

Selection of better rice for East Timor

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Abstract

The objectives of the rice component of ACIAR's 'Seeds of Life — East Timor' project are to identify rice varieties with good yield potential, tolerant to major abiotic and biotic stresses, and with acceptable grain qualities for various rice ecosystems and to help in the spread of selected varieties. The three activities being conducted are researcher-managed variety trials, farmer-managed variety trials and seed production. Seed production is an essential component in improving crop productivity. Limited amounts of quality seed will be produced at IRRI and will reach the farmers through on-farm trials. For the irrigated lowland trials, many test entries performed consistently better than the local check at trials at Maliana, Betano and Faulara. These varieties then went on to be evaluated in farmers' fields in the 2002–2003 wet season. The rainfed lowland variety trial failed in 2001–2002 due to the failure of the cropping season. The upland rice trial conducted in 2000–2001 had a very poor stand due to excessive rain and poor soil. Varietal differences were noted in a trial at Lisadila for agronomic traits. The best performing varieties were entered in on-farm variety trials in the following wet season. Once a variety is released, the farmers should be able to obtain quality seeds from government seed farms. Thus, there is a need to train agricultural technicians on rice seed production.

Introduction

THE VOTE for independence in East Timor in September 1999 was followed by widespread destruction of infrastructure, displacement of people, and disruption of agricultural and market activities. Returning farmers need substantial help to rebuild crop production. The ACIAR project: Seeds of Life — East Timor was established to help the East Timorese farmers. Its goal is to improve food security through the introduction and distribution of improved germplasm of various food crops, and training of East Timorese agricultural technicians. The International Rice Research Institute is one of

the participating CGIAR centers in the project, responsible for the rice component. The objectives of this component of the project are to identify rice varieties with good yield potential, tolerant to major abiotic and biotic stresses, and acceptable grain qualities for various rice ecosystems, and to help in the spread of selected varieties.

Rice component activities: an overview

Three interrelated activities are being conducted. These are researcher-managed variety trials, farmer-managed variety trials and seed production. A

researcher-managed trial has 10–15 test materials evaluated in small plots. It may or not be replicated and is conducted at a few sites for at least one year.

The best entries in researcher-managed trials are further evaluated in farmer-managed trials which are unreplicated and have big plots (100 sq m/variety). A farmer is given two to four test entries which he grows using his own resources and management practices. The objectives of a farmer-managed trial are: 1) to know the performance of promising/released varieties in farmers' fields; 2) to allow farmers to select the best variety under their own management practices; 3) to obtain feedback from farmers regarding the varieties; 4) to serve as a source of good seed for use by farmers; and 5) to serve as a demonstration field for promising/released varieties.

It is not enough that a farmer has selected the right variety for his farm. They should have quality seed (genetically pure and viable). Thus, seed production is an essential component in improving crop productivity. In East Timor, where there is no seed industry, the government should have a viable system of seed production and distribution. In the rice component of this project, limited amounts of quality seed will be produced at IRRI and delivered to farmers through

on-farm trials. It will be used for further seed increase in government seed production farms. Some technicians will be trained in seed production.

Materials and methods

The target environments for rice varietal testing are irrigated lowland (13,000 ha), rainfed lowland (6000 ha) and upland (3000 ha) ecosystems. Replicated yield nurseries were composed for each ecosystem. The irrigated lowland nursery had 14–15 test entries, rainfed lowland had 11, and upland had 12 for the 2000–2001 and 2001–2002 cropping seasons. An observational nursery for the rainfed lowland ecosystem in high elevations was also composed with 11 test entries for the 2001–2002 cropping season. The test entries originated from IRRI, Philippines; University of the Philippines at Los Banos [UPLB], the Philippine Rice Research Institute [PhilRice]), Indonesia, India and South Korea (Table 1). They were selected based on their yield performance, grain quality and reactions to insect pests and diseases in the Philippines. Most of the entries were developed by IRRI, UPLB and

Table 1. Test entries for rice variety trials and their origin (2000–2002).

Entry	Origin	Entry	Origin
Irrigated lowland		Rainfed lowland	
B2983B-SR-85-3-2-4	Indonesia	CAMOR	Indonesia a
B7003D-MR-3-1-3	Indonesia	DJAMADI	Indonesia a
IR36	IRRI	IR36	IRRI ab
IR 50	IRRI	IR66	IRRI ab
IR 60	IRRI	LEMO BESAR	Indonesia ab
IR 62	IRRI	PSB RC12	Philippines ab
IR 64	IRRI	PSB RC14	Philippines ab
IR 72	IRRI	PSB RC60	IRRI ab
PSB RC 10 (IR50404-57-2-2-3)	IRRI	PSB RC68	IRRI ab
PSB RC 20 (IR57301-195-3-3)	IRRI	PSB RC70	IRRI ab
PSB RC 32	Philippines	SARANG BARUNG	Indonesia ab
PSB RC 4	IRRI	PSB RC42	Philippines b
PSB RC 54 (IR60819-34-2-1)	IRRI	IR68333-R-R-B-19	IRRI c
PSB RC 58	Philippines	IR71121-35-1-1-1-2	IRRI c
PSB RC 74	Philippines	IR73305-14-2-2	IRRI c
Upland		IR73689-19-1	IRRI c
B3632F-TB-1	Indonesia	IR73689-31-1	IRRI c
B6144	Indonesia	IR73689-76-2	IRRI c
B6149F-MR-7	Indonesia	IR73691-14-1	IRRI c
C22	Philippines	PSB RC92	Philippines c
IET1444	India	PSB RC94	Philippines c
IR43	IRRI	PSB RC96	Philippines c
IR57924-9	IRRI	SR18518-BF4-B-12-1-2	Korea c
KMP34	India		
PSBRC1	IRRI		
PSBRC5	IRRI		
UPLRI-5	Philippines		
UPLRI-7	Philippines		

a: entries in yield nursery, 2000-2001
b: entries in yield nursery, 2001-2002
c: entries in observational nursery

PhilRice. Many of them are commercial varieties in the Philippines and if any are found to be adapted to East Timor conditions, it will be easy to import a large quantity.

The farmer's best local variety for each ecosystem was used as the check variety. The nurseries were given to cooperators along with field books describing how trials should be conducted (field layout, crop establishment, and data collection).

In the 2000–2001 cropping season, the irrigated lowland rice trial was conducted on one site, the rainfed lowland trial on three sites, and the upland trial on two sites. In the following cropping season, the irrigated lowland rice variety yield trial was conducted on two sites, and upland and rainfed lowland rice trials on one site each.

Results and discussion

Irrigated lowland

The irrigated lowland trial was conducted at Maliana in the 2000–2001 cropping season. The entries were laid out using a systematic arrangement for all replications instead of the recommended randomised complete block design. Thus, the trial was treated as an observational nursery and yield data were not collected. Most test entries looked better than the local check.

The outstanding performance of many test entries over the local check was confirmed in the 2001–2002

cropping season at Betano and Faulara (Table 2). The local check variety had the lowest yield at Betano. Ten test entries had significantly higher yields than the local variety (3.49 t/ha). PSB RC 74 had the highest yield (8.1 t/ha), followed by IR 72 (7.34 t/ha), and PSB RC 4 (6.90 t/ha). The top three test entries flowered early and had intermediate height. At Faulara, five test entries had significantly higher and one had a significantly lower yield than the local check variety (2.89 t/ha). PSB RC 54 (4.75 t/ha), B7003D-MR-3-1-3 (4.59 t/ha), and PSB RC 58 (4.43 t/ha) had the highest yields. The best test entries across sites were PSB RC 74, PSB RC 58, PSB RC 54, and PSB RC 20. They consistently had significantly higher yields than the local check variety at both sites. Their performance was better than IR 64, a widely accepted variety in East Timor. They, along with PSB RC 32, will be evaluated in farmers' fields in the 2002–2003 wet season.

Rainfed lowland

Results of the yield trials at Aileu and Maliana in 2000–2001 are given in Table 3. At Aileu, not a single test entry produced more yield than the local check variety. The farmer cooperator indicated that the trial was exposed to low temperatures at certain stages of growth. However, a number of test entries showed some potential at Maliana.

Table 2. Agronomic characteristics of entries in the irrigated lowland rice variety trial conducted at Betano and Faulara (2001–2002).

Entry No.	Designation	Betano			Faulara	Mean Yield (t/ha)	Rank
		DTF ^a (no.)	Height (cm)	Yield (t/ha)	Yield (t/ha)		
1	B2983B-SR-85-3-2-4	87	115	6.24*	3.71	4.97	2
2	B7003D-MR-3-1-3	95	106	4.92	4.59*	4.75	2
3	IR 50	82	82	4.75	3.90	4.32	
4	IR 60	84	81	6.17*	2.08	4.12	
5	IR 62	86	85	5.09	4.17*	4.63	2
6	IR 64	87	92	5.91*	2.63	4.27	
7	IR 72	80	87	7.34*	3.84	5.59	2
8	PSB RC 10 (IR50404-57-2-2-3)	81	79	6.69*	2.34	4.51	
9	PSB RC 20 (IR57301-195-3-3)	80	90	5.90*	4.12*	5.01	1
10	PSB RC 32	78	106	6.90*	3.60	5.25	2
11	PSB RC 4	89	85	5.46	1.23#	3.35	
12	PSB RC 54 (IR60819-34-2-1)	90	94	6.57*	4.75	5.66	1
13	PSB RC 58	90	101	5.60*	4.43	5.01	1
14	PSB RC 74	80	95	8.10*	4.27*	6.19	1
15	Nona Portu (local check)	—	—	3.49	2.89	3.19	
	<i>l.s.d.</i>			2.05	1.18		

^aDTF = days to flowering; * = significantly higher than the check; # = significantly lower than the check.

Table 3. Yield (t/ha) of entries in a rainfed lowland rice variety trial conducted at Aileu and Malina (2000–2001).

No.	Designation	Aileu	Maliana	Mean	Rank
1	Camor	2.85#	2.57	2.71	
2	Djamadi	3.92	2.25	3.08	2
3	IR36	3.12#	2.62	2.87	4
4	IR66	2.68#	2.17	2.43	
5	Lemo Besar	2.17#	2.32	2.24	
6	PSB RC12	1.58#	2.32	1.95	
7	PSB RC14	3.73	1.98	2.86	5
8	PSB RC60	3.63	1.53	2.58	
9	PSB RC68	3.43	1.73	2.58	
10	PSB RC70	3.82	2.72	3.27	1
11	Sarang Barung	2.93#	2.93	2.93	3
12	local check	4.62	2.27	3.44	
l.s.d. (5%)		1.42	1.08		

The trial in the 2001–2002 cropping season failed. The rainfed observational nursery for low temperature areas was not sown. The yield trial will be repeated in 2002–2003 and the top five entries (PSB RC 70, Djamadi, Sarang Barung, IR 36, and PSB RC 14) will be evaluated in farmers' fields.

Upland rice

The upland rice trial conducted in the 2000–2001 cropping season had a very poor stand due to excessive rain and poor soil. Varietal differences were noted in the 2001–2002 trial at Lisadila for many agronomic traits (Table 4). Yield data was not reliable because lots of grains were lost due to bird damage. Farmers made a visual evaluation of the varieties in the trial and in larger, but unreplicated, plots in an

adjacent area. UPL Ri-7 and C22, products of the UPLB breeding program, were ranked number one and two, respectively. These two varieties have been released in other Asian countries. Two Indonesian varieties (B6144 and B6149F-MR-7) and one IRRI variety (IR 43) were ranked third. These five varieties will be entered in on-farm variety trials during the 2002–2003 wet season.

Tentative workplan for 2002–2003

Researcher-managed varietal testing will continue in 2002–2003. The composition of all nurseries will be the same as last year. The yield trial sites are Loes (three ecosystems) and Betano (irrigated lowland ecosystem). If feasible, a rainfed lowland rice observational nursery will be established in Aileu. IRRI will send the nurseries to East Timor in mid November 2002.

Farmer-managed variety trials will be conducted in the coming wet season. The five best lines identified in each ecosystem yield nursery will serve as test entries. On-farm trials for irrigated lowland will be established in eight sub-districts; rainfed lowland in three sub-districts and upland in two sub-districts (Table 5). Each sub-district will contain two sites for a given ecosystem on-farm trial. Each site will have one to five farmer-cooperators — one if the cooperator is willing to evaluate five varieties and five cooperators if each is only interested in evaluating one variety. The suggested variety plot size is 100sq m (1 kg seed). IRRI will send seeds to East Timor in December 2002. The results of the researcher and farmer-managed trials will be the basis for variety recommendation.

Table 4. Agronomic characteristics of entries in an upland rice variety trial at Lisadila (2001–2002).

Entry No.	Variety	DTF (no.)	Height (cm)	Yield (t/ha)	Remarks	Farmer rating
1	B3632F-TB-1	84	135	0.98	Resistant to blast, very susceptible to stemborer (SB)	
2	B6144	83	134	0.73	Moderately resistant to SB	Good
3	B6149F-MR-7	84	125	0.58	Moderately resistant to SB	Good
4	C22	94	118	1.02	Moderately resistant to SB	Better
5	IET1444	82	100	0.35	Very susceptible to SB	
6	IR43	93	87	1.54	Very susceptible to SB	Good
7	IR57924-9	87	115	0.96		
8	KMP34	83	86	1.27	Resistant to blast	
9	PSBRC1	94	122	0.96	Resistant to blast, Moderately resistant to SB	
10	PSBRC5	87	122	1.79	Resistant to blast, Susceptible to SB	
11	UPLRI-5	92	120	0.58	Intermediate resistance to SB	
12	UPLRI-7	86	109	1.21	Moderately resistant to SB	Best

DTF = days to flowering.



Figure 1. Rice farmers harvesting.

Photographer: Eric McGaw

Table 5. Target sites for on-farm variety trials to be conducted in the 2002–2003 cropping season.

Ecosystem	District	Sub-district
Irrigated lowland	Bobonaro	Atabae and Maliana
	Liquisa	Faulara
	Baucau	Vemase and Venalale
	Manufahi	Betano and Same
	Viqueque	Viqueque
Rainfed lowland	Manatutu	Manatutu
	Dili	Metinaro
	Bobonaro	Maliana
Upland	Liquisa	Lisadila
	Viqueque	Viqueque

Once a variety is released, the farmers should be able to obtain quality seeds from government seed farms. Thus, there is a need to train agricultural technicians in rice seed production. Seed production training may be done in East Timor in 2003.

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