Research Article

A Comparison of Net Revenue of Wheat and Sunflower Cultivation in District Dera Ghazi Khan, Pakistan

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ABSTRACT

The present study was designed to compare the net revenues of wheat and sunflower in District Dera Ghazi Khan of Punjab, Pakistan. A total sample size of 180 farmers, 90 farmers of each crop was selected for the study from three villages by proportional sampling allocation technique. A comprehensive questionnaire was designed to collect data from these farmers. The costs and revenues were estimated by simple budgeting technique. The cost of production of wheat was found to be Rs. 100022.65ha^{-1} including land rent (32.53%), labour cost (17.69%), fertilizer cost (16.65%), irrigation cost (10.45%), threshing cost (5.13%), marketing cost (4.38%), land preparation cost (4.22%), seed cost (6.14%) and chemical cost (2.81%). Similarly the cost of production of sunflower was found to be Rs. 84099.33 ha^{-1} including land rent (39.93%), labour cost (17.98%), fertilizer cost (9.56%), irrigation cost (7.64%), seed cost (7.18%), threshing cost (6.23%), marketing cost (5.40%), land preparation cost (4.35%), and chemical cost (1.73%). The average gross revenue of sunflower (Rs. 158479.53ha^{-1}) was higher as compared to that of wheat (Rs. 113414.60ha^{-1}) which resulted in higher amounts of net revenue for sunflower (Rs. 74380.20ha^{-1}) than that of wheat (Rs. 13391.95ha^{-1}) which is about 5.55 folds higher than wheat. It was realized from the study that sunflower is more profitable than wheat in the study area as having more net revenue, cost benefit ratio and revenue per rupee of input cost.

Key words: Wheat, sunflower, comparison, net revenue

INTRODUCTION

Being staple food grain of Pakistan, wheat supplies 72 percent of the calories and protein in the average diet. According to the Pakistan Agricultural Research Council (PARC), per capita wheat consumption of the country, at 120 kg a year is among the highest in the world (PARC, 1989).

The area under wheat cultivation in the year 2009-10 decreased, which resulted in the decreased production of wheat as compared to the year 2008-09. The per acre yield of wheat crop increased 2.1% by use of high yielding varieties, favorable soil and weather conditions (GoP, 2010).

One of the challenges to the economy of Pakistan is the edible oil deficit. Edible oil is considered a necessity and not a luxury product and hence its demand is relatively inelastic and grows with time. There are many reasons behind the shortcoming like; lack of awareness of farmers, ignorance of policy makers regarding oilseed crops and technological deficiency in oilseed production etc (Ahmad *et al.* 1986).

Over the years sunflower has become an important crop for both farmers and consumers in Pakistan. Sunflower is a crop that fits well in the local cropping system and is considered the most important cash crop in all parts of the country. Sunflower is grown in two seasons all over the country that is spring and summer. Although it is a high yielding, high oil crop which gives high return to the farmers, no serious efforts have been made to increase the local production of sunflower. Consequently, the sunflower acreage declined from 144,191 ha in 1998-99 to 107,717 ha in 2002-03 and production from 194,544 to 128,531 tonnes during the same period (GoP, 2003).

Importance of the study

The finding was important for various reasons. The review explicitly indicates information on the cost, revenues, production and marketing of wheat and sunflower. Wheat and sunflower are two competitive crops which are sown in different areas of district Dera Ghazi Khan. Both of the crops were compared with respect to cost of production and revenues generated. The main objectives of the study were (i) to estimate costs and returns of wheat and sunflower production, (ii) to compare net revenues of wheat and sunflower production and (iii) to suggest recommendations on the basis of the findings of the study.

MATERIALS AND METHODS

Universe of the study

For the present study three villages of district Dera Ghazi Khan, namely Kot Chhutta, Mana Ahmadani and Notak were selected. 90 growers of wheat and 90growers of sunflower were purposively selected from these villages to be interviewed.

Data and Data collection

A comprehensive schedule covering each and every aspect of the study area was designed to draw the information from the growers. Pre testing of the questionnaire was carried out for further improvements. The farmers were assured of confidentiality of the information to persuade them to answer the questions frankly to the best of their knowledge.

Survey

A survey was conducted during June-July 2011. The data was taken directly from the farmers through face to face interview. The interviews were usually conducted at the farmers' home and fields.

Analytical framework

The economic comparison of wheat and sunflower was made. Cost of production of wheat and sunflower was determined by carrying out all the operations from sowing to harvesting and post harvesting. For the comparison of net revenues the following statistical tools were used.

Estimation of Net Revenue

According to Debertin (1986) and Varian (1992) farmer's profit (net revenue) is equal to total revenue (TR) minus total cost (TC).

$NR = TR - TC$

Where:

$TR = P_1 \times Q_1 + P_2 \times Q_2$

$TC = V_i \times X_i$

Where V_i denotes the price of inputs and X_i denotes the input level.

P_1 = price of main product and Q_1 = quantity of main product

P_2 = price of by-product and Q_2 = quantity of by-product.

Data regarding average cost, gross revenues and net revenues per ha of both wheat and sunflower were analyzed by Microsoft Excel and statistically using paired t-test statistics by SPSS package.

The three null hypotheses were as under.

i. There is no difference between per ha cost of wheat and sunflower.

ii. There is no difference between per ha gross revenues of wheat and sunflower.

iii. There is no difference between per ha net revenues of wheat and sunflower.

These hypotheses were tested for possible rejection to know whether wheat is profitable or sunflower. Average cost of both wheat and sunflower included the actual cost paid by the farmers and opportunity cost.

The collected data having identical but unknown variances was analyzed through the use of t test of independent sample (Chaudhry and Kamal, 1997). For convenience t-test is defined as:

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{s_p \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Which under null hypothesis (H_0) follow a distribution with $(n_1 + n_2 - 2)$ degrees of freedom.

Where

$s_p^2 = [(n_1 - 1) s_1^2 + (n_2 - 1) s_2^2] / (n_1 + n_2 - 2)$

is the pooled variation.

$s_1^2 = [1/(n_1 - 1)] * \sum (X_{1i} - X_1)^2$

is the variance of first sample.

$s_2^2 = [1/(n_2 - 1)] * \sum (X_{2i} - X_2)^2$

is the variance of second sample.

$\bar{X}_1$ and $\bar{X}_2$ are the means where as n_1 and n_2 are the sample sizes corresponding to first and second sample respectively.

Cost Benefit Ratio

Cost benefit ratio = Total gross revenues (Rs. ha^{-1}) / Total Cost

Revenue per Rupee of Input Cost

Revenue per Rupee of input cost = Gross Revenue (Rs. ha^{-1}) / Variable cost of inputs

RESULTS AND DISCUSSION

Distribution of sampled respondents

A total of 90 growers of each crop were selected by the proportional allocation sampling technique from three villages namely Kot Chhutta, Mana Ahmadani and Notak of district Dera Ghazi Khan. Table 1 shows the distribution of the sampled respondent of both crops (wheat and sunflower) in the study area.

Wheat and Sunflower Cropped Area and Seed Rates

Mean cropped area under wheat was 4.29ha while the area under sunflower cultivation was 4.43 ha in the study area (Table 2). The table 2 also shows the average seed rate of wheat and sunflower that were recorded to be 127.12 kg ha^{-1} and 7.96 kg ha^{-1} respectively. The growers of the study area had used a lesser seed rate for wheat than recommended. The reason for lower seed rate in case of wheat could be associated to low economic level of the growers (Ali *et al.,* 2005).

Table 1: Number of sampled respondents in the study area

| Villages | Crop | | Total |
	Wheat	Sunflower	
Kot Chhutta	37	37	74
Mana Ahmadani	28	28	56
Notak	25	25	50
Total	90	90	180

Source: Survey Data

Table 2: Area sown and seed rate of wheat and sunflower

| Parameter | Crops | | | |
| | Wheat | | Sunflower | |
	Mean	STD	Mean	STD
Cropped Area	4.29	1.52	4.43	1.78
Seed Rate	127.12	22.70	7.96	1.56

Source: Survey Data

Table 3: Per ha average cost of wheat and Sunflower

| Input | Crops | | | |
| | Wheat | | Sunflower | |
	Mean	%	Mean	%
Seed	6144.47	6.14	6040.14	7.18
Land preparation	4219.86	4.22	3655.66	4.35
Irrigation	10452.19	10.45	6428.63	7.64
Fertilizer	16650.88	16.65	8040.25	9.56
Chemical	2805.92	2.81	1457.87	1.73
Labour	17698.98	17.69	15122.31	17.98
Threshing	5134.12	5.13	5238.45	6.23
Marketing	4381.85	4.38	4538.34	5.40
Land Rent	32534.39	32.53	33577.68	39.93
Total	100022.65	100	84099.33	100

Source: Survey Data

Table 4: Per ha output of wheat and sunflower crops

| Out come | Crops | | | |
| | Wheat | | Sunflower | |
	Mean	Std.dev	Mean	Std.dev
Economic yield	3.61	0.18	2.74	0.20
By- product	3.56	0.17	2.92	0.31
Gross revenue	113414.60	5737.61	158479.53	12058.52
Net revenue	13391.95	5272.56	74380.20	12925.49

Source: Survey Data

Cost of production of wheat and sunflower

The cost of production of wheat was estimated to be Rs. 100022.65ha⁻¹in the study area. The rent of land was highest (32.53%) followed by labour cost (17.69%) and fertilizer cost (16.65%) in total cost of wheat production (Table 3). Similarly, the cost of production of sunflower was found to be Rs. 84099.33ha⁻¹. The land rent was highest (39.93%) followed by labour cost (17.98%) and fertilizer cost (9.56%) in total cost of sunflower production. The rent of land used was different for both crops as different farmers reported different land rents in their areas. More fertilizer was used for wheat as compared to sunflower. Fertilizers improve soil fertility, fulfill the nutritional status of the crops and also enhance crop growth, resistance to different environment and productivity of the crops (Khan *et al.,* 2005)

Output of wheat and sunflower

The higher yield depends on various factors such as adequate water supply, improved seed variety, fertilizer application pesticide application and proper seed technology. In the present study, the mean grain yield of wheat was 3.61ton ha⁻¹ (Table 4) which is less than the average yield of the country. The lower grain yield might be due to unavailability of adequate irrigation water, quality seed and proper management information (Afzal *et al.,* 2006). The table 4 also indicates that average sunflower yield was 2.74ton ha⁻¹. The yield could be increased by optimum inputs and better practice management (Karim *et al.,* 1999).

The table 4 also indicates that by-product of wheat which supplements its revenues was 3.56 tonha⁻¹. The by-product of sunflower which supplements its revenues was 2.92 tonha⁻¹in the study area. The table 4 also highlights the gross and net revenues of wheat and sunflower. In the study area the average gross revenue of wheat was Rs. 113414.60ha⁻¹ and average net revenue was Rs. 13391.95ha⁻¹ whereas the average gross revenue and net revenue of sunflower was found to be Rs. 158479.53ha⁻¹ and Rs. 74380.20ha⁻¹ respectively (Table 4). The higher net revenue was accorded for sunflower; the probable reason could be the higher market price and lower cost of production.

Statistical Comparison of Wheat and Sunflower

The statistical analysis showed the significant difference (P<0.05) between wheat and sunflower average total cost per ha by using independent sample t-test statistic. The high total average cost of wheat might be due to the higher fertilizer cost (Khalil and Jan, 2000) and higher irrigation cost as compared to sunflower. The average gross revenue of wheat and sunflower is presented in table 5. The statistical analysis showed the significant difference (P<0.05) between the gross revenue of wheat and sunflower. The application of fewer amount of chemical fertilizer, less number of irrigations along with higher market price could be the probable reasons for high gross revenue of sunflower. Statistical analysis in table 5 also indicates that there exists a significant difference (P<0.05) between the net revenues of wheat and sunflower by using independent sample t-test statistic.

Comparative Profitability Analysis

Comparative profitability analysis of wheat and sunflower is shown in table 6. Cost benefit ratio of sunflower is higher (1.88) than wheat (1.13). Similarly revenue per rupee of input cost was high (3.13) in case of sunflower as compared to wheat (1.68).

Conclusion and recommendations

Wheat and sunflower are two competitive crops grown in the same season. Wheat is grown as the staple food crop in the study area where as sunflower is grown for its edible oil. In cost estimation the land rent, labour cost and fertilizer costs were the main factors contributing to the cost of production which was higher for wheat as compared to sunflower. The gross revenue of wheat was less than sunflower and had resulted in lower net revenues of wheat. The net revenue of sunflower was 5.55 times higher than wheat which is a reasonable increase in net revenue of sunflower growers.

Based on the findings of the study i.e. less cost of production of sunflower and higher net revenue generated it is recommended that the farmers should grow sunflower crop in the study area keeping in view the current prices and demand for sunflower. The farmers should be trained

Table 5: t-statistics values of total cost, gross revenues and net revenues of wheat and sunflower crops

Parameters	t	Df	Sig. (2-tailed)	Mean difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Total Cost Equal variances assumed	19.10	178.00	.000	15923.32	833.89	14277.73	17568.91
Equal variances not assumed	19.10	175.59	.000	15923.32	833.89	14277.58	17569.06
Gross Revenue Equal variances assumed	-32.02	178.00	.000	-45064.93	1407.63	-47842.72	-42287.14
Equal variances not assumed	-32.02	127.33	.000	-45064.93	1407.63	-47850.31	-42279.55
Net Revenue Equal variances assumed	-41.45	178.00	.000	-60988.25	1471.46	-63892.00	-58084.49
Equal variances not assumed	-41.45	117.82	.000	-60988.25	1471.46	-63902.19	-58074.31

SE = Standard error of mean; CI = Confidence Interval

Table 6: Comparison of cost benefit ratio and revenue per rupee of input cost of wheat and sunflower

Analysis	Wheat	Sunflower
Cost benefit ratio	1.13	1.88
Revenue per rupee of input cost	1.68	3.13

Source: Survey Data

by extension personals regarding the scientific ways of production technology i.e. use of optimum seed rate, certified seed, sowing time and better managerial activities etc for improved crop productivity. The government should stabilize the input, output prices which play a vital role in sustaining higher productivity

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