Research Article Open Access

Comparative Analysis of Wheat and Brassica in Terms of Relative Profitability: A Case Study of District Chakwal, Punjab, Pakistan

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Received
January 10, 2017

Accepted
March 25, 2017

Published Online
March 31, 2017

Abstract: The aim of a farmer is to get profit from their produce and more profitable crop should be grown. Therefore, this study was planned to investigate the relative profitability of wheat and Brassica crops in district Chakwal. Eight villages were selected for study during Rabi 2013-14. A total of 80wheatcum Brassica growers were interviewed. Costs, gross margins and net returns of wheat and Brassica crops were estimated by using farm budgeting technique. The analysis revealed that the average grain yield was computed to be 31.06 and 11.97 per 40 kg per acre of wheat and Brassica respectively. The average total cost of producing one acre of wheat and Brassica was estimated to be Rs. 31963 and Rs. 26654 respectively. The average gross margins per acre of wheat and Brassica were computed to be Rs. 18221 and Rs. 9391 respectively. The average net returns (profit) per acre of wheat and Brassica were estimated to be Rs. 12772 and Rs. 3941respectively. It is thus concluded that wheat crop is much more profitable as compared to Brassica crop.

Keywords: Wheat; Brassica; cost; gross margin; net return; Chakwal..

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Cite this article as: Ishfaq, M., M. Younas, M.Q. Waqar, U.I. Ahmed and M. Zia-ul-Hassan. 2017. **Comparative analysis of wheat and brassica in terms of relative profitability: A case study of district Chakwal, Punjab, Pakistan.** Journal of Environmental and Agricultural Sciences. 10:71-77.

1 Introduction

Wheat is vigorous and efficient basic food. It is a source for 20 percent of the world's food calories. The food demand of 40 percent of the people of the world is met by wheat (Ahmad et al., 2015).It is staple food grain crop of people in Pakistan and therefore occupies a central position in agricultural policies. It contributes 9.9 percent to the value added in agriculture and 2.0 percent to gross domestic product (GOP, 2016).There is huge gap in per acre yield of wheat in Pakistan and other parts of the world (Akhtar et al., 2015). The major oilseed crops grown in Pakistan include rapeseed & mustard (Brassica), sunflower, canola and cotton. Even though, Although Pakistan is an agriculture-based economy, yet it is limited edible oil production to meet its domestic consumption (Malik et. al., 2006). Consequently, we have to import main food items like edible oil and tea, worth of millions of dollars every year. Due to ever-increasing consumption of edible oil, oilseed sector has attained critical significance in the economy of Pakistan. The supply of edible oil in Pakistan from all sources was 2.667

million tons during 2015-16. Domestic production of edible oil stood at 0.462 million tons during the same period, which was almost 17 percent of the total supply in the country, whiles the remaining 83 percent, amounting to Rs. 136.920 billion (US$ 1.392 billion) had been imported (GOP, 2016).

During the period 1999-00 to 2013-14, the share of district Chakwal in total acreage of Rawalpindi Division under Brassica was remained almost 53 percent on an average. It was almost 49 percent on an average, in case of total production of Brassica in Rawalpindi Division. This relative share in area and production indicates that the Brassica crop is mainly concentrated in district Chakwal out of the Pothohar region (Rawalpindi Division).The major part of the total cropped area of the district Chakwal was under wheat crop (almost 79 percent in 2012-13, whereas almost 78 percent in 2013-14), followed by Brassica which was cultivated on 10 percent of the total cropped area in 2012-13 and almost 12 percent in 2013-14. For both wheat and Brassica, the cultivated area increased in 2013-14 as compared to the last year. However, for all other Rabi crops, it was decreased from 41.6 thousand acres in 2012-13 to 39.1 thousand acres in 2013-14 (CRS, 2014).Figure 1(a) indicates that there is a slight diminishing trend and minute variation for area under Wheat in Chakwal during the period 1999-00 to 2013-14. The total area under Wheat cultivation was 343 thousand acres during the year 1999-00 and it was 297 thousand acres in 2013-14. Figure 1(b) is also indicating the diminishing trend of area under Wheat in Chakwal for the surveyed farmers during the years 2011-12 to 2013-14, which is in line with that of whole Chakwal (Figure 1 (a)). The average area under Wheat was 5.15 acres during the year 2011-12 and it was estimated at 4.84 acres in 2013-14. The main reason behind the continuous decrease in area under Wheat reported by the respondents was shifting of wheat's area towards the main kharif's cash crop (Groundnut) of Pothohar region. During the survey, the farmers of Tehsil Talagang and Chakwal responded that they grew Wheat just for fulfilling their domestic consumption needs. They also declared the groundnut as more profitable as compared to wheat.

Figure 2 (a) shows the slight increasing trend (7.2 percent average annual rise) of area under rapeseed and mustard (Brassica) in Chakwal during the years 1999-00to 2013-14. The total area under rapeseed and mustard was 25.7 thousand acres in Chakwal during the year 1999-00 and it was 45.1 thousand acres in 2013-14. Figure 2 (b) is also showing the slight increasing trend of area under Brassica in Chakwal for the selected farmers during the years 2011-12 to 2013-14 which is in line with that of entire Chakwal (Figure 2 (a)). The average area under Brassica was 1.85 acres during the year 2011-12 and it was estimated at 2.01 acres in 2013-14. The main reason behind a continuous rise in area under rapeseed and mustard reported by the respondents was its usage as fodder for their animals. They further explored that the additional area for Brassica was the result of diversion of area under Rabi crops other than Wheat.

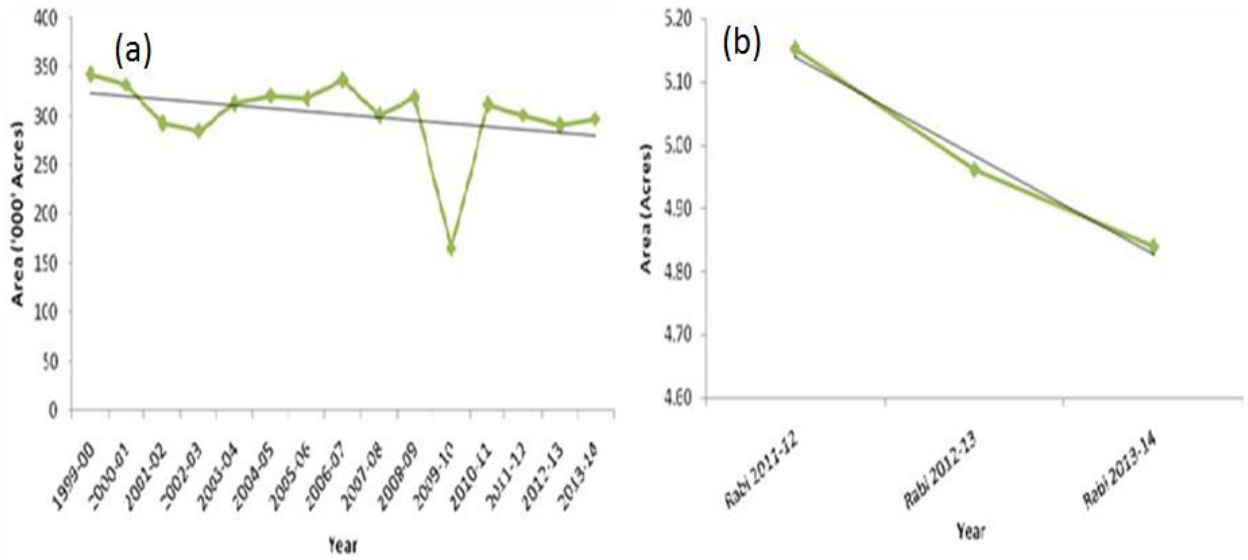

Figure 1: (a) Nation area trend of wheat from 1999-00 to 2013-14 (b) Area trend of wheat from 2011-12 to 2013-14 in Chakwal for selected sample

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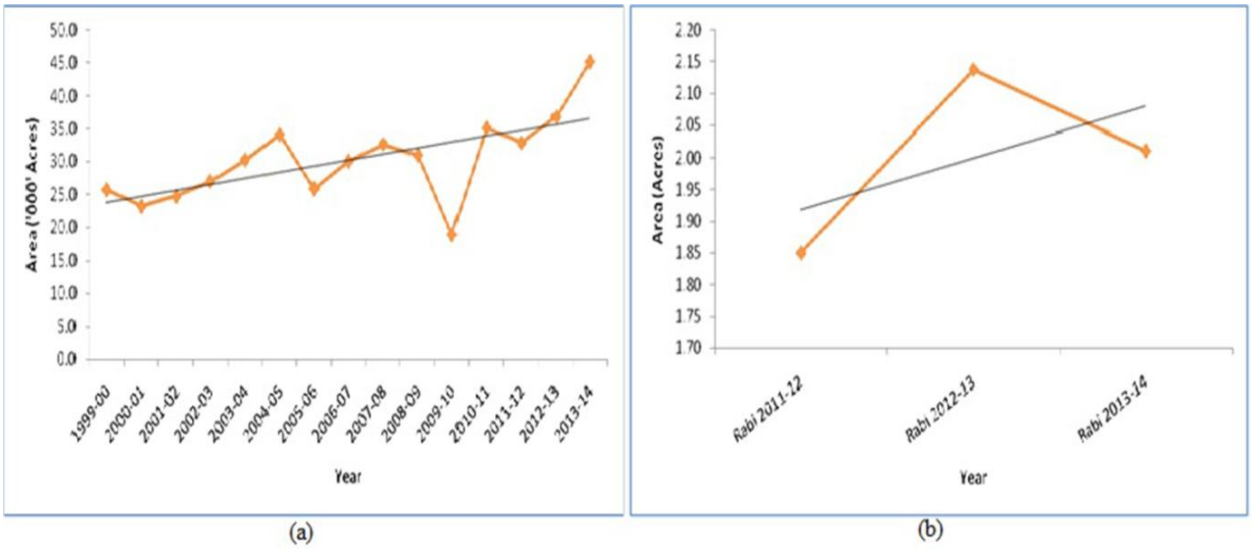

Figure 2: (a) National area trend under Brassica crop from 1999-00 to 2013-14, (b) Area trend under Brassica crop from 2011-12 to 2013-14 in Chakwal for selected sample

The study of farm costs is of principal importance as it serves as an effective guide in planning and distribution of farm expenditure for different agricultural inputs. Cost studies deal with the collection and analysis of cost data in monetary terms on the operation and production of individual commodity (Hassan et al., 2005). Ahmad and Chaudhry (1987) conducted study on profitability of Pakistan's agriculture. They found that the estimated per acre total cost, gross income and net income for wheat were Rs. 2482.19 (Rs. 1 = US$ 104.846) Rs. 1574.13 and Rs. -908.86 respectively. Hassan et al. (2005) did economic analysis of wheat farming in the mixed farming zone of Punjab Province, Pakistan and reported that the estimated the average variable cost of production of wheat to be Rs. 6547.65 per acre, average gross income to be Rs. 11221.59 per acre and average gross margin to be Rs. 4673.94 per acre.Akramet al.(2007) revealed that intercropping of canola with sunflower gave gross economic returns of Rs. 12128 per acre. Khanet al.(2008) did economic analysis of wheat profitability in Peshawar Valley. They found that total cost of wheat production came to be Rs. 10757.51 per acre. The gross margins from wheat production were Rs. 5225.75 per acre.Samiullahet al. (2014) conducted study to assess the cost and gross margin of wheat in Dera Ismail Khan, Khyber Pakhtunkhwa Province, Pakistan. They estimated the average cost of wheat to be Rs. 23711.32 per acre, average yield of wheat to be40.46 per 40 kg per acre and average gross income to be Rs. 45315.39 per acre. The high productivity and profitability of wheat crop can lead to food secure farm households and serves as a tool for coping food insecurity (Ahmed et al. 2015).

However, there is a huge difference in area under wheat and Brassica crops in Chakwal, but still Brassica can be considered as its second major crop of Rabi. This study was conducted to sort out the costs, gross margin and net returns of wheat and Brassica crops. So, the objectives of the present study were (1) to estimate the trend of area under cultivation of wheat and Brassica, (2) to investigate the reasons behind the decreasing trend of area under wheat, (3) to estimate and compare the relative profitability of wheat and Brassica and (4) gives policy recommendation on the basis of study results.

2. Methodology

2.1 Study area and data collection

The present study was conducted during Rabi 2013-14 in district Chakwal. A multi-stage purposive sampling technique was adopted to select tehsil, village and respondents. District Chakwal comprises of 4 tehsils i.e. Chakwal, Talagang, Kallar Kahar and Choa Syden Shah. Considering percentage share of each tehsil in total area of district Chakwal under Brassica, 4 villages were purposively selected from tehsil Chakwal, 2 from tehsil Talagang, 1 from tehsil Kallar Kahar and 1 from tehsil Choa Syden Shah. Finally, wheat cum Brassica growers (10) were selected from each village by using simple random technique, leading to a total sample of 80 farmers. A

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well-structured questionnaire for the study was designed and pre-tested in the field and modified accordingly. The primary data on land utilization, inputs used along with cost and production for wheat and Brassica crops were collected by using the well-structured questionnaire through personal face-to-face interview method.

2.2 Data Analysis

The Statistical Package for Social Sciences (SPSS) was used for primary data analysis. The following procedures (farm budgeting technique) were applied as it is commonly used method to estimate profitability (Ahmad and Chaudhry, 1987; Chaudhry et al., 1992; Khan et al., 2008; Afridid et al., 2014; Samiullah et al., 2014).

2.2.1. Cost Estimation Procedure

The procedure adopted by Ahmad and Chaudhry (1987) and Chaudhryet al. (1992) was used for cost estimation. The variable cost per acre was estimated by summing up of following cost items per acre; cost of land preparation, cost of seed, cost of drilling/sowing, cost of irrigation, cost of pesticides/plant protection, cost of fertilizers, cost of Farm Yard Manure (FYM), cost of harvesting, cost of threshing, cost of hired labor used for these practices, management cost and/or opportunity cost of family labor and mark up on investment @ 9.5% for 6 months. The fixed cost per acre was estimated by adding opportunity cost of land or land rent and land tax. Finally, the total cost per acre was computed by adding total variable and fixed costs per acre.

2.2.2. Gross Income/ Gross Value Product (GVP) Estimation Procedure

By following Ahmad and Chaudhry (1987) and Chaudhry et al. (1995), the gross income/GVP per acre was estimated by multiplying total production of a particular crop with its unit price and then dividing the resultant by total acreage of that crop. For wheat, it was the sum of gross income of wheat grains and wheat straws, whereas, for Brassica, it was equal to the gross income of Brassica grains plus value of Brassica used as fodder.

2.2.3. Gross Margin and Net Return Estimation Procedure

The gross margin can be defined as the net income obtained by deducting cash costs (variable cost) from gross income/GVP (Scott, 2001). The procedure adopted by Ahmad and Chaudhry (1987) and Chaudhry et al. (1995)was used in estimation of gross margin. In estimation of gross margin per acre, only variable costs per acre that were incurred by the farmers to sow, grow and harvest their crops were deducted from gross income (GVP) of those crops. The procedure adopted by Hassan et al. (2005) was used in estimation of net return. The net return can be defined as the net income obtained by deducting cash and opportunity costs (variable cost plus fixed cost) from gross income.

3. Results and Discussion

3.1 Land Utilization in Rabi 2013-14

The statistics on land utilization for Rabi 2013-14 by the surveyed farmers are reported in Table 1. On average, a farmer's net cultivated land was 10.3 acres, area under wheat was 4.8 acres, area under Brassica was 2 acres and area under other Rabi crops and/or fallow area was 3.5 acres. On average, a farmer allocated almost 47 percent of his cultivated land to wheat, almost 20 percent to Brassica and about 34 percent to other Rabi crops or kept fallow for Kharif crops. Farmers allocated 2.4 times more area to wheat on an average as compared to Brassica because wheat being their staple food and a source of wheat straw (bhoosa) for their animals.

3.2 Average Cost of Production of Wheat & Brassica in Chakwal

The breakup of cost per acre of producing wheat and Brassica in Chakwal is presented in Table 2. The average variable cost of producing one acre of wheat and Brassica was estimated to be Rs. 26514 and Rs. 21204 respectively. It implies that this cost is 1.3 times more for wheat as compared to Brassica. The same variable cost estimated by Samiullah et al. (2014) was Rs. 23711.32 for irrigated wheat in Dera Ismail Khan. Thus, difference in these studies' estimates is because of irrigation cost. The average total cost of producing one acre of wheat and Brassica was estimated to be Rs. 31963 and Rs. 26654 respectively. Moreover, major share in total cost was of land rent (almost 17 % for wheat and 20 % for Brassica), land preparation (almost 16 % for wheat and almost 17 % for Brassica) and fertilizers (almost 13 % for wheat and almost 10 % for Brassica).

Table 1. Land Utilization in Rabi 2013-14 for the Selected Sample

Particular	Avg. Acres	% of Cultivated area
Area under wheat	4.8 *(4.7)*	46.6
Area under Brassica	2.0 *(2.6)*	19.42
Area under other crops and/or fallow area	3.5 *(4.2)*	33.98
Cultivated area	10.3 *(8.6)*	100.0

Figures in parenthesis are standard deviations.

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Table 2. Average Cost of Production of Wheat & Brassica in Chakwal (Rs/Acre)

Sr. No.	Activity/ Cost Item	Wheat	% of Total	Brassica	% of Total
1	Land preparation	5079	15.9	4476	16.8
2	Seed cost	2185	6.8	375	1.4
3	Drill/sowing cost	720	2.3	718	2.7
4	Irrigation cost	144	0.5	106	0.4
5	Pesticides/plant protection cost	723	2.3	0	0.0
6	Fertilizer scost	4120	12.9	2733	10.3
7	FYM cost	2017	6.3	2181	8.2
8	**Total hired labor cost for above practices (Sr. No. 1 to 7)**	**867**	**2.7**	**1621**	**6.1**
9	Cost of Harvesting through machinery	1314	4.1	2032	7.6
10	Threshing cost	1843	5.8	1144	4.3
11	Total hired labor cost for harvesting & threshing	4116	12.9	2660	10.0
12	Management cost and/or opportunity cost of family labor	2632	8.2	2579	9.7
13	Mark up on investment @ 9.5% for 6 months on Sr. No. 1 to 8	753	2.4	580	2.2
14	***Total Variable Cost*** *(Sum of Sr. No. 1 to 13)*	***26514***	***83.0***	***21204***	***79.6***
15	Opportunity cost of land or land rent	5414	16.9	5414	20.3
16	Land tax	35	0.1	35	0.1
17	***Total Fixed Cost*** *(Sum of Sr. No. 15 to 16)*	***5449***	***17.0***	***5449***	***20.4***
18	Total Cost (Sum of Sr. No. 14 & 17)	31963	100.0	26654	100.0

Table 3. Average Yield, Producer Price and Gross Income (GVP) of Wheat & Brassica in Chakwal

Particular	Unit	Wheat	Brassica
Yield (Grains)	40 kg/Acre	31.06	11.97
Yield (Straw)	40 kg/Acre	29.27	-
Producer Price (Grains)	Rs/40 kg	1232	2556
Producer Price (Wheat Straw)	Rs/Kg	221	-
Producer Price (Brassica Fodder)	Rs/Acre	-	13376
Gross Income (GVP)	Rs/Acre	44735	30595

3.3 Average Yield, Producer Price and Gross Income of Wheat & Brassica in Chakwal

The average yield, producer price and gross income (revenue) of wheat and Brassica in Chakwal are given in Table 3.The average grain yield was computed to be 31.06 per 40 kg per acre of wheat which is almost 2 times of that reported earlier (CRS. 2014). The farmers were probed about very good yield of wheat, even in rain-fed conditions. They reported that wheat received a very good amount of rainfall (124.6 mm during March 2014) at its grain formation stage that resulted in very good yield. The average yield of Brassica was estimated to be 11.97 per 40 kg per acre that is 1.4 times of that reported by CRS (2014). In case of wheat, grain yield is 2.6 times more than that of Brassica grains for the surveyed farmers. The producer price was reported to be Rs. 1232 and Rs. 2556per 40 kg for wheat and Brassica grains respectively. The average gross income of wheat was calculated to be Rs. 44,735 per acre. The income from wheat production can be improved by focusing on extension services and reducing transportation costs (Ahmed et al., 2016). This result is almost in accordance with the estimate of Samiullahet al. (2014) who computed gross income of wheat to be Rs. 45315.39 per acre. Whereas, the average gross income of Brassica was computed to be Rs. 30595per acre; roughly speaking half than that of wheat. This difference is mainly because of additional income of wheat straw in case of wheat, because lesser relative yield of Brassica is being compensated with its higher relative producer price as compared to wheat.

3.4 Average Gross Margins and Net Returns of Wheat and Brassica in Chakwal

The average gross margins and net returns of wheat and Brassica in Chakwal are presented in Table 4. The average gross margins per acre of wheat and Brassica were estimated to be Rs. 18221and Rs. 9391respectively. In other way around, gross margin of wheat is almost 3 times higher than that of Brassica. The average net returns per acre of wheat and Brassica were estimated to be Rs. 12772and Rs. 3941respectively. These results are in line with the findings of previous studies (Khan et al., 2008; Uddin et al., 2010; Afridid et al., 2014; Samiullah et al., 2014).

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Table 4. Average Gross Margins and Net Returns of Wheat & Brassica in Chakwal (Rs./Acre)

Sr. No.	Particular	Wheat	Brassica
1	Gross Income (GVP)	44735	30595
2	Total Variable Cost	26514	21204
3	***Gross Margin*** *(1 minus 2)*	***18221***	***9391***
4	Total Cost	31963	26654
5	***Net Return*** *(1 minus 4)*	***12772***	***3941***

The results of the study shows that wheat is more profitable than Brassica in the study area in terms of cost, income and margin. This is justifying the case of why did the selected farmers allocate 47 percent of their cultivated land to wheat and just 20 percent to Brassica (reported earlier in Table 1)

5. Conclusion

The present study therefore concludes that wheat crop is much more profitable as compared to Brassica crop. The average total cost of producing one acre of Wheat and Brassica is almost 1.3 times more for wheat (Rs. 31963) as compared to Brassica (Rs. 26654). The major share in total cost is of land rent (almost 17 % for wheat and 20 % for Brassica), land preparation (almost 16 % for wheat and almost 17 % for Brassica) and fertilizers (almost 13 % for wheat and almost 10 % for Brassica). The average gross income of Brassica (Rs. 30595 per acre) is roughly half than that of wheat (Rs. 44735 per acre). Whereas, the gross margin of wheat (Rs. 18221per acre) is 3.3 times higher than that of Brassica (Rs. 9391per acre). The net return of wheat (Rs. 12772per acre) is significantly higher than that of Brassica (just Rs. 3941per acre).Keeping in view the main findings of the study and survey experience, the following corollaries have been drawn for future in Chakwal. During survey, it was also revealed that majority of farmers is not applying fertilizers as per recommendation mainly due to high prices. So, policy should be devised for stable fertilizer and other input prices with timely supply of these inputs that are necessary for sustaining higher productivity. As Brassica's yield is just 11.97 per 40 kg per acre which is far behind the potential. During survey, it was revealed that no farmer is doing thinning of Brassica due to unawareness. So, research and extension system should be reinvigorated to inform/train Brassica growers about its production technology.

Acknowledgements: This work was done without any research funding.

Competing Interest: The authors declare that there is no potential conflict of interest.

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