EXECUTIVE SUMMARY

1. OBJECTIVES

This midterm assessment research on hybrid rice technology was undertaken to monitor and analyze the profitability and productivity impacts of the Hybrid Rice Commercialization Program (HRCP) among its major stakeholders: the seed growers and F1 commercial rice farmers. In addition, the study also assessed, the impact of HRCP on hectarage, production, job generation, and efficiency, measured in terms of financial and economic benefit–cost ratios, using import parity prices.

2. SCOPE OF THE STUDY AND METHODOLOGY

The study covered five (Isabela, Nueva Ecija, Iloilo, Davao del Norte and Davao del Sur) hybrid rice producing provinces during WS 2002, DS 2003, WS 2003 and DS 2004. The socioeconomic surveys of both hybrid and inbred rice seed growers, inbred and hybrid rice commercial producers, and other stakeholders of HRCP, using stratified random sampling techniques, formed the bulk of data in the comparative analysis of hybrid and non hybrid rice seedgrowers and producers.

The comparative analysis covering four seasons used the enterprise budgeting techniques generated by the surveys, in comparing the profitability of inbred and hybrid rice seed growers, and inbred and hybrid rice commercial producers. Stochastic production and cost frontier functions were also used to estimate the technical and allocative efficiencies of both inbred and F1 hybrid rice commercial production.

3. SUMMARY OF FINDINGS

i. Seed Growers : Hybrids vs Inbreds

During the start of the program (WS 2002) hybrid seed growers across the five provinces were less profitable by 66% than the inbred seed producers even with the subsidy on the AxR seed and gibberelic acid (GA$_3$). A major reason for this comparative low profitability was due to the low yield of 355 kilogram per hectare. During the succeeding seasons when yields in hybrid seed production increased from a range of 693-776 kg/hectare, and given the price of F1 seed at P120/kg, the net profitability of hybrid seed production has overtaken that of inbred seed growers by a range of 20 to 86 percent even without the seed subsidy.
The cost per unit of inbred rice seed however, was still lower, averaging P6.5/kg from dry season 2003 to dry season 2004. In contrast, the cost of hybrid rice seed (F₁) production without subsidy averaged P68/kg, during the same period.

Within the four seasons, the hybrid rice seed producers (who are basically cooperative members) had shown tremendous improvements in adapting to the new hybrid rice seed production technology. It must also be mentioned at this point that private companies such as the SL Agritech and Bayer are getting more than a metric ton per hectare in their hybrid rice seed production.

The sensitivity analysis also indicated that given a fixed price of hybrid rice seed, profitability increases proportionately with improvements in yields. Between 693 kg to 776 kg/hectare yield of hybrid rice production and at a price ranging from P80 to P100/kg, hybrid rice seed production can still be equally if not more profitable than inbred rice seed production. This is because the higher the yield level, given fixed output prices, the lower the break-even price of production.

**ii. Commercial Rice Hybrids vs Inbreds**

**Socio – economic characteristics.** There were no significant differences between hybrid and inbred rice farmers in terms of age (48-51), household size (5), and education (HS graduate). However, in terms of area cultivated and household members working in the farm, inbred rice farmers had slight advantage.

**Patterns of input utilization.** There was a very significant difference between hybrid and inbred rice farmers in terms of seed use, fertilizer and use of labor. Inbred rice farmers used on the average, 100 kilos of seed per hectare, in contrast to hybrid rice farmers of 23 kilos. Fertilizer utilization was also significantly different between the two groups: hybrid farmers’ use of 156 NPK/ha vs. 134 NPK/ha for inbreds; and organic fertilizer use by hybrid rice farmers vs inbred was 145kgs : 52 kgs / hectare. Finally, hybrid rice farmers, significantly used more total labor/ha than inbred rice farmers by a ratio of 102 mandays : 79 mandays per hectare.

**Profitability.** In terms of overall profitability, findings illustrate that higher yield and relativity comparable prices of hybrid and inbred rice across seasons and provinces, led to higher gross income from hybrid rice production.

The analysis showed that costs of material inputs such as seeds, fertilizers, and chemical pesticides were consistently higher in hybrid rice production for the two wet seasons. Results further indicated higher hired labor
costs for hybrid specifically in seedling management, land preparation and crop establishment activities. The increase in costs of first and third activities was due to less seed requirement of hybrid rice technology, since care must be exercised in seedling management and establishment. Increase in land preparation costs, on the other hand, could be attributed to intensified field-leveling activity.

Overall, hybrid rice total production cost per hectare was 8 to 13 percent higher. On the other hand, while production cost per kilogram of hybrid was significantly higher during 2002 WS, no statistical difference was observed in 2003 WS because of yield improvement. This implies efficiency gains as farmers master the new technology.

Net income derived from hybrid was higher than inbred for the two wet seasons. However, while significant mean profit difference was observed in 2002 WS, no statistical difference was recorded in 2003 WS due to yield improvement that was experienced by inbred farmers.

Farm budget structures for dry seasons also showed superiority in gross income from hybrid rice owing to yield advantage. Yield levels, though, were generally lower in 2004 DS for both inbreds and hybrids owing to incidence of pest infestations, and flooding as reported by the respondents.

Costs of material inputs are still higher for hybrids but a remarkable narrowing of differences were observed in 2004 DS. The 22 and 24 percent differences in fertilizer and pesticide costs, respectively, during 2003 DS narrowed down to 10 and 15 percent in 2004 DS. As a result, even though production cost per hectare is higher in hybrids, cost per kilogram became statistically lower in 2004 DS. Net profit derived from hybrids was also significantly higher in both seasons.

Profitability analysis was also done at different yield levels (below 5 mt/ha and 5 and higher mt/ha). The results indicated that significantly lower average yield for hybrids for this category was recorded in the initial season leading to smaller gross income. Total cost per hectare was however higher resulting in lower net income.

Improvement in hybrid mean yield levels was noted in second and third seasons, which resulted in insignificant differences in gross income levels of hybrid and inbred respondents under this category. It was further noted that hybrid rice yield improvement was undertaken without significant increase in production cost per hectare. This resulted in the narrowing of gap between the net income from hybrid and inbred rice production.
In 2004 DS, hybrid yield level improved more and became significantly higher than inbred leading to higher gross income. Larger net income was also realized from hybrid during this season, as production cost per hectare did not increase significantly.

For the farmers with yields of 5 and higher mt/ha, average yield for hybrid was generally higher than inbred across four seasons under this category resulting in higher gross income. Hybrid rice production costs per hectare in the first season was 18 percent higher than inbred. However, this gap narrowed as seasons progressed until no significant difference was observed in the final season. This resulted in statistically higher net income from hybrids from 2003 DS to 2004 DS. Cost per kilogram of hybrid rice is slightly higher in wet season while a little bit lower during dry season.

Finally the profitability analysis without seed subsidy, i.e. using the unsubsidized price of the hybrid seeds resulted in doubling of seed cost per hectare. This further increased the production cost per hectare, and cost per kilogram of hybrid. Results showed, however, that net income from hybrids were still slightly higher than inbred during wet season and significantly larger during dry season. This indicates that economic advantage could still be obtained from hybrid rice particularly in dry season even when seed subsidy is removed.

**Technical and Allocative efficiency.** Empirical results of the stochastic production frontier function indicated that hybrid rice production was more technically efficient on the average by 4 percent than the inbreds. A major explanation of the higher technical efficiency of hybrid over inbreds was the higher yield levels given the same statistically significant relationship between physical inputs and outputs.

For the stochastic cost frontier estimation, the results indicated that the prices of seed, fertilizer and chemicals were all significantly correlated with production cost. In terms of cost or allocative efficiency however, inbreds are more cost efficient on the average by 3 percent, over hybrids. This further implies that hybrid rice farmers have not yet adjusted in allocating their costs of inputs at a given level of output. However, considering that the hybrid rice technology is just 4 seasons old, a difference of only 3 percent in cost efficiency with a long tested technology like inbred rice production is a tremendous improvement.

**iii. Perceptions of Major Stakeholders**

The study also indicated that the major stakeholders of the HRCP had a satisfactory general level of understanding and awareness of the program, and had sufficient institutional manpower capability and, good working relationships
with other institutions in the program. Likewise, production, yield, income of farmers/seed growers, and grain quality were mentioned by stakeholders as impact indicators of the Program.

Finally, major stakeholders of the program mentioned the problems/constraints, they encountered as follows: quality, supply and distribution of both parental hybrid and F1 seeds; coordination among program implementors; insufficient water supply; grain quality and low milling recovery; and the lack of information and dissemination activities of the program to consumers.

### IV. Overall Program Impact Assessment

**Production and Hectarage.** The hectarage planted to hybrid rice increased from 5472 hectares in 2001 to 208,342 in 2004, an average annual growth rate of 254 percent. In crop year 2004, the total area devoted to hybrid rice reached 7 percent of total irrigated rice area.

In terms of production, hybrid rice increased from 29,223 mt of paddy in 2001 to 1,091,258 mt in 2004. It attained a level of 10 percent of total production from irrigated area production in 2004.

**Job Creation.** Man labor requirements for hybrid rice production are much higher than inbred rice. Results of the analysis for the 4 seasons indicated that HRCP had generated a total of 85,266 jobs during the period.

**Direct Program Beneficiaries.** The program had benefited a total of 247,887 hybrid rice farmers and 1,857 seed growers during the period.

**Indirect Technology Diffusion.** The program had also induced synergies between hybrid and inbred rice farmers in terms of: lower seed utilization per hectare, soil analysis, patterns of fertilizer usage, integrated nutrient and pest management and synchronous farming, among others.

**Financial and Economic Impact.** Results of the analysis indicated that financial and economic benefits of the program far exceeded its costs. The financial and economic benefit cost (B/C) ratios were estimated at 1.56 and 1.13, respectively, during the period. In terms of US dollar savings from rice imports, the program had an economic savings equivalent to US$ 23.25 million.

### V. Outstanding issues

The study also listed and discussed eight outstanding issues related to program. These include: the politics of HRCP, program target setting, technology adoption curve, R&D, technology promotions and training, seed
subsidy and budgetary support, credit repayment rates, seed quality and control systems, and the role of traders, millers and consumers.

4.0 CONCLUSIONS

Results from the midterm assessment of HRCP, indicated encouraging results in terms of improvement of farm management practices among both hybrid and inbred farmers, and seed growers leading to attainment in higher yields, improved factor productivity, and overall efficiency.

The empirical findings from the 4 seasons data among stakeholders in the five provinces, affirmed the robust potentials of the HRCP in improving the productivity of the rice subsector. If these empirical findings were typical to the other hybrid rice producing provinces, these results should provide a very clear mandate of the leadership at the Department of Agriculture to vigorously sustain the budgetary support of the program and fully institutionalize it as a major program within the Department.

5.0 Recommendations

The study recommends the following:

i. The Need to Sustain and Further Enhance the Productivity Gains Posed by HRCP over the Past 2 years.

The empirical data from the five provinces demonstrated the high potentials of hybrid rice technology in terms of yield improvements and factor productivity among seed growers and F1 commercial rice farmers. In this regard, the funding support for the program must be guaranteed as a priority by the DA, to allow the further strengthening of linkages and coordination among DA-RFU, LGUs, PhilRice and the other major stakeholders of the program. The sustained program funding will likewise enable program implementors and stakeholders, in the timely deployment and distribution of high quality seeds, provision of technical assistance and extension services to seedgrowers and farmers for continuous training in seed production and processing, integrated nutrient and pest management, and other adaptive measures to enhance their productivity. The technological advantage of hybrid technology must be optimized to the fullest, now that the birth pains of the program have been partly resolved.

ii. Refocus HRCP in High Impact Areas

After two years of program implementation, the experience should be used to properly identify and prioritize the most suitable areas for cultivation,
given the agroclimatic variances across regions, level of coordination, technical services, and infrastructure development at the LGU level. The targeting should be prioritized in those areas where hybrid rice production has demonstrated clear superiority over inbreds. The DA- Regional Rice Program Coordinator and the Hybrid Rice Action Officer must take proactive coordination stance with LGUs in this regard, by providing LGU assigned personnel the necessary logistical support in their extension services under the program.

iii. Continue the Funding Support for R&D, Technology Promotions, and Training

Upstream research on hybrid parental lines and on farm adaptive research on hybrid commercial production through technology promotions and training must be continued in the medium to long term to ensure national capacity development in hybrid rice. Results of location specific researches on hybrid parentals relative to yields, pest and disease resistance due to agro climatic variability and other regional/provincial environmental variances can be used as inputs to technology promotion and training that can ensure technology sustainability. The research development extension (RDE) continuum at location specific sites will inject dynamism among program participants. PhilRice should be provided budgetary support to assume major portion of this recommendation.

iv. Revisit the Seed Subsidy Policy

To a major extent, the gains in hybrid rice productivity and efficiency over the past two years have been achieved due in part to steady hybrid rice seed subsidy policy. During the 4 seasons covered by the assessment, the procurement price of hybrid seed of P120/ kg and subsidy of 50% at the farmers’ level, was the one constant variable in the analysis of the profitability of hybrid rice seed and F1 commercial production. Given the 2 years experience in program implementation, the seed subsidy policy should be revisited to analyze its impact on rice hybrid technology adoption, on the financial viability among seed producers, considering the risk and investment requirements (especially R&D, seed processing and marketing) of the hybrid seed industry, and the availability of public funds. A balance should be arrived at in the timing of phasing out the subsidy without endangering the viability of the efficient seed producers and hybrid rice commercial farmers.

v. Strengthen the National Seed Quality Control System (NSQCS)

To ensure quality standards in hybrid rice seed production, the institutional capacity of the NSQCS as a regulatory agency must be strengthened.
This includes among others, personnel training on seed quality and control and acquisition of vehicles and equipments that can enhance efficiently its mandate.

vi. Adopt the Private Sector Led, Market Driven Approach in Hybrid Rice Industry Development

The long term goal of the program should be market driven, private sector led hybrid rice industry. This approach implies that the private sector is the engine of growth in industry development. The role of government is to provide a conducive policy environment where the hybrid rice industry can be sustainable and competitive over time.

However, at its current period of development, the hybrid rice industry, particularly the hybrid seed industry which is 75 % cooperative based, needs a sustained technical support from the public sector in terms of quality seed production, drying processing, packaging, storage and marketing.

It is most desirable and this stage for the hybrid rice industry to avail of the coordinated efforts of DA-RFUs and LGUs in availing of such technical services in their respective areas. The technical assistance may include but not limited to development of location specific hybrids resistance to Tungro virus, Stemborer and Bacterial Leaf Blight, synchronous flowering in different regions, availment of breeder and foundation seeds from PhilRice through a special memorandum of agreement, and development of marketing network to sell seeds to dealers, municipalities or directly to farmers.

vii. Form Strategic Alliances

The hybrid rice program is one of national vital interest due to its implications to food security. Stakeholders of the program are therefore encouraged to form strategic alliances with other agribusiness industries, farmers’ organizations, government and non government organizations (GO-NGOs), consumers groups and other stakeholders of the other sectors of the economy. After all the success of the hybrid rice program in supplying cheaper and abundant food will have its broadbased multiplier effects on the economy, especially the nutritionally disadvantaged segment of Philippine Society.

vii. Continue and Expand the Socio Economic Monitoring and Evaluation of the HRCP

The socio economic monitoring and program level evaluation of five provinces under the HRCP, had provided the program implementors of HRCP, a snapshot of the direction of the program at the farm level. This monitoring research should be further pursued by PhilRice in collaboration with the DA-HRPC.
covering 16 major hybrid rice producing provinces (one province per region in priority sequence of 5 provinces every year). Likewise, it would be desirable at this stage of to develop a user friendly, computer based program benefit monitoring and evaluation system (PBMES) of HRCP to be used as a management tool by the DA leadership.