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Performance of Hybrid and Conventional Rice Varieties in Sindh, Pakistan

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Abstract
The study was design to compare the economic performance of hybrid and conventional rice production, major objectives of the study were to asses financial gain from hybrid rice comparing with conventional rice and Taluka Golarchi was selected for the present study where both on hybrid and conventional rice varieties are grown, primary data on hybrid and conventional rice was collected from the farmers through personal interviews with the help of specially designed questionnaire. A simple random sampling technique was used to collect the data. Statistical approaches used to analysis the data. Total costs per hectare of hybrid rice were 148992.23 Rs per hectare which were more then conventional rice was 140661.68 Rs per hectactare. Major differences in hybrid rice production cost are related to higher seed prices, slightly higher land management costs. On an average higher yield (196.14 monds per hectare) was obtained from hybrid rice while conventional rice yield (140.14 monds per hectare) was less then hybrid rice. There was 16.64 percent increase in hybrid rice yield comparing with conventional rice which gives additional income to poor farmers, Price gained per mounds was almost the same in both activities. High profit was observed in hybrid rice and low profit was obtained in conventional rice. Most of the farmers focused to grow hybrid rice due to high yield.
Keywords: Rice, performance, hybrid, conventional, varieties, Pakistan

1. Introduction

Rice (Oryza sativa L.) belongs to the family Poaceae is one of the most important cereal crops, grown in wide range of climatic zones (Place et al. 1970) The genus Oryza includes 22 wild and 2 cultivated species, originally cultivated in tropical Asia, the oldest record dating 5000 years BC, but then extended also to temperate regions (Watanabe, 1997). Rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by humans (Smith & Bruce 1998). Crop improvement program also depends on the utilization of germ spasm stock that is available in different rice research institutes of the world. Improving and increasing the world's supply will also depend upon the development and improvement of rice varieties with better yield potential, and to adopt various conventional and biotechnological approaches for the development of high yielding varieties that having resistance against biotic and a biotic stresses (Khush G.S. 2005).

In Pakistan's economy Rice is second food source after wheat and is an important foreign exchange earning commodity fetching about $950 million annually. Pakistan grows a high quality rice to fulfill domestic demand and also for exports. Rice account 2.7 percent of the value added in the agriculture and 6 percent of GDP (Gross Domestic Production). The area under rice crop in Pakistan during 2012-13 was 2311 hectares with total production of 5541 thousand Tons; whereas the total area of rice crop in Sindh was 361.2 hectares with total production 1230.3 Tones (Pakistan Statics 11).

Pakistan is an Agricultural country due to high increase in population it face major challenges of food scarcity, so for the completion of food needs of the peoples, need to grow high yielding varieties. It is one of the highest water requiring crops, depending on early and late maturing varieties. Coarse grain varieties are early maturing while fine grain varieties are late maturing. The yield of fine varieties is much lower than the course grain varieties but demand of fine rice is high in national and international markets. Most of the farmers prefer to grow fine varieties despite low yield high production cost and more water requirement. (Khushk et al. 2011). The term "hybrid rice" refers to the first-generation (F1) offspring of a cross of two genetically diverse parents that yields (performs) better than both parents due to manifestation of a biological phenomenon known as hybrid vigor or heterocyst. (asiabiotech). Hybrid rice typically displays heterocyst (or hybrid vigor) such that when it is grown under the same conditions as comparable high-yielding inbred rice varieties it can produce up to 30 percent more rice. High-yield crops, like hybrid rice, are one of the most important tools for combating world food crises (IRRI) International Rice Research Institute. Hybrid Rice was first commercially cultivated in China in 1976, it proven to have 20 percent yield advantage over inbred rice in China (Yuan 2004). During the last decade, Vietnam, India, Philippines, Bangladesh and United States have also started its commercial cultivation. (Khushk et al. 2011).

1.1 Materials and Methods

The study was conducted through primary data collection from growers of Rice from Taluka Golarchi District Badin. The study focused on the determinants affecting Rice yield and to compare the financial gains from two Rice activities (hybrid and conventional rice).

Primary data will be collected from sample of 60 hybrid and conventional rice growers, which will equally be distributed among different categories of farmers will be selected by purposive sampling techniques from the farms located within 10-kilometers radius of Taluka Golarchi District Badin. A comprehensive and well designed questionnaire will be prepared for data collection, selected hybrid and conventional rice growers will be interviewed to collect the data. To accomplish the objectives mentioned above the specific analytical techniques will be used. The first objective will be accomplished by the Rapid Rural Survey method to gather baseline information on production of hybrid and conventional rice crop in Taluka Gorachi District Badin Sindh. The other objective will be achieved by collecting cross section micro level data from the hybrid as well as conventional rice crop Growers. The proposed analytical techniques are as under. The farm cost analysis based on hybrid and conventional rice production. The results of this study will provide for the comparison of total costs and returns of hybrid rice with conventional rice. Total costs consist of expenditure from the profit and loss account (fixed costs and variable costs etc.). For the estimation and calculations, following procedure is adopted to examine the profitability of hybrid as well as conventional rice.

Averages (Average = $\sum Xi / n$)
Percentages (Percentage = F / N* 100)
Total Cost of Production TC=TFC+TVC
Total Revenue =T physical *Price
Net Returns NR = TR- TC
Gross margin = Total return –variable costs

1.1.1 Results

The general objective of study was to find out the yield gap of hybrid and conventional rice crop. Hybrid and conventional rice were performed in study area. Most of the farmers focused to adopt hybrid rice; they get greater benefits from hybrid rice than conventional rice. Distribution of respondents with socio-economic variables and the influence of these socio-economic variables on the production of hybrid and conventional rice are discussed here.

Total Revenue

Total revenue is the total money received from the sale of any given quantity of output. The total revenue is calculated by taking the price of the sale times the quantity sold. (Total revenue = price x quantity) (Biz 2002).

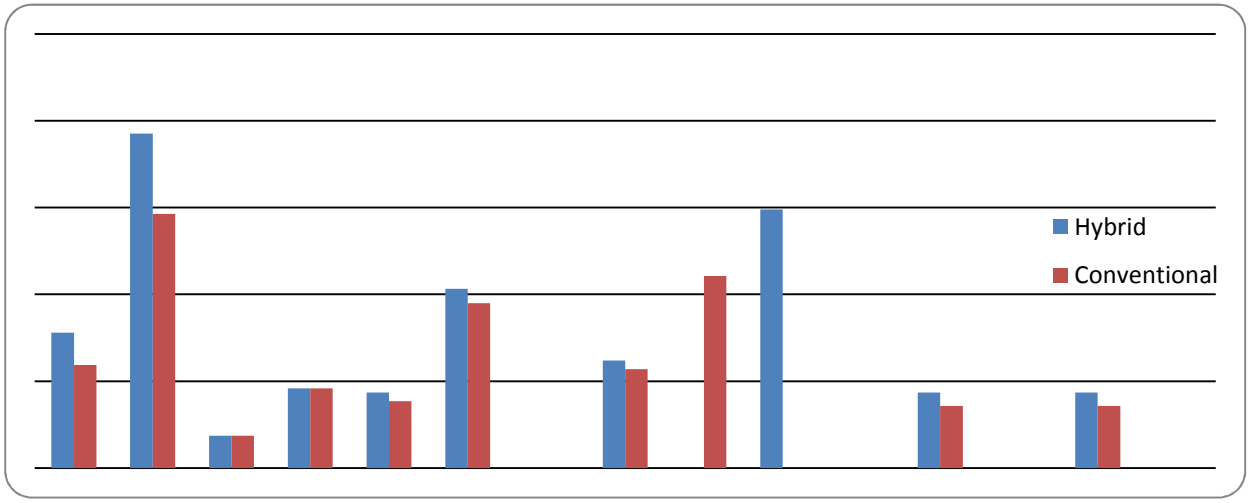
Table 01 Total variable costs of Hybrid and Conventional Rice

Cost	Hybrid Rice			Conventional Rice		
	Quantity	Price/Unit	Total (Rs/Acre)	Quantity	Price/Unit	Total (Rs/Acre)
Ploughing Hrs/Hectore	19.76	1208.18	23873.4	17.29	1104.21	19091.8
Seed (Kg)	Seed (Kg)	Seed (Kg)	Seed (Kg)	47.89	59.41	2845.34
Bed making No.	12.35	209.66	2589.3	14.82	235.29	3486.99
Sowing/Transplanting (M/D)	24.7	264.29	6527.96	27.7	228.37	6204.8
Fertilizers (Bags)	7.41	2642.91	19584	9.88	2445.25	24159.1
Weedicide	2.47	850	2099.5	0	0	0
Micro nutrients (Zink, Boron) begs	4.94	1882.16	9297.87	7.41	1194.84	8853.76
Irrigations (No.)	21	0	0	25	0	0
Pesticides (No.)	7.41	838	6209.58	11.11	845	9392.18
Harvesting cost (M/D)	27.17	308.6	3884.66	22.23	356.2	7918.33
Threshing Rs/Min	44	196.14	8630.16	48	140.14	7918.33
Packing	19	196.14	3726.7	19	140.14	6727.09
Transportation	16	196.14	3138.24	16	140.14	2662.8
Commission	2.85	196.14	558.99	2	140.14	2242.24
Load/unload	8	196.14	1569.12	7	140.14	280.28
Total variable costs (Rs/Hectare)	103176.2			94845.65		

Table 02 Gross Margin and Net Return of Hybrid and Conventional Varieties

	Hybrid	Conventional
Gross Revenue	192557.19	146414.23
Fixed Costs	45816.03	45816.03
Variable Cost	103176.2	94845.65
Total Cost	148992.23	140661.68
Net Return	43564.96	5752.55
Gross Margin	89380.99	51568.58
Input Out Ratio	0.000717593	0.000706019

Fig.1 Gross Margin and Net Return of Hybrid and Conventional Varieties



1.1.2 Discussion

The production of farms is influenced by the physical, biological and socio-economic factors subsequently these factors not only effected on production but also on the cost and return of any farm enterprise. Production of any crop depend upon soil structure, climatic condition, social organization, availability of resources, quality inputs and favorable marketing condition both in factor and product markets. It is, therefore, considered meaningful to have brief discussion of area and production levels of Hybrid and conventional Rice in various regions of Pakistan, production potentials, profile of study are before explaining survey results

Study revealed that overall cost of land management and seed on Hybrid Rice was high as compared to on Conventional Rice due to more land management practices and high seed rate. The use of fertilizer is more in conventional Rice as compared to Hybrid Rice. Overall high yield was obtained 196.14 mounds per hectare as compared to conventional rice which was 140 mounds per hectare. Total revenue of Rice production was received by the Hybrid Rice growers Rs.192557.19 per hectare and conventional growers Rs.146414.23. Study results further indicate that hybrid Rice growers obtained higher gross margin Rs. 89380.99 per hectare, as compared to conventional growers Rs. 51568.58 per hectare.

Majority of Farmers were reducing the Conventional Rice area and focusing for Hybrid Rice, because of Hybrid Rice gives better yield i.e 196.14 monds per hectare was obtained from hybrid rice while conventional rice yield 140.14 monds per hectare.Result highlighted that some of the differences in production cost related to production of hybrid Rice, compared with the Conventional Rice were 103176.2Rs per hectare and 94845.65 Rs per hectare. Major differences in hybrid rice production cost are related to higher seed prices, slightly higher land management costs. Market price of both was nearly same i.e 981.72Rs/mound for Hybrid Rice and 992.25Rs/mound for Conventional Rice. Hybrid rice production offers gross margin and increase net returns, as well as reduces net return variability from year to year, to the farming operation. Majority of the farmers focused for adoption of Hybrid Rice which was beneficial to the farmers in both production and profit. Farmers use less fertilizer for Hybrid as compared to Conventional Rice and earn greater profit due to greater production. It was concluded that Hybrid Rice enhances the paddy yield. The was compared with the study of Khushk on rice as mentioned bellow.

Khushk et al. (2011) assess the performance of rice hybrid and other varieties planted in rice growing areas of Sindh and Balochistan during the year 2008-2009. The results revealed that average yield of hybrid rice was 195 mds/hectare, followed by IRRI-6 (151 mds/hectare), B-2000 (91 mds/hectare) and Rosi (94 mds/hectare). This indicates that the yield of hybrid rice was higher by 29 percent than the major variety IRRI-6. However, the growers received low price by Rs. 8/mds for hybrid rice against IRRI-6 variety. The main reasons

for low price were reported as poor grain quality i.e. high percentage of broken rice and variation in the grain size. This study concludes that overall growers earned more profit by adopting hybrid seed technology but there are some repercussions of this technology such as, growers have to buy costly seed every year and have to depend on seed companies. Additionally there is a loss of age-old knowledge and tradition of seed production that sustained rice farming from centuries.

Therefore the result shows that majority of Farmers were reducing the Conventional Rice area and focusing for Hybrid Rice, because of Hybrid Rice gives better yield i.e 196.14 monds per hectare was obtained from hybrid rice while conventional rice yield 140.14 monds per hectare.Result highlighted that some of the differences in production cost related to production of hybrid Rice, compared with the Conventional Rice were 103176.2Rs per hectare and 94845.65 Rs per hectare.

Conclusion and Suggestion

This study was carried out to compare the economics of hybrid and conventional rice based on the field survey in the rice cropping zone of Sindh. The information was collected from selected hybrid and conventional rice growers. The data was collected through personal interviews. Number of analytical techniques has been used to access comparative economic analysis of hybrid and conventional rice production i.e. farm cost analysis, Net Return analysis; gross margin analysis.

Major findings are the differences in production cost between hybrid and conventional rice, which were 148992.23Rs per hectare of hybrid and 140661.68 Rs per hectare of conventional rice. Major differences in hybrid rice production cost are related to higher seed prices, slightly higher land management costs. The result indicates that significant increase in out put of hybrid rice production is related to the higher yield potential of hybrid rice was 196.14 mounds per hectare as compared to conventional rice which was 140 mounds per hectare while market price of both was slightly different i.e 981.72Rs/mound for hybrid rice and 1045.81Rs per mound for conventional rice.

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