Rice Science FOR DECISION-MAKERS

VOL. 7 • DECEMBER 2017 • ISSN 2094-8409

Is Hybrid Rice Worth Investing In?

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INTRODUCTION

Rice prices are expected to drop when trade protection shall have finally been relaxed in compliance with our international trade agreements. To remain in the market, farmers have to strategize on how to compete in terms of quality and price of their products. This policy brief tackles Hybrid Rice as one of the ways to help farmers survive in a market with tight competition, especially with cheaper imported rice. It discusses implications of hybrid rice on the country's total rice supply and on farmers' competitiveness; identifies the factors that make farmers adopt hybrid rice; and presents possible steps to hasten its adoption.

WHAT IS HYBRID RICE?

Hybrid Rice (HR) is a product of two different cross-pollinated rice plants with superior qualities. HR, also called F1, inherits the qualities making it perform better than its parents in terms of nutrient uptake and absorption, competition with weeds, and resistance to pests and diseases (Kuyek et al., 2000), among other traits. Therefore, HR can produce bigger

KEY POINTS

- A farmer is competitive if he/she can sell the same quality of *palay* (paddy rice) at a lower price than his/her competitors. This is possible only if he can produce *palay* at lower unit cost without sacrificing quality.
- Planting hybrid rice is one way to improve competitiveness. This could increase yield and reduce production cost per kilogram of *palay* (i.e., unit cost). Even if the price of hybrid is higher than certified inbred seeds, its unit cost is lower resulting in higher income for hybrid users.
- Due to its high yield, hybrid rice can increase the availability of local supply, which strengthens the country's rice security and minimizes the need to import.
- Hybrid rice adoption can be escalated by expanding irrigated areas; making hybrid seeds available and accessible within farmers' localities; intensifying extension activities in irrigated areas; and widening hybrid seed production areas.

yields than inbred varieties that are produced through inbreeding or the process of self-pollination.

However, grains from F1 harvests are not for re-planting due to resulting lower yields. Farmers need to buy fresh hybrid seeds every season. Certain farmers even perceive that HR production is more expensive than inbred because it requires more inputs and needs extra care. Nevertheless, the government considers HR as a key technology to secure domestic rice supply.

IMPLICATIONS OF HR PRODUCTION ON FARMERS' COMPETITIVENESS

The succeeding sections present results of the 2011-2012 Rice-Based Farm Household Survey of PhilRice. Low-quality inbred seeds include those saved from previous harvest that did not undergo or pass the quality tests of the BPI-NSQCS; high-quality refers to Certified and Registered Seeds.

Figure 1 shows higher HR dry-season yields than high-quality seeds (HQS) by more than 1 mt/ha and low-quality seeds (LQS) by 2 mt/ha; wet-season yields higher by 0.81 and 1.30 mt/ha. All wet-season yields are lower than in the dry season because of unfavorable weather.

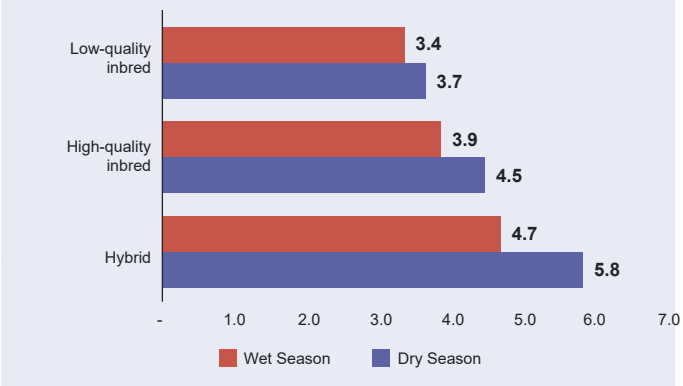

Figure 1. Yield (mt/ha), by seed class, WS 2011 and DS 2012.

Table 1 shows that HR production is costlier than inbred in terms of seeds, fertilizers, and labor due to the extra care for seedlings, in transplanting, replanting, and weeding. Harvesting and threshing involve a harvest-sharing payment, hence bigger yields lead to higher labor payment.

Table 1. Average seasonal cost/ha (P) of major expenses, by seed class, 2011- 2012.

Expenses	Hybrid	HQS	LQS
Seeds	4,043	2,315	1,856
Fertilizers	8,260	6,587	5,100
Pesticides	1,735	2,008	1,793
Labor	22,591	19,381	17,398
Land	11,185	11,122	10,274

Note: Differences are statistically significant except for pesticide and land costs.

But Figure 2 shows that for every 1 kilogram of HR produced, farmers would spend only P11.00-P12.00, lower than inbred in both seasons. Unit cost is lower because high yield compensates the higher HR production cost.

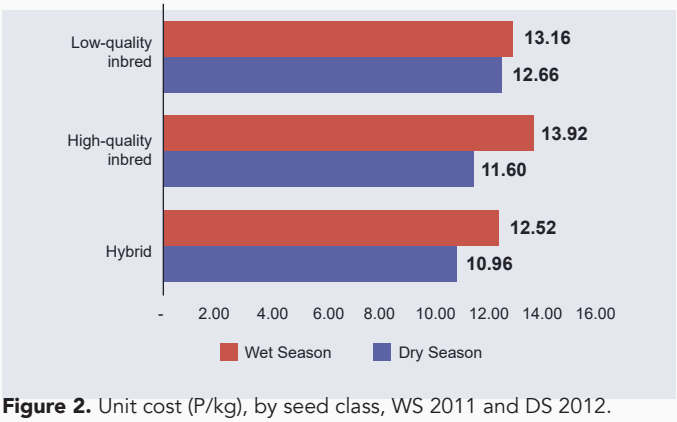

Figure 2. Unit cost (P/kg), by seed class, WS 2011 and DS 2012.

Using the DS 2012 data (Table 2) and pricing fresh *palay* at P17/kg, the lower unit cost implies that HR farmers could get more profit than HQS (44%) and LQS (121%).

Table 2. Net profit of farmers using the estimated unit costs, by seed type, DS 2012.

Seed Type	Ave. Yield (kg/ha)	Gross Income at P17/kg	Unit Cost (P/kg)	Total Cost (P/ha)	Net Profit (P/ha)
Hybrid	5,828.75	99,088.71	10.96	63,904.84	35,183.87
HQS	4,533.20	77,064.41	11.60	52,604.28	24,460.12
LQS	3,672.07	62,425.13	12.66	46,484.31	15,940.81

HR production, therefore, could help farmers become more competitive and earn bigger profit. Lower cost allows farmers to sell their rice at a lower price than their competitors.

IMPLICATIONS OF HR PRODUCTION ON RICE SUPPLY

Table 3 shows how much *palay* could have been produced in 2016 had a portion of irrigated areas that used inbred seeds been instead planted with hybrid. If a million ha of the area harvested were allotted for hybrid, we could have gained an additional harvest of 931,941 mt dry *palay*. This is equivalent to 609,490 mt milled rice, which could have covered 2016 imports amounting to USD202.31 million.

Table 3. Estimated production had some of the irrigated areas that used certified seeds been instead planted with hybrid rice in 2016.

Particulars	Volume/Value
Actual total *palay* production, 2016 (mt) (A)	17,627,244.82
Estimated *palay* production if area for hybrid production was increased to 1 million hectares (B)	18,559,186.03
Palay production increment (mt) (B-A)	931,941.21
Milled Rice Equivalent of production increment (mt)	609,489.55
Total Imports, 2016 (in mt)	609,363.60
2016 FOB price of Viet Nam rice, 25% brokens (USD/mt)	332.00
Value of 2016 imports (in million USD)	202.31
2016 BASELINE DATA:	
Area harvested for hybrid, all areas (ha)	388,827
Area harvested for certified inbred, all areas (ha)	2,031,450
Average yield of certified inbred, all areas (mt/ha)	4.22
Average yield of hybrid, irrigated areas (mt/ha)	5.74
Milling Recovery (%)	65.40

Sources of raw data: Philippine Statistics Authority, Department of Agriculture, and UN - Food and Agriculture Organization

HYBRID RICE ADOPTION

During its early adoption years, HR production was driven by a heavy subsidy program. The subsidy, however, was discontinued in 2010 because of its high cost to the government, exacerbated by some implementation problems (Bordey et al., 2016). With this, adoption slightly dropped but slowly increased from 4% of area harvested in 2011 to a low 9% in 2016. Majority of farmers planted inbreds, with 45% of area harvested devoted to high-quality seeds; 43% to low-quality seeds; and 3% to traditional/native seeds (Figure 3).

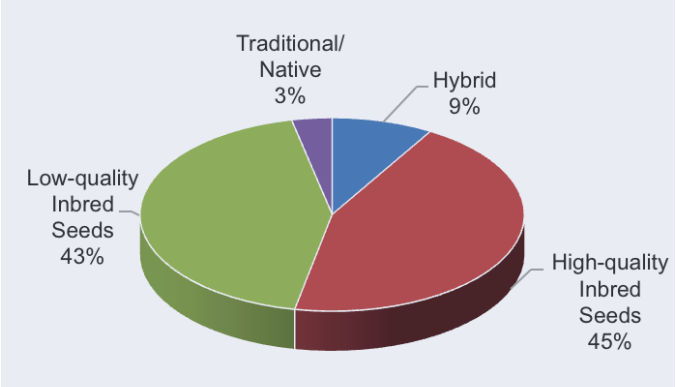

Figure 3. Distribution of area harvested, by seed class, 2016.
Source: Department of Agriculture

Hybrid rice production was constrained by limited supply of affordable hybrid seeds in the market (Bordey et al., 2016). In response to this, the private sector imported hybrid seeds; government and international organizations bred new varieties (28); by private companies (45). Despite these efforts, adoption remained limited, which the government now wants boosted.

FACTORS THAT MAKE FARMERS ADOPT HYBRID RICE

Adequacy of irrigation and price of hybrid seeds are two main factors that affect farmers' decision to plant hybrid. Sufficient water helps attain the potential yield of HR.

Hybrid seeds are costlier than inbred at around P200/kg; only P28 and P17 for high- and low-quality seeds (Table 4). Filipino farmers generally don't take risks.

Table 4. Average price of seeds, by type, 2011-2012.

Seed Types	Average prices (P/kg)
Hybrid	223
High-quality inbred	28
Low-quality inbred	17

CONCLUSION

Adopting hybrid seeds can help farmers become more competitive by allowing them to produce more at lower unit cost than inbred seeds, hence higher profit. However, despite these benefits, hybrid seeds adoption is still low.

Availability of sufficient water motivates farmers to plant hybrid seeds. It is therefore important that a reliable source of irrigation water is available for them.

Local government units in existing irrigated areas have to ensure the availability of hybrid seeds. Promotion and production training can also be intensified in these areas.

The government should also devise ways to reduce hybrid seed prices. In their paper, Bordey et al. (2016) concluded that hybrid seeds are more expensive in PH because supply is limited. Expansion of area for hybrid seed production was recommended.

CALL FOR ACTION

- **Expand irrigated areas.** To motivate farmers to plant hybrid rice, irrigation must be provided for them to make their areas ideal for HR production.
- **Expand hybrid seed production areas.** This will produce additional supplies of hybrid seeds and consequently reduce prices to more affordable levels.
- **Ensure availability of hybrid seeds in irrigated areas.** Availability and accessibility help farmers choose the varieties they plant. To increase adoption, hybrid seeds have to be made available and accessible to farmers.
- **Intensify extension activities for hybrid rice production in irrigated areas.** Farmers in these areas are more receptive to HR adoption. The role of hybrid rice in helping them become more competitive needs to be amplified. They must be educated on the current issues of the rice industry, and how HR can solve concerns on rice supply and competitiveness.

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ABOUT THE MATERIAL

Rice Science for Decision-Makers is published by the Department of Agriculture-Philippine Rice Research Institute (PhilRice). It synthesizes findings in rice science to help craft decisions relating to rice production and technology adoption and adaptation. It also provides recommendations that may offer policy triggers to relevant rice stakeholders in search of opportunities to share their knowledge on rice-related products.

The articles featured here are grounded on solid basic and applied research.

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Rice Science for Decision-Makers, December 2017
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Managing Editor: **Mary Grace M. Nidoy**
Editorial Advisers: **Constante T. Briones, Ronan G. Zagado, and Sailila E. Abdula**

Published by PhilRice as a policy advocacy material.

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