (Rhyzoppertha dominica), Rice Weevil (Sitophilus oryzae), Red Flour Beetle (Tribolium castaneum), Flat Grain Beetle (Cryptolestes pusillus) and Saw Toothed Grain Beetle (Oryzaephilus sarinamensis) (Figure 21). Occurrences of unidentified species of parasitoids were also noticed from seed samples. Generally, lower average number of stored insects' was recorded from those sacks soaked in croton solutions at 1.5 to 6 months after application. It was further noted that those sacks applied with 100 grams croton solutions have lower stored insect population than those sacks applied with 50, 25 grams, and the control treatment, respectively. At 1.5 months after application, those sacks soaked in 100 grams croton solution have 18.67 adult stored insects significantly lower to those sacks soaked in 25 grams but comparable 50 grams and the control treatment.

Figure 21. Adult Lesser grain borer (a), Rice weevil (b), Red flour beetle (c), Flat grain borer (d), Saw toothed beetle (e), and unidentified adult parasitoid (f).

Table 47. Mean number of adult storage insect pests from 1.5 to 6 months after the application of different dosages of C. tiglium botanical solutions. January to June 2014.

Treatment	Month After Treatment							
	1.5		3		4.5		6	
	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked
Control	26.67ns	22.67ab	40.33 ns	37.00ns	69.00ns	75.33ns	62.00ns	68.00ns
25g	29.67	42.33a	47.33	38.00	67.00	48.33	43.33	46.00
50g	34.33	27.33ab	53.67	33.67	65.33	47.33	42.00	45.67
100g	26.67	18.67b	37.00	25.33	81.00	44.00	39.33	44.00

Average of 3 replications
1/ Based on 500g seed samples
Values followed with different letters are significantly different at á=0.05 based on Fisher's PLSD test.

Table 48. Percentage of storage insect pests survived from 1.5 to 6 months after the application of different dosages of C. tiglium botanical solutions. January to June 2014.

Treatment	Month After Treatment							
	1.5		3		4.5		6	
	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked
Control	90.65a	95.48a	86.43ns	90.45ns	73.66ns	64.05ns	74.17ns	69.50ns
25g	48.95b	55.17b	64.02	86.64	69.45	66.03	63.07	53.52
50g	33.82bc	25.85c	77.15	89.76	65.36	75.15	59.21	56.05
100g	20.38c	24.34cd	71.33	72.43	51.66	60.41	54.08	55.45

Average of 3 replications
1/ Based on dead insects from 500g seed samples
Values followed with different letters are significantly different at á=0.05 based on Fisher's PLSD test.

- Insect Survival (%). The percentage of insect survival or alive stored insect pests depended on the concentration of croton solutions and span of exposure. Percentage survival decreased as concentration used increased. These were noticed at 1.5 months after application were sacks sprayed with 100 g solutions have the lowest (20.38%) alive stored insect recorded. It was comparable to those sacks sprayed with 50g (33.82%) but significantly lower to 25g and the control treatment respectively. Similar trend were noticed in soaked method wherein those sacks soaked in 100g have the lowest alive stored insects recorded. Survival increases from 3 to 6 months after the application, yet, those sacks applied with 100g croton solutions have usually lower alive insects recorded.

  This is in connection with the findings of Kemabonta et al. (2013) that percentage mortality of S. oryzea depended on the plant products concentration of formulation and exposure time. In wheat grains treated A. indica powder, mortality for all treatment was significantly higher than the control at $P<0.05$. Highest (100g) dosage seemed to kill more stored insects over time. As evidence, dead insects were collected and recorded during data collection. Most of them were the lesser grain borer that seemed vulnerable to croton solutions while the slight affected were the rice weevils.

- Damaged Grains (%). Stored grains like rice seeds that were not properly protected would lose its quality over time due to the damaged caused by stored insect pests in the warehouse. Percentages of grain damaged were presented in table 3. At 1.5 months after application, sacks soaked in 50g botanical solutions obtained 0.07% grain damaged and significantly lower than the control (39.67%) but comparable those sacks sprayed with 25 and 100g, respectively. At 3 months after application, those sacks sprayed and soaked in 100g croton solutions had the lowest (1.33 & 0.20%) grains damages but comparable to 50 and 25 grams respectively. The control have the highest damaged. At 4.5 to 6 months after application, those sacks treated with 100g croton solutions continually obtained lower grain damaged than those applied with 50 and 25g, respectively. The results further showed that soaked method have a little bit lower percentage of grain damaged than sprayed method.

Table 49. Percentage of damaged grains from 1.5 to 6 months after the application of different dosages of C. tiglium botanical solutions. January to June 2014.

Treatment	Month After Treatment							
	1.5		3		4.5		6	
	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked
Control	3.33ns	0.67a	7.67a	0.93a	2.93a	2.63a	2.20a	2.23a
25g	1.67	0.23b	4.00ab	0.57b	1.93b	2.16b	1.80ab	1.77ab
50g	0.67	0.07b	4.00ab	0.30bc	1.53b	1.60c	1.03b	0.97ab
100g	0.00	0.10b	1.33b	0.20c	1.36b	1.13d	0.97b	0.80b

Average of 3 replications
1/ Based on 1000 seed samples
Values followed with different letters are significantly different at á=0.05 based on Fisher's PLSD test.

- Seed Germination (%). Seed germination is one of the factors considered after seed storing. Based on the standard, it should fall below 85 percent. The present study showed that percentage of seed germination from the four treatments did not showed significant differences from 1.5 up to 4.5 months after the application of croton botanical solutions. Though there were small variations noticed but still and did not fall below 88 percent. It was further noticed that at 6 months after application, all treatments in sprayed method continue to decline ranging from 86 to 89.67%, respectively. In soaked method, germination ranging from 91.33 to 96.67 percent, respectively. The results suggest that 6 months duration of seed storing, the seeds still possessed a good germination.

Table 50. Percentage of seed germination1/ from 1.5 to 6 months after the application of different dosages of C. tiglium botanical solutions. January to June 2014.

Treatment	Month After Treatment							
	1.5		3		4.5		6	
	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked
Control	94.00ns	97.67ns	95.33ns	91.67ns	95.33ns	91.67ns	89.67ns	96.67a
25g	97.67	97.33	88.33	90.00	88.33	90.00	89.33	93.33ab
50g	92.33	94.00	90.67	88.67	90.67	88.67	88.00	93.00ab
100g	95.33	94.33	91.67	91.33	91.67	94.67	86.33	91.33b

Average of 3 replications
1/ Based on 100 seed samples
Values followed with different letters are significantly different at á=0.05 based on Fisher's PLSD test.

- Weight of 1000 grains (grams). Stored grain insects often cause reductions in germination and weight as a result of direct feeding. Most of the treatments did not showed significant differences after 6 months except in sprayed method at 3 months. Sacks sprayed with 50g had the lowest

(23.57g) weight among the treatments but it was comparable to 25 and 100g respectively. The control had the heavier (24.27g) weights of 1000 grains. One thousand grain weight ranges from 23.57 to 24.77g, respectively. Variation in grain weights maybe due to damage grains and half-filled grains incorporated unintentionally during the counting of 1000 grains.

Table 51. Weight of 1000 grains from 1.5 to 6 months after the application of the different dosages of C. tiglium botanical solutions. January to June 2014.

Treatment	Month After Treatment							
	1.5		3		4.5		6	
	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked	Sprayed	Soaked
Control	24.27ns	24.17ns	24.07a	24.10ns	24.43ns	24.10ns	24.03ns	25.13ns
25g	24.30	24.07	24.00ab	24.13	23.47	24.67	24.33	24.23
50g	24.47	24.30	24.23b	24.30	24.57	24.77	24.63	24.43
100g	24.60	24.87	24.37ab	24.34	24.60	24.80	24.70	24.33

Average of 3 replications
Values followed with different letters are significantly different at á=0.05 based on Fisher's PLSD test.

XI. Palayabangan: Socio-Economic Component

MB Amoin

The 10-5 standard aims to raise the rice production standard to 10t/ha yield at P5 input cost for every kilogram of palay produced. Current average yield is about 4t/ha while input cost is about P11 /kg of palay. This initiative also aims to provide opportunities for all players in the rice sector to show what they can do to improve yield and reduce production cost.

Palayabangan: the 10-5 Challenge supports the goal of the Food Staple Sufficiency Program of the country and the advocacies of the National Year of Rice to help increase farmer's productivity, make them globally competitive, and boost their morale.

Highlights:

- Ten tons per ha goal (10t/ha). Among 10 entries, a farmer-participant from Bayugan City (AFG & RFT Partnership) got the highest yield with 6.12t/ha, came next is DevGen with 5.48t/ha, followed by the entry from Research with 4.87t/ha while the Japan-based organic technology (Nature Technos Enterprises) obtained the lowest yield with 3.29t/ha. The second lowest yielder is the Jeel's Masagana Farm Supply with 3.85t/ha.

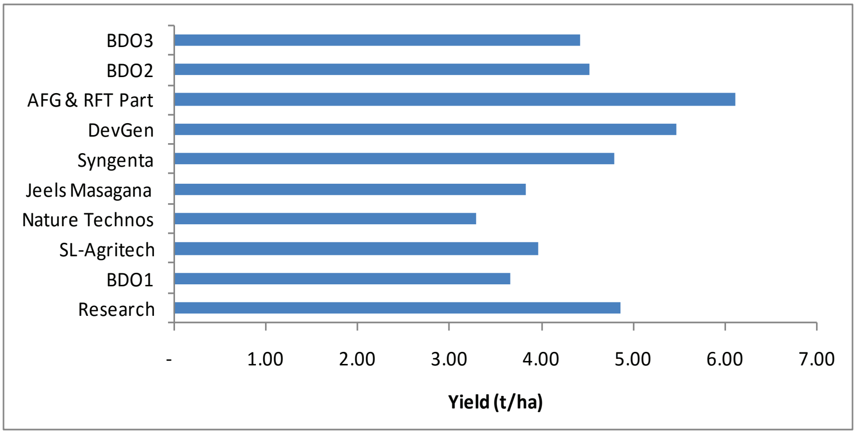


Figure 22. Comparative yield performance of Palayabangan participants, January to June 2014.

- Five pesos input cost/kg (5PhP/kg). Just like the 10t/ha goal, nobody achieved PhP5/kg input cost of palay produced during January to June 2014 cropping period. The lowest input cost attained was PhP7.97/kg (PhilRice Research) while PhP19.88/kg (Nature Technos Enterprises) being the highest.

Table 52. Summary of yield and production data, January-June, 2014.

PARTICIPANTS	YIELD /HA (14% MC)	PRODUCTION COST/HA	GROSS INCOME/ HA	NET INCOME/ HA	PRODUCTION COST/KG	RETURN TO COST RATIO
PhilRice Research	4,867	38,776	101,230	62,455	7.97	1.61
PhilRice BDO1	3,662	37,136	77,000	39,864	10.14	1.07
SL Agritech Corporation	3,967	44,867	81,719	36,852	11.31	0.82
Nature Technos Enterprises	3,290	65,400	72,736	7,336	19.88	0.11
Jeels Masagana Farm Supply	3,846	40,914	86,534	45,619	10.64	1.11
Syngenta Philippines	4,808	63,033	102,096	39,063	13.11	0.62
DevGen	5,479	67,649	114,912	47,263	12.35	0.70
Rogelio Gilos	6,118	59,500	131,712	72,212	9.72	1.21
PhilRice BDO2	4,538	37,248	92,600	55,352	8.21	1.49
PhilRice BDO3	4,425	35,666	90,501	54,834	8.06	1.54

Table 53. Comparative rice production expenses of Palayabangan entries for January to June 2014 cropping period.

PARTICIPANTS	LP	SM	CE	NM	PM	WM	FM	HM	TOTAL PRODUCTION COST
PhilRice Research	883	844	351	1,132	132	425	-	3,391	7,158
PhilRice BDO1	993	952	949	1,21	434	42	-	2,46	7,427
SL Agritech	983	1,31	949	1,87	259	45	42	2,72	8,973
Nature Technos	506	1,010	900	4,950	2,900	438	48	2,329	13,080
Jeels Masagana	878	1,401	806	89	1,650	439	120	2,801	8,183
Syngenta	1,13	2,07	1,27	2,80	1,00	47	30	3,53	12,607
DevGen	1,13	1,83	900	2,78	461	46	30	5,64	13,530
Rogelio Gilos	883	1,14	863	2,37	1,34	44	49	4,35	11,900
PhilRice BDO2	887	1,09	949	872	575	44	-	2,62	7,450
PhilRice BDO3	887	1,095	1,087	742	239	455	-	2,628	7,133

Note: all figures are based on actual expenses for 2,000 s.q.m
LP – land preparation; SM – seedling management; CE – crop establishment; NM – nutrient management; PM – pest management; FM – field monitoring; HM – harvest management

- Ten tons per ha goal (10t/ha). The 10:5 challenge remained elusive as none of the participants achieved the 10t goal per hectare for the three (3) consecutive seasons. Among 10 entries, the Japanese-based technology from the Agusan Greenfield and Agro-tech Corporation got the highest yield with 6.98t/ha, came next is Syngenta Philippines with 6.33t/ha, followed by the first entry from BDO with 6.087t/ha while the its second entry obtained the lowest yield with 5t/ha. The second lowest yielder is the second entry from Jeel's Masagana Farm Supply with 5.37t/ha.

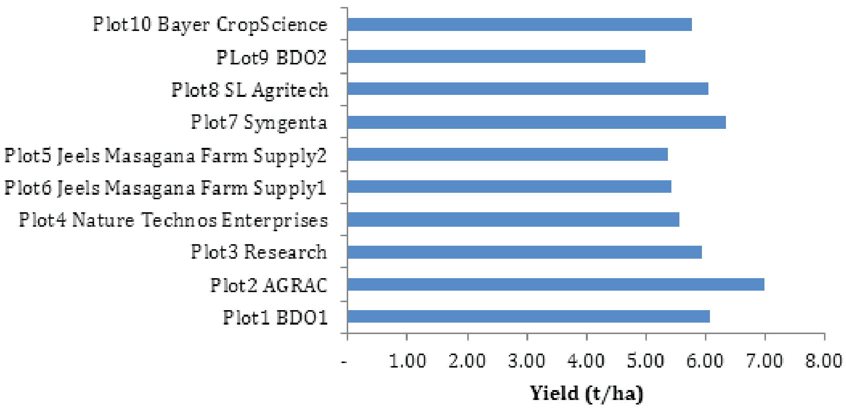


Figure 23. Comparative yield performance of Palayabangan participants, January to June 2014.

- Five pesos input cost/kg (5PhP/kg). For July-December 2014 cropping period, nobody achieved PhP5/kg input cost of palay produced. The lowest input cost attained was PhP6.54/kg (Bayer CropScience Inc.) while AGRAC incurred the highest expenses of PhP19.88/kg of palay produced. The relatively high expenses for AGRAC is attributed to the high labor cost for harvest management as they employed the manual threshing which took them more than a week to finish the activity. Specifically, threshing activity cost them at least PhP2,000 per day which is very expensive.

Table 54. Summary of yield and production data, July to December, 2014.

PARTICIPANTS	YIELD/ HA (14% MC)	PRODUCTION COST /HA	GROSS INCOME /HA	NET INCOME /HA	PRODUCTION COST /KG	RETURN TO COST RATIO
PhilRice BDO1	6,080	47,564	115,520	67,956	7.82	1.43
AGRAC	6,980	320,470	132,620	(187,850)	45.91	(0.59)
PhilRice Research	5,940	56,824	112,860	56,036	9.57	0.99
Nature Technos Enterprises	5,546	42,816	105,379	62,563	7.72	1.46
Jeels Masagana Farm Supply 1	5,412	47,110	102,833	55,723	8.70	1.18
Jeels Masagana Farm Supply 2	5,371	43,623	102,051	58,429	8.12	1.34
Syngenta Philippines	6,330	56,511	120,270	63,760	8.93	1.13
SL Agritech Corporation	6,036	48,138	114,682	66,545	7.98	1.38
PhilRice BDO2	5,000	35,594	95,000	59,407	7.12	1.67
Bayer CropScience Inc.	5,786	37,832	109,937	72,105	6.54	1.91

Table 55. Comparative rice production expenses of Palayabangan entries for July to December 2014 cropping period.

Participants	LP	SM	CE	NM	PM	WM	FM	HM	TOTAL PRODUCTION COST
PhilRice BDO1	1,586	603	1,093	2,161	514	144	-	3,412	9513
AGRAC	13,912	2,259	2,725	45	1,799	1,200	5,335	36,692	63966
PhilRice Plot3	1,755	1,043	1,416	1,963	524	415	-	4,249	11365
Nature Technos Enterprises	1,540	1,206	1,074	1,149	701	100	-	3,723	9493
Jeels Masagana Farm Supply 1	1,978	1,312	700	1,005	396	150	-	3,882	9422
Jeels Masagana Farm Supply 2	1,940	1,329	1,050	167	373	25	-	3,841	8725
Syngenta	1,560	1,470	977	2,216	601	96	-	4,542	11462
SL Agritech	1,365	1,435	900	1,433	321	73	63	4,039	9628
PhilRice BDO2	1,485	345	949	873	-	55	-	3,412	7119
Bayer CropScience	1,340	1,668	949	2,360	1,249	-	-	4,221	11787

Note: all figures are based on actual expenses for 2,000 s.q.m except for AGRAC with only 1,996 s.q.m

LP – land preparation; SM – seedling management; CE – crop establishment; NM – nutrient management;
PM – pest management
FM – field monitoring; HM – harvest managent

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
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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