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Economic Analysis Based on Benefit Cost Ratio Approach for Rice Varieties of Malakand Division

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Abstract
Different rice varieties of Malakand division were economically compared using cost benefit analysis approach during 2014. Data was recorded on a randomly selected sample size of 50 farmers in three districts (Swat, Malakand and Lower Dir) by structured questionnaire. Rice varieties namely, Fakhre Malakand, JP5, Basmati-385, Sara Saila and Mardanai were used in the study. The total per acre paddy and straw yield of rice varieties amounted a sum of Rs.165000 for Fakhre Malakand, Rs. 115000 for Basmati 385, Rs.110000 for JP5, Rs.104000 for Sara Saila and Rs.93000 for Mardanai. The Benefit Cost Ratio (BCR) was higher for variety Fakhre Malakand having value of 3.24 and least for variety Mardanai with a value of 1.39. The varieties Basmati 385, JP5 and Sara Saila presented a close value of Benefit Cost Ratio (BCR) with respect to each other viz. 1.95, 1.82 and 1.67 respectively. On the basis of BCR values Fakhre Malakand found to have more commercial benefits to the farming community of the area than the other cultivated varieties.
Keywords: Cost benefit ratio, Rice varieties

Introduction

Rice (*Oryza sativa L.)* being the most important cereal of the world fulfills one third food requirement of the world population. It provides some 700 calories per person, mostly residing in developing countries (Barai et al., 2009). According to International Rice Research Institute (IRRI) 800 million tons of rice will be required in 2025 (Kubo and Purevdorj, 2004).

In Pakistan's agrarian economy rice plays multifarious roles. Firstly, it is second staple food and contributes more than 2 million tons of national food requirement. Secondly, rice industry is an important source of employment and income for rural people. Thirdly, it contributes in the country's foreign exchange exchequer. Rice being the second most important cereal after wheat has been a major source of foreign exchange earnings in recent years (GOP, 2011). For instance, during 2011-12 about 3.29 million tons rice of worth US $ 2.06 billion was exported. The barter trade on Afghanistan border was in addition to this export (Agricultural Statistics of Pakistan. 2010-11).

Rice is grown under many different conditions and production systems, but submerged in water is the most common method used worldwide. Rice is the only cereal crop that can grow for long periods of time in standing water (Int. Year of Rice, 2004). Adequate Water availability and temperature are basic requirements for rice crop (IRRI, 2013). Scarce water resources in Pakistan has considerably resulted in reduced production of rice crop during recent years. Export of rice from Pakistan decreased from US $2.18 billion in 2009-10 to US $1.92 billion in 2012-13, thus showing decline of 19%. Pakistan mainly exports rice to UAE, Iran, Saudi Arabia, Kenya and Afghanistan. In Pakistan rice is an important cash crop of the country and the overall national economy. Rice accounts 2.7% of the value added in agriculture and 0.6% of GDP (Memon, 2013). Rice ranks as second amongst the staple food grain crop in Pakistan and it has been a major source of foreign exchange earnings in recent years. Pakistan is the world's largest producer of rice. Each year, it produces an average of 6 million tons and together with the rest of the South Asia; the country is responsible for supplying 25% of the world's paddy rice output. Among the most famous varieties grown in Pakistan include the Basmati, known for its flavor and quality. Rice production comprises 40% of Basmati (Fine) type and 60% of coarse types (Trade Development Authority). The areas, production and yield of rice for the last five years are shown in Table 1.

Table 1: Production and Yield of Rice

Year	Area (000)	Production (000)	Yield (kg/ha)
2008-09	2963	6952	2346
2009-10	2883	6883	2387
2010-11	2365	4823	2039
2011-12	2571	6160	2396
2012-13	2311	5541	2398

Source: (Federal Bureau of Statistics, 2012-13**)**

In Pakistan, rice is grown under diverse climatic and edaphic conditions. Basmati predominates in traditional rice tracts of Punjab. In Swat at high altitude mountain valleys, temperate Japonica rice is grown. In the South of KPK, Sindh and Baluchistan IRRI type long grain heat tolerant tropical rice are grown (Memon, 2013). Haq et al., 2002, Used Cobb-Douglas type of production function technique to find out the contribution

of each input towards output. He investigated the relationship of farm size and input use and its effect on production and gross and net incomes.

In Malakand division, rice is grown on an area of 22173 ha with a total production of 44599 tons (Crop Statistics of Khyber Pakhtunkhwa, 2011-12). Malakand division is mostly comprised of high altitude cold and mountainous areas where due to cold damage, the production of rice varieties significantly varies from each other. There is a need to analyze the economic and commercial aspects of locally grown varieties of the area. For this purpose the present study was done to compare cost and revenue of different rice varieties, using benefit cost ratio technique. The study may be a valuable source for farmers and agriculture economists to understand the cost and revenue parameters of rice in Malakand division.

Materials and Methods

Experimental Details

The study was conducted in Malakand division (Swat, Malakand and Lower Dir districts) during 2014. A sample size of fifty farmers from seven villages in each district were randomly selected. A structured questionnaire was used to collect the data from the participants.

Benefit Cost Ratio (BCR) Calculation Formula:

BCR = VNR (Variety net revenue) / **TC** (Total cost of the variety)

Benefit Cost Ratio is directly proportional to the net return, i.e. higher the Cost Benefit Ratio will result in the higher net return.

Recorded Data and Questionnaire Used: The data recorded on different aspects and the questionnaire used during the survey is presented as follows:

Questionnaire Form for Cost Benefit Analysis

Farmer's Name	Village		Tehsil		District
Varieties cultivated					
Seeding date					
Transplanting date					
Source of seed					
1. Own					
2. Farmer to Farmer					
3. Market					
Fertilizer (bags)	DAP	Urea	SSP	K	Others
Weeds infestation	1.High		2.Medium		3.Low
Types of weeds	1.		2.		3.
Weed control	1.Manual		2.Mehcincal		3.Chemical
Herbicides applied			Time of application		
1.					
2.					
3.					
Irrigation source	Canal		Tube well		
Insect pests/disease situation					
Varieties cultivated	Disease/insect attacked		Slight	Moderate	Severe
1.					
2.					
3.					
Pesticide applied	Time of application		Dose /acre		
1.					
2.					
3.					
Overall crop condition	Crop stand_____		Plant population_____		
Production techniques	Agriculture Department		Fellow Farmer		Print/Radio/TV
Production/acre	(Provided by the concerned farmer)				
Marketing issues	Price		Disposal		Other

Results and Discussion

Cost of Production:

The specifics of cost of production are presented in Table 2. The average cost of production for all the varieties was Rs.38872.

Table 2: Cost of production of rice varieties

Particulars	Unit	Quantity/No	Rate (Rs)	Amount/Acre
A- INPUTS				
a- Land Preparation				
1. Ploughing with tractor	Hour	3	1000	3000
2. Puddling with tractor	Hour	4	1000	4000
b- Raising Nursery				
1. Seed	Kg	15	60	900
2. Nursery bed preparation	Day	1	308	308
3. Sowing Nursery	Day	1	308	308
4. Nursery maintenance	Day	6	308	1848
5. Nursery pulling, transportation	Day	2	308	616
c- Fertilizers				
1. DAP	No.	1	4200	4200
2. Urea	No.	2	1800	3600
d- Transplanting	Day	8	308	2464
e- Irrigation	Day	20	308	6160
f- Plant protection			3000	3000
1. Insecticides				
2. Weedicides				
g- Hand weeding	Day	8	308	2464
h- Harvesting	Day	6	308	1848
i- Threshing	Hour	2	1000	2000
j- Cleaning/handling	Day	7	308	2156
Total Cost				**38872**

Paddy yield of rice varieties:

Figure 1 indicates that among all the varieties Fakhre Malakand produced maximum paddy yield. JP5 and Basmati 385 showed little differences in quantity produced per acre and amounted nearly same values. Whereas least amount per acre was found in variety Mardanai though its quantity produced was higher than the Sara saila due to lower rate than the Sara saila. The rate of various varieties used in this particular trial are given in figure 1.1.

Figure 1:

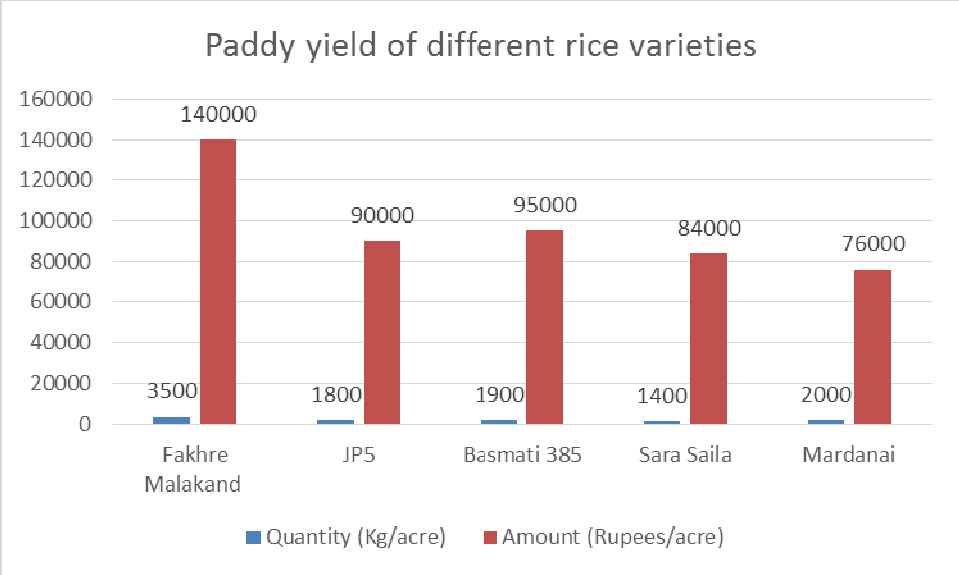
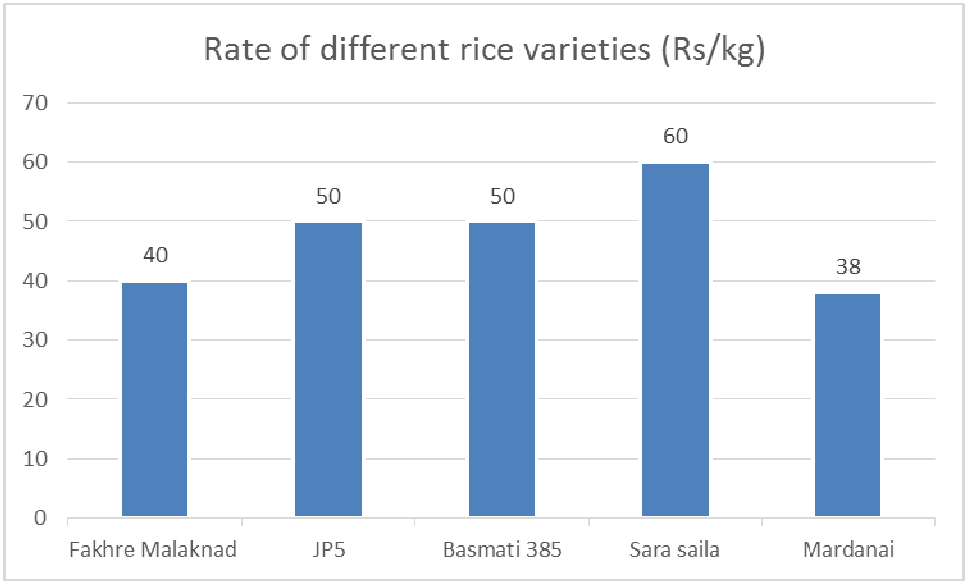


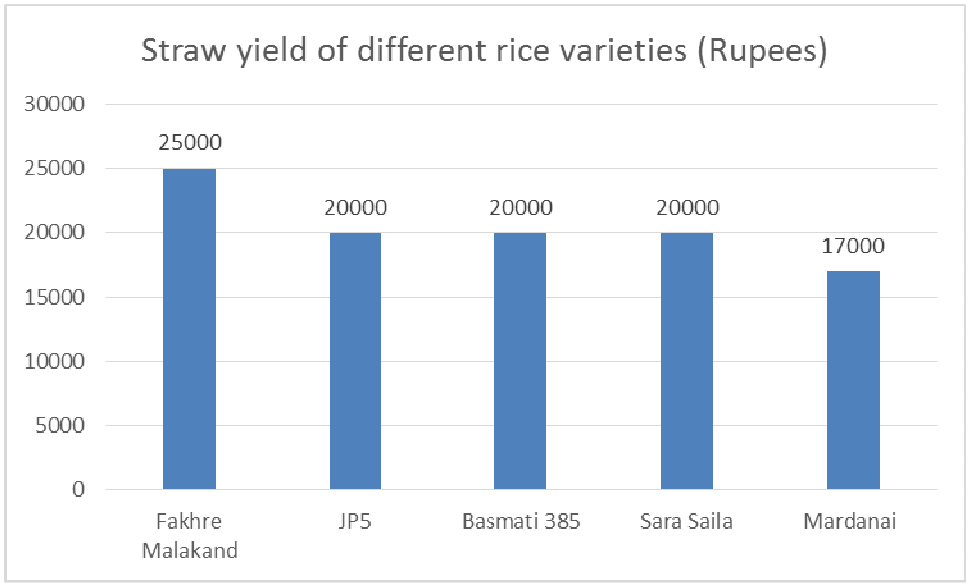
Figure 1.1:



Straw yield of rice varieties:

Straw yield is presented in figure 2 that clearly indicates that Fakhre Malakand amounted higher values than the remaining varieties of the area. The straw yield was same for the varieties; JP5, Basmati 385 and Sara saila except Mardanai that showed least straw yield values in rupees.

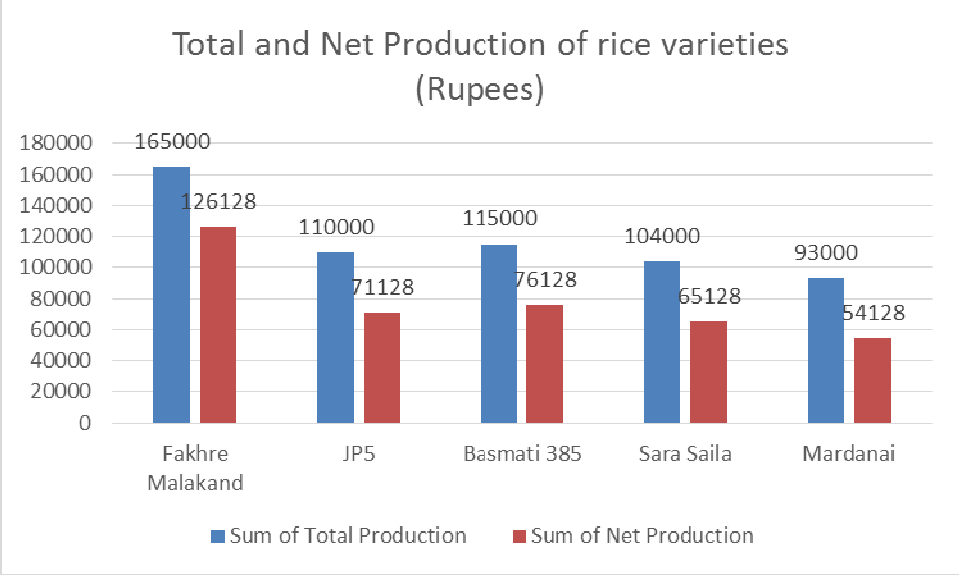
Figure 2:



Total and Net production:

The total production is a sum of paddy and straw yield produced by the varieties. Whereas Net production is obtained from subtracting the production cost (Rs. 38872) from the total production of each variety. As shown in figure 3 Fakhre Malakand was far more superior to the rest of the varieties in term of total and net production. JP5 and Basmati 385 showed lesser differences in this regard. Furthermore, least total and net production was observed for variety Mardanai.

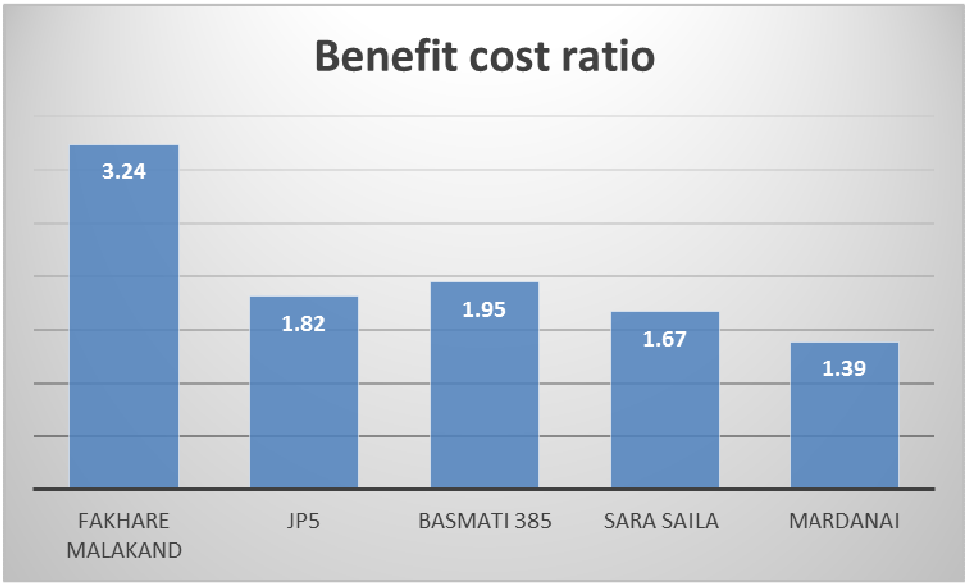
Figure 3:



Benefit Cost Ratio (BCR):

Maximum Benefit Cost Ratio (BCR) was observed for Fakhre Malakand (Figure 4). All the remaining varieties showed a Benefit Cost Ratio well lower than the Fakhre Malakand. Least Benefit Cost Ratio was noted in variety Mardanai. The results indicated that Fakhre Malakand far more superior than the rest of varieties in the area and this higher Benefit Cost Ratio of 3.24 made it economically best yielded variety of Malakand division.

Figure 4:



Conclusions

Results of this study indicated that maximum Benefit Cost Ratio (BCR) was recorded in variety Fakhre Malakand than the other varieties grown in the region. Moreover, the salient features of Fakhre Malakand like higher yield, cold tolerance, lodging and pests resistance along with more Benefit Cost Ratio of 3.24, made it most popular and economical commercial variety of the rice farming community

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