Commercializing hybrid rice technology in the Philippines

Edilberto D. Redo?a, Leocadio S. Sebastian, Frisco M. Malabanan, John C. deLeon, Manuel G. Gaspar and Lea D.R. Abaoag[1]

[1] Philippine Rice Research Institute (PhilRice), Munoz, Nueva Ecija 3119 Philippines, www.philrice.gov.ph
Email edredona@philrice.gov.ph

Abstract

Hybrid rice technology has been recognized as a key approach for increasing rice productivity in the Philippines, beginning with its inclusion in the government's rice production program in 1998 and the launching of a hybrid rice commercialization program (HRCP) in 2002. Four public hybrids, and four proprietary hybrids have so far been released for commercialization. To promote their continued use by farmers, 414 front-line demonstrations and 138 field days were conducted in 2003 to highlight the advantages of using hybrid seed. To enhance national capacity for hybrid rice development and use, over 73,000 farmers and extension workers, and over 5000 agricultural technicians, rice specialists, and seed inspectors, have participated in 15 types of training courses and technical briefings in hybrid rice cultivation and hybrid rice seed production. By 2003 wet season, the 56,802 hectares planted to hybrid rice had an average yield of 6 t/ha, while the 1,925 hectares seed production area produced an average yield of 0.68 t/ha. Newly organized seed cooperatives produce about 60% of the commercialization program's seed requirement while private seed companies produce the other 40%. Television, radio, and print media and the Internet were utilized for information campaign. The government provides marketing assistance to farmers through credit, discounted seed pricing, and an installment payment scheme. Public sector hybrid rice research was also strengthened on the areas of breeding, integrated crop management, and optimization of production and postproduction technologies. Activities on hybrid rice breeding, integrated crop management, and seed production, are also being pursued by the private sector (seed companies and cooperatives) that play an active role in the national program.

Media summary

The Philippine hybrid rice program jointly participated in by the public and private sector is increasing productivity and profitability of rice farming while generating rural employment.

Key Words

Hybrid rice, commercialization, Philippines, heterosis, productivity

Introduction

A sustainable and efficient rice production system is essential for the long-term economic and social stability of Philippine society. Currently, there is a pressing need to increase the yield of rice per unit area per unit time in order to address the continual increases in demand by the country's population that is growing by 2.3% per annum. By 2020, rice production volume must be 40 to 50% higher than the current level to satisfy the needs of the Philippine population. The potential of hybrid rice technology has been recognized as a key approach for addressing this food challenge (Redo?a and Gaspar, 2001). This started with the inclusion of hybrid rice technology in the government's rice production program in 1998 and the subsequent launching of a more focused hybrid rice commercialization program (HRCP) in 2002. The program aims to promote the widespread use of hybrid rice seeds in the country in order to enhance farmers' productivity and income and to generate employment in the rural areas. The program has seven components, namely: hybrid rice commercial production (F1 cultivation), hybrid seed production, technology demonstration, training, information campaign, marketing assistance, and research and development. The Philippine Rice Research Institute (PhilRice), being the lead implementing agency of HRCP, has been mandated to take the full responsibilities for technology development, technology

promotion and seed procurement. It collaborates closely with other agencies in the public sector and also with private seed companies and seed growing cooperatives.

Major Program Activities

Hybrid Rice Commercial Production

Since its launching, there has been a steady increase in demand for hybrid seeds by farmers. For example, a 125% increase in hybrid cultivation area was recorded in 2003, from 25,232 hectares in the dry season to 56,802 hectares in the wet season. An average yield superiority of 34% for hybrids over that of certified seeds was recorded between 2001 wet season to 2003 dry season, with a national average yield of 6 t/ha for hybrid rice as compared to 4.5 t/ha for inbred certified seeds (Table 1). The average yield advantage was 1.23 t/ha in the wet season and 1.83 t/ha in dry season The total production of hybrid rice reached 216,351 tons in 2003 wet season.

Four public hybrids, *Magat, Mestizo*, *Mestizo 2 and Mestizo 3* and four proprietary hybrids, including two from multinationals Monsanto and Bayer Crop Science (*Magilas* and *Bigante,* respectively*)* and two from local seed companies SL Agritech and HyRice Corp. (*SL 8* and *Rizalina 28*, respectively), have been released and/or accredited for commercialization. The involvement of private seed corporations has greatly enhanced the development and adoption of hybrid rice technology. All of them promote their rice hybrids with little involvement of and/or support from the public sector.

Region	May 2001 - October 2001			November 2001 - April 2002			May 2002 - October 2002			November 2002 - April 2003		
	Yield of Hybrid (mt/ha)	Yield of CS (mt/ha)	Yield Advantage (%)	Yield of Hybrid (mt/ha)	Yield of CS (mt/ha)	Yield Advantage (%)	Yield of Hybrid (mt/ha)	Yield of CS (mt/ha)	Yield Advantage (%)	Yield of Hybrid (mt/ha)	Yield of CS (mt/ha)	Yield Advantage (%)
CAR	6.75	5.32	26.88	8.45	4.78	76.78	7	4.93	41.99	7.53	5.05	49.11
I	5.48	4.69	16.84	5.09	4.3	18.37	6.55	4.78	37.03	5.83	4.63	25.92
II	4.89	4.26	14.79	6.75	4.83	39.75	6.19	4.71	31.42	5.98	4.44	34.68
III	6.14	4.51	36.14	5.7	4.9	16.33	5.28	4.45	18.65	5.75	5.05	13.86
IV	5.52	3.99	38.35	6.06	4.38	38.36	5.05	4.39	15.03	5.79	4.22	37.2
V	6.31	4.32	46.06	6.43	4.45	44.49	5.16	4.66	10.73	4.56	4.61	-1.08
VI		3.93		6.66	3.91	70.33	4.46	3.95	12.91	4.49	3.77	19.1
VII		4.31		5.76	4.29	34.27	5.9	4.26	38.5	5.45	4.06	34.24
VIII	6.21	3.8	63.42	5.1	3.9	30.77	4.83	4	20.75	4.86	3.91	24.3
IX	4.83	4.44	8.78	8.07	4.46	80.94	5.72	4.56	25.44	6.02	4.59	31.15
X	6.05	4.4	37.5	5.49	4.41	24.49	5.33	4.55	17.14	5.76	4.45	29.44
XI	5.28	5.4	-2.22	7.73	5.12	50.98	6.47	5.38	20.26	6.7	4.76	40.76
XII	6.07	4.3	41.16	5.59	4.02	39.05	5.53	4.37	26.54	5.49	4.19	31.03
CARAGA	3.81	4.02	-5.22	3.77	3.87	-2.58	4.66	4	16.5	4.4	4.21	4.51
ARMM	4	3.46	15.61	4.62	3.95	16.96	4.72	3.74	19.8		3.93	
Philippines	5.49	4.28	28.27	6.85	4.59	49.24	5.78	4.54	27.31	6.03	4.63	30.24

Table 1. Yield comparison between hybrid and inbred rice across the different Philippine Regions

Hybrid Seed Production

By 2003, 21 seed growers' cooperatives were involved in seed production of public hybrids, producing about 60% of the program seed requirements. Members of these cooperatives used to be ordinary rice farmers who were trained by PhilRice on hybrid seed production. Figure 1 shows the key seed production areas in the country. These include region 2 (primarily Isabela province), the Cordillera Autonomous Region or CAR (Kalinga province), and region 11 (provinces of Davao Oriental and Davao del Sur). In 2003 wet season, more than 1,500 hectares were planted to seed production of public and proprietary hybrids. For public sector seed production, yields were highest in CAR (864 kg/ha), region 11 (841 kg/ha), and region 2 (696 kg/ha), while average national seed yield was 683 kg/ha, the highest so far for a wet season crop. In the private sector, seed companies are producing seed of proprietary hybrids on a contract-growing as well leased-land basis.

Figure 1. Key Hybrid Rice Seed Production Areas during 2003 WS

Technology Demonstration

Hybrid rice cultivation and seed production front-line demonstration activities were initiated beginning 1998 to showcase the different components of hybrid rice technologies to farmers and potential seed growers. In hybrid rice cultivation demonstration activities, plots planted to different rice hybrids were planted alongside popular inbred varieties. New technologies were introduced along with the use of hybrid seeds. These included the use of 20 kg seed per ha, sparse seeding rates, 1-2 seedlings per hill planting rates, the use of integrated nutrient management tools such as the minus-one element technique (MOET) and the leaf color chart. Hybrid rice seed proved to be a convenient vehicle for introducing other modern technologies that gained easy acceptance amongst farmers. In 2003, region 2 established 433 hybrid rice techno demo sites where 153 field days were conducted for 7,448 farmer participants. At 338 demonstration sites where the MOET was introduced, 18 field days were conducted with 1,089 farmer participants.

Training

To further strengthen the national capacity for hybrid rice development and use, a total of 73,184 farmers, extension workers and members of partner agencies from all over the country have been educated in 10 types of hybrid rice cultivation training courses/technical briefings. On the other hand, a total of 5,540 agricultural technicians, rice specialists, and seed inspectors have participated in 5 types of training courses and technical briefings on hybrid rice seed production. The latter aimed at explaining the principles of hybrid rice seed production, demonstrating practical skills in the use of the three-line system, discussing the different cultural management practices for hybrid rice production, and drawing a strategic plan for the promotion, seed production, and commercialization of hybrid rice in different parts of the country.

Information Campaign

The launching of the hybrid rice program in the Philippines was accompanied by a massive campaign utilizing television, radio, print media and the Internet (Redo?a and Gaspar, 2001). Various promotional

materials were produced such as briefing kits, hybrid rice cultivation and seed production technology bulletins, CD-ROMs, videos, production leaflets/booklets, TV and radio plugs/jingles, posters, print/broadcast media releases, tricycle banners, street billboards, and car stickers. In addition, hybrid rice news and success stories were featured regularly in the PhilRice website (www.philrice.gov.ph) and educational materials on hybrid rice cultivation and seed production were put on-line.

Marketing Assistance

To further support the widespread use of hybrid rice seeds in the country, the government provided marketing assistance to farmers such as production loans, discounted pricing of hybrid seeds, installment payment schemes, and fertilizer support. Hybrid rice grain was also preferentially procured by the National Food Authority, the government's grain procurement agency, at a price equivalent to that of premium class grain. The government procured hybrid seed, produced by both the public and private sector. In addition, production inputs such as gibberelic acid, parental line seeds, and production loans were also provided to seed growers.

Research and Development

Hybrid rice research and development (R&D) has significantly advanced hybrid rice germplasm improvement and breeding and the improvement of production and postproduction technologies for hybrids. PhilRice, the national R&D agency for rice established a fully-fledged hybrid rice R&D program and a hybrid rice center for applied R&D in northern Philippines. By 2003, nine three-line hybrids were being tested nationally alongside the released elite hybrids. IRRI and private seed companies also have hybrid breeding activities. The use of the two-line system is also being explored with 31 new thermosensitive genetic male sterile lines in the pipeline. A biotechnology-mediated approach for hybrid seed quality testing and purity assurance is being readied for pilot testing while resistance genes are being transferred to parental lines through marker-assisted selection and genetic transformation (de Leon et al, 2004).

Socio-Economics

To ensure sustainable adoption of hybrid rice technology with less intervention from the government, socio-economic profiling activities indicated that a potential hybrid rice farmer should be a certified seeds user, an irrigator's association and cooperative member, and have superior yield and rice income compared to the average rice farmer (Catudan and Arocena, 2003). Economic studies, on the other hand, revealed that the farmer gets a net income of P12, 285/ha from hybrid cultivation compared to P11, 356/ha net profit from inbred rice cultivation. Some issues and concerns encountered by various stakeholders in the implementation of the hybrid rice program include: the assurance of hybrid seed demand, high cost and risk of producing hybrid seed, the lack of improved post harvest facilities, weak extension and monitoring services, and budgetary constraints.

Conclusion

Hybrid rice technology is a key strategy for increasing rice production and achieving food security and rice self-sufficiency. Results of the hybrid rice commercialization program in the Philippines look promising. The superior yield potential of rice hybrids, the high profitability of seed production that has also resulted in employment generation, is now being realized on-farm. Hybrid seed is also proving to be an efficient vehicle for the promotion of other new technologies. However, the concerted efforts of both the public and private sectors shall be vital in ensuring a more rapid growth in the development and adoption of hybrid rice technology in the country. It is envisioned that private sector should be more involved over the long term for the program's sustainability.

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