Research Article

Factors Affecting Wheat Productivity of Small Farm Households in the Rural District Charsadda

Shahzad Khan[1]*, Munir Khan[1], Arif Alam[2], Ikram Shah[2], Mahfooz Khan[1] and Fida Muhammad Khan[1]

[1]Institute of Development Studies, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; [2]Department of Development Studies, COMSATS University, Islamabad Abbottabad Campus.

Abstract | This study was conducted to perform economic analysis and to elaborate the determinants of wheat crop in district Charsadda, Khyber Pakhtunkhwa, Pakistan in the year 2018. Three villages, namely, Aspandehri, Kamran Kalay and Sarfaraz Kalay, were purposively selected. A sample size of 41 wheat growers from farm households was chosen from these villages for data collection. Thus, selection of the farmers was based on the proportional allocation technique. However, primary data were randomly collected through face to face interview from the selected respondents with the help of a semi-structured questionnaire. For data analysis, profit margin, gross margin and Cobb-Douglas production function were applied. Therefore, the labour, tractor, and fertilizers were found major components in the total variable cost. The profit per acre was obtained as Rs.12714. The profit margin was obtained at 32.48%. Empirical results of the regression model found tractor, fertilizer, seed, and pest/weed inputs positive and significant, with coefficients 0.1693, 0.1646, 0.4894, 0.0285, respectively. In contrast, labour and animal costs were noted negatively. For the larger benefit of the farmers' and the growth of the agriculture sector, the study recommends a reduction in the prices of fertilizers and suggested to the Government to develop high yielding certified seed and provision of certified/tested seed to the growers.

Received | December 28, 2019; **Accepted** | March 07, 2021; **Published** | August 03, 2021
***Correspondence** | Shahzad Khan, Institute of Development Studies, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; **Email:** drshahzad99@aup.edu.pk
Citation | Khan, S., M. Khan, A. Alam, I. Shah, M. Khan and F.M. Khan. 2021. Factors affecting wheat productivity of small farm households in the rural district Charsadda. *Sarhad Journal of Agriculture,* 37(3): 1089-1097.
DOI | https://dx.doi.org/10.17582/journal.sja/2021/37.3.1089.1097
Keywords | Cobb-Douglas production function, District Charsadda, Economic analysis, Wheat crop

Introduction

Wheat is one of the most important cereal crops grown on 200 million hectares of farmland worldwide. It is the world's second most important cereal crop after maize and around 21% of the world's food depends on this crop (FAO, 2012). China is the leading wheat-producing economy followed by India, Russia, USA, France, Canada, Germany and Pakistan, respectively. It is observed that 75% of global wheat production is consumed by developing countries (BizVibe, 2019).

Cereals are the main source of providing protein and energy in most countries (Bos *et al*., 2005). Wheat is one of the prime cereal crops with exceptional protein and an essential element of the human diet, which is consumed by humans and is grown around the world in diverse environments (Salekdeh and Komatsu, 2007).

The agriculture sector of Pakistan plays a pivotal role in the economic growth by contributing 18.9% to GDP and absorbing 42.3% of the labour force. It is also a key source of foreign exchange and acts as a

stimulus for other sectors. The fast population growth rate of 2.45 is increasing the demand for agricultural commodities (GOP, 2018).

Keeping in view the significance of food security, wheat is grown in the large areas of Pakistan. The official sources had shown that wheat is a major food crop occupying the largest farmland under cultivation. Its share of agriculture value addition is 8.9% and to GDP 1.6%. During 2018-19 wheat output was estimated at 25.195 million tons (GOP, 2019).

Consumption of wheat around the globe, particularly in Pakistan has increased sharply due to population explosion, increase in income and development in the technology of wheat processing. Production of wheat can be augmented either by increasing the land area of wheat crop or by enhancing yield. The scope for increasing the land area for the wheat crop is limited due to the scarce supply of land on one hand and competition of other crops like sugarcane, pulses, oilseeds and fodders. That is why the major emphasis is to increase yield per hectare which can only be obtained with the adoption of suitable production technologies such as; improved high yielding varieties, correct sowing time, weed control, appropriate and proper application of inputs, and adequate water supply for irrigation (Khan *et al*., 2008).

In Pakistan, the wheat crop has experienced sharp fluctuations, having close to self-sufficiency periods followed by years of disappointing performance. Such variations are caused by terrible weather conditions, causing a long dark fortune to the agriculture sector despite a well-developed irrigation system. However, the introduction of improved farming technology e.g. high yielding seed varieties, a more intense fertilizer application, and secure supply of water through canal irrigation and tube-wells has raised land area, output, and per acre yield (Cornelisse and Naqvi, 1987).

Khyber Pakhtunkhwa is one of the four provinces of Pakistan, where roughly 20 million people live. The vast majority 83% population resides in rural areas and using land-based natural resources irrationally. To fulfill the basic living needs of the growing population, the province has around 10.18 million hectares of land; while the land under cultivation is about 2.75 million hectares. Unfortunately, only 1.8 million hectares of land (65.45%) has been cultivated, and the remaining1.08-million-hectare land (34.54%) is cultivable waste (GOKP, 2010).

Table 1 demonstrates the area, production and yield per hectare of wheat of Khyber Pakhtunkhwa for ten years. In 2006-07 an area of 754.2 thousand hectares produced 1160.4 thousand tons of wheat crop. The area under wheat crop in 2015-16 increased to 772.3 thousand hectares showing an increase of 2.4%. Similarly, the total production of wheat for the same period increased to 1400.5 thousand tons and the yield of wheat per hectare also increased to 1814 kg. The main reasons for more output are support price, a large increase in crop area, good weather conditions, and subsidized fertilizer rates, etc. (GOP, 2016) (see Table 1).

Table 1: *Area, production, and yield per hectare of wheat crop in Khyber Pakhtunkhwa (2006-07 to 2015-16).*

Year	Area in "000" Hectares	Prod in "000" Tons	Yield Per Hectare in Kgs
2006-07	754.2	1160.4	1539
2007-08	747.4	1071.8	1435
2008-09	769.5	1204.5	1566
2009-10	758.3	1152.5	1520
2010-11	724.5	1155.8	1596
2011-12	729.3	1130.3	1550
2012-13	727.3	1257.6	1730
2013-14	776.8	1363.1	1755
2014-15 (P)	732.5	1259.9	1721
2015-16 (P)	772.3	1400.5	1814

Source: *Pakistan statistical year book 2016.*

Abate *et al*. (2019) analyzed the effect of new technologies use on wheat production and concluded that 61% more output could be attained with the use of technology. Mehmood *et al*. (2018) showed that seed variety, sowing mode, nitrogen, and phosphorous fertilizers have a significant and direct effect on wheat yield. Mode of irrigation and weed spray also has many effects on wheat yield. While Rao and Ketema (2016) reported that the size of land holding and rainfall have an inverse relationship with production. Variables such as; pesticide, fertilizer, and temperature have a direct effect on production.

Abid *et al*. (2014) reveal that inputs like fertilizers, FYM and the number of irrigations were reported significantly and directly related to wheat output. Moreover, the yield of mixed cropping zone growers was found higher than the farmers of the other two zones.

Iqbal *et al.* (2014) noted that per acre yield of literate farmers were 99.9 kg more than the illiterate farmers. Moreover, growers who applied certified seed obtained 127.41 kg more output per acre as compared to those who used non-certified seed. Similarly, the area affected by flood has 54.88 kg less yield per acre than the non-flood area.

Hussain *et al.* (2012) analyzed the impact of the wheat cultivated area on its production in Pakistan using time series data ranging from 1961-2009. The study found coefficients of wheat cultivated area significant at 1% level. It indicated that bringing an additional hectare of land under wheat crop will increase wheat production by 3.67 tons. The study suggested that the Government should peruse useful policy measures for growing more wheat crop in the country.

Muhammad *et al.* (2010) studied the technical efficiency of rice and wheat crops and to identify the aspects of technical inefficiency of the wheat farming system of Punjab. The mean technical efficiency was found 0.83, while the minimum and maximum were 0.31 and 0.99, respectively. The study found technical inefficiency in the rice-wheat system of Punjab. Furthermore, the sampled farming system of rice-wheat would be the best efficient if the crop inputs are decreased by 17% without affecting the level of output and current technology. The results showed a negative impact of the variables like schooling years, interactions with extension representatives and loan availability, while age, farm size and distance were found better-contributing factors to technical inefficiency. The study suggested the provision of interest-free loans for attracting young educated generation in the farming system.

Hassan *et al.* (2010) reported education, rotator use, seed rate, nitrogenous fertilizer, and weedicides are the contributing factors of higher wheat yield and suggested that utmost priority be given to educating the growers for adopting recommended methods.

Iqbal *et al.* (2001) empirically analyzed various factors for enhancing wheat yield during 1999-2000. A modified Cobb Douglas type production function was applied. The results showed that seed rate, irrigation, and fertilizer directly affected wheat productivity and were highly significant. Aslam *et al.* (1993) placed that wheat sowing is also done by the broadcasting method, which results in poor plant standings. Moreover, rainfall during the land preparation period may further delay wheat sowing for 2-3 weeks. Randhawa *et al.* (1979) and Hobbs and Butler (1988) revealed that an extra day's delay in sowing of wheat seed after mid-November decreases per hectare yield by 1%. Hassan (2004) reported that fertilizer, herbicide, in-time sowing, credit, education, number of cultivations and drill sowing have a direct relation with wheat production. However, Muhammad and Khan (2005) noted that nitrogen and phosphorus has a direct impact on wheat productivity while tillage use and irrigation have an inverse relationship with wheat productivity in Peshawar Valley.

The literature highlighted various research endeavors carried out to analyze the economic analysis of the Wheat crop. The prime concern is that the per-unit output of wheat crop in Pakistan is far below the developed nations leading towards the food insecurity issue. It is also worth mentioning that the wheat yield in KP province is lower than Sindh and Punjab province accelerating the issue of food insecurity.

Keeping in view the significance of the wheat crop, the present study was undertaken to obtain cost and net returns and find out the main determinants of wheat yield in district Charsadda of Khyber Pakhtunkhwa province.

Materials and Methods

The present study was undertaken in district Charsadda. Three wheat-growing villages, namely Aspandehri, Kamran Kalay, and Sarfaraz Kalay were chosen purposively. A total of 41 wheat growers were selected for interview by adopting the proportional allocation sampling method mentioned below.

$$N_i = n/N \times Ni$$

Where;
ni= number of growers in the village; I= number of villages; n= sample size; Ni= number of growers in the village; N= total number of growers in the area.

Table 2: *Total households and sample size in the selected villages.*

Villages	Total growers	Sample size
Aspandehri	110	18
Kamran Kalay	84	14
Sarfaraz Kalay	52	9
All	246	41

Data collection

In the present study, primary data were collected through face-to-face interviews using a pretested interview schedule. The main questions were regarding wheat growers characteristics farm attributes and inputs applied in to wheat cultivation.

Data analysis

For the data analysis, Microsoft Excel and STATA-13 software packages were used to reach the main findings of the study finally.

The profitability of wheat crop

Profitability was assessed by performing a cost-return analysis. The profitability of wheat crop can be estimated by subtracting the total cost of wheat production from the total returns per acre (Etuah *et al*., 2013; Kuboja and Temu, 2013). It is represented by the formula given below:

$$Profitability\ \pi = TR - TC \quad \ldots (1)$$

Where;
TR= total returns; TC = total cost.

$$TR = Qi\ Pi = (Q^{w} \times P) + (Q^{S} \times P) \quad \ldots..(2)$$

Where,
Q^{w} = Quantity of wheat grain per acre; Q^{S} = Quantity of straw (By product) per acre; P= price in rupees.

$$TC = TVC + TFI \quad .... (3)$$

Where,
TVC = Total variable cost of (seed, labour, fertilizer, pesticides, tractor hours, and other costs) per acre; TFC = Total fixed cost (i.e. land rent).
Therefore,

$$\pi = Qi \times Pi - (TVC + I) \quad \ldots..(4)$$

Profit Margin was also calculated. It is a percentage measurement of profit that expresses the amount earned per dollar of sales (Investopedia, 2018).

Model specification

To find out the determinants of wheat yield, a double-log model was used by applying the least square method which best fits the data (Haq *et al*., 2002; Sarkar *et al*., 2010; Adhikari, 2011).
The Cobb-Douglas production function is given as follow:

$$Yd = \alpha_0 + Sd\beta 1 + Trhrs\beta 2 + Anml\beta 3 + Lab\beta 4 + Fert\beta 5 + Pestweed\,\beta_6 + e_i \quad \ldots.(5)$$

The model was linearized by transforming into a double log form as follows so that it could be solved by the least square method.

$$LnYw = \alpha_0 + \beta_1 LnSd + \beta_2 LnTrhrs + \beta_3 LnAnml + \beta_4 LnLab + \beta_5 LnFert + \beta_6 LnPestweed + e_i \quad (6)$$

Where;
Yw= yield of wheat in kg; Sd= seed sown in kg; Trhrs =tractor hours used; Anml= animal days used; Lab= human labour days; Fert= quantity of fertilizers in kg applied; Pest-weed= quantity of pesticides and weedicides in liters applied; e_i= error term; Dependent variable= Wheat Yield (kg/acre); Independent variables= cost of various inputs including seed, tractor, animal, labour, fertilizer, pest-weed per acre.

Results and Discussion

Cost estimation of wheat crop per acre

In the agriculture sector, crop inputs are crucial in increasing/decreasing crop production. Therefore, the application of high-quality crop inputs can lead to more productive output. Although the present study was an effort to find out the main determinants of wheat output, the study has also calculated the total production cost by adding the cost of all applied inputs. The various cost incurred in the process of wheat production is segregated in Table 3.

Agricultural costs include fixed costs and variable costs. The fixed cost reflects the value of the fixed factors of production which does not change by the change of production volume, while variable costs are those which their value changes by the change of the volume of production and include the costs of agricultural processes on the crop as well as the costs of the production factors required to complete cultivation. Studying the fixed cost and variable costs in the study sample reached about 10000 rupees and about 16436, respectively (Table 3).

Labour cost

Labour cost includes man-days in preparation of soil, sowing, irrigation, fertilization, and harvesting. The total labour cost contributed Rs.4500 or 17.01% (see Table 3).

Table 3: *Per acre cost of various inputs in wheat production (in rupees).*

Inputs	Particulars	Units	Quantity	Price/unit	Total cost	Percent
Seed	Seed	Kg	36	42	1092	4.13
Labour	Land preparation	Days	3	300	900	3.40
	Sowing	Days	1	300	300	1.14
	Fertilizer Application	Days	1	300	300	1.13
	FYM Application	Days	1	300	300	1.13
	Irrigation	Days	3	300	900	3.40
	Harvesting	Days	6	300	1800	6.81
Total Labour	(i+ii+iii+iv+v+vi)	Days	15	300	4500	17.01
Fertilizer	Urea	Kg	70	30	2100	7.94
	Ammonium Nitrate	Kg	50	20	1000	3.78
	DAP	Kg	5	80	400	1.51
Total Fertilizer	(viii+ix+x)	Kg	125		3500	13.23
Pesticides	Pesticide/Weedicides	Liter	1	1000	1000	3.78
Tractor	Ploughing	Hrs	3	1100	3300	12.48
	Threshing	Kg	67	32	2144	8.11
o. Water charges					900	3.40
TVC (a+c+e+f+g+o)					16436	62.17
TFC (Land Rent)		Acre	1	10000	10000	37.83
TC = TVC+TFC					26436	100

Source: *Author calculation.*

Seed cost

The application of certified seed gives the growers a smooth way to obtain the maximum yield. However, because of the high price and shortage of certified seed, most of the growers utilized low-quality seed. The quantity of seed-applied per acre was reported 50-60kg. The average cost of wheat seed reached an amount of Rs. 1092 (4.13%).

Cost of fertilizer

Fertilization is a vital technological factor; wheat treatment with suitable fertilizers at the correct time can lead to a significant increase in wheat production.

Various kinds of organic and chemical fertilizers are often applied for enhancing land fertility and output. Fertilizers such as Urea, Ammonium Nitrate and DAP were used for the wheat crop. However, due to the high prices of fertilizers, many small landholders could not have applied the required amount. The per-acre cost of Urea, Ammonium Nitrate, DAP, Pest/weed, and FYM (transport) reached an amount of Rs. 2100, 400, 1000, 1000 and 1230, respectively.

Irrigation cost

The land is mainly canal irrigated. The average cost of irrigation reached an amount of Rs. 900/- per acre in the study area.

Harvesting cost

When the wheat crop is matured, it is then harvested either manually or through reaper. Rigorous labour is needed for harvesting and heaping. Both family and hired labour were used in harvesting the wheat crop. The harvesting cost averaged Rs.1800 or (6.81%) per acre.

Threshing

The final cost of wheat production crop is threshing cost, which reached an amount of Rs.2100 per acre.

Land rent (opportunity cost)

The tenant growers were inquired about the rent of land per season. Land rent was obtained for those growers who were cultivating their land. Thus, land rent is considered as opportunity cost, which was Rs. 10000 per acre per season accounting for 37.83% share of the total cost (see Table 3).

Total cost consumed

The total cost of wheat cultivation is the addition of both total fixed and total variable costs. The total

cost consumed in wheat production is estimated at Rs. 26436 per acre, which includes the land rent cost (fixed cost) consumed of Rs.10000 per acre and total variable cost of Rs. 16436.

Table 4: *Net return of wheat crop.*

Wheat crop	Quantity/ Acre (kg)	Price /kg (Rs)	Value/acre (Rs)
Main product (grain)	675	32	21600
By product(straw)	1350	13	17550
Gross return			39150
Total cost			26436
Net return			12714

Source: *Survey Data, 2018.*

Net return

Table 5 describes gross return, total cost, and net return from wheat crop. The gross return of wheat output was valued at Rs.39150 per acre, the total cost was Rs. 26436 per acre, and the net return was obtained as Rs.12714 per acre (Table 4).

The profitability of the wheat crop

To calculate the net return of wheat, the total cost of production per acre was subtracted from the total return per acre. The resulting per acre profit of wheat was obtained Rs. 12714 (see Table 5).

Table 5: *Profit per acre of wheat crop.*

Crop	Total return (TR)	Total cost (TC)	Profit (π)
Wheat	39150	26436	12714

Source: *Data Analysis–STATA output, 2018.*

The profit margin for the studied crop in the year 2018 was estimated at 0.3248. It indicates that every single rupee invested in wheat makes a profit of Rs. 0.3248. In other words, the profit margin for the Wheat crop was recorded at 32.48% (see Table 6).

To estimate profitability on a variable cost basis, gross margin was calculated. The gross margin per acre for wheat was obtained at Rs. 22714 (see Table 7).

Table 6: *Profit margin per acre of wheat crop (in rupees).*

Crop	(TR)	(TC)	Profit (π)	Profit margin
	1	2	3=1-2	4=3÷1
Wheat	39150	26435	12714	0.3248

Source*: Data Analysis–STATA output, 2018.*

Table 7: *Gross margin per acre of Wheat Crop (in rupees).*

Crop	Gross return Rs.	TVC Rs.	Gross margin Rs.
1	2	3	4=2-3
Wheat	39150	16436	22714

Source: *Field Survey, 2018.*

To find out the main determinants of wheat yield, regression analysis was conducted on main inputs. The regression output is shown in Table 8.

Table 8: *Empirical results of the regression model.*

Variables	Coef.	Std. Err.	t	p
LnTractor	.1692665	.0545301	3.10	0.004
LnAnimal	-.0593448	.0276449	-2.15	0.039
LnLabour	-.0037373	.0380498	-0.10	0.922
LnSeed	.4893833	.2106989	2.32	0.026
LnFertilizer	.1645942	.0549361	3.00	0.005
LnPestWeed	.0285324	.0126852	2.25	0.031
Constant	3.949815	.6238999	6.33	0.000
R-squared = 0.8398 F(6,34) = 29.70 p=0.000				

Source: *STATA output.*

Normality

Shapiro-Wilk test was applied for normality. The estimated p-value= 0.21976, which is higher than normal value of α= 0.05. It suggests accepting the null hypothesis of normal data.

Shapiro-Wilk W test for normal data.

Variable	Obs	W	V	z	Prob>z
U	41	0.96418	1.443	0.773	0.21976

Multi-collinearity

It refers to the existence of a linear relationship among some or all independent variables included in the model. The variance inflation factor (VIF) was applied. The value of VIF 2.26 illustrates that there is no serious problem with multicollinearity.

Heteroscedasticity test

Breusch-Pagan test with the null hypothesis of constant variance was used for heteroscedasticity. Calculated chi-square value 1.88, with a p-value of 0.1703, which is greater than 0.05; hence there is no serious issue of heteroscedasticity.

Variance inflation factor (VIF).

Inputs	VIF	1/VIF
LnSd	3.27	0.3058
LnTrhrs	1.97	0.5076
LnAnml	1.81	0.5525
LnLab	1.37	0.7299
LnFert	2.30	0.4348
LnPestweed	2.86	0.3496
Mean VIF	2.26	

Breusch-Pagan/ Cook-Weisberg test for heteroscedasticity. Ho: Constant variance; Variables: fitted values of LnYw.

chi2(1)	Prob > chi2
1.88	0.1703

Regression model

The regression model computed the va1ue of R-square as (0.8393). It indicates that 83.93% of the variations in wheat yield are explained by the included independent variables in the model. The highly significant F-test value of (29.70) shows that all the included variables are vital in explaining the variations of the dependent variable, i.e., wheat yield, which implies the best fit of the data (Table 8).

Input-output relationship

Seed: The coefficient for the variable of seed cost was positive (0.4894) and significant at 5%, which indicated that 01% addition in the seed cost would enhance the wheat yield by 0.489% keeping other variables fixed (See Table 8). The results about the positive contribution of seed cost to wheat yield are quite similar to Hassan *et al.* (2010) who reported seed coefficient 0.418, with a highly significant p-value of 0.000.

Fertilizer: The fertilizer coefficient was significant and positive (0.1646), and highly significant at 1%, which indicated that adding 1% in the use of fertilizer leads to an increase in the yield by 0.1646% keeping other factors unchanged.

Mehmood *et al.* (2018) reported the coefficients of Urea fertilizer positive 170.840 with highly significant p=0.003. Naveed *et al.* (2014) found fertilizer cost positive (0.040) with significant p=0.019. Hassan *et al.* (2010) also noted highly significant coefficients of nitrogen fertilizer (0.092) significant at 1%. Similarly, Rao and Ketema (2016) revealed that for each change of one unit in fertilizer, the yield of wheat (y) changed by 40.118 units. Kaur *et al.* (2010) showed fertilizer value 0.1105, significant at 1%.

Tractor cost: The estimated co-efficient for tractor cost was significant with a positive value (0.1692), significant at 1%, which indicated that a 01% rise in the use of tractor cost would raise wheat yield by an amount of 0.1692%. Kaur *et al.* (2010) reported an insignificant machine coefficient of 0.0073.

Pest/weed cost: The coefficient of pest/weed was negative (0.0285) significant at 5%, which shows that 1% increase in the pest/weed cost would enhance the wheat productivity by 0.0285%, holding all other factors constant (see Table 8). Quite similar findings are reported by Hassan *et al.* (2010), they found a coefficient of herbicides cost 0.081 and highly significant.

Labour cost: The coefficient of regression for the variable of labour cost was negative (-0.0037), with a non-significant effect on wheat yield, which indicated that a 01% increase in the labour cost would decrease yield by 0.0037% (see Table 8). Similar findings were placed by Kaur *et al.* (2010), i.e., negative and insignificant labour cost of -0.0053.

Animal cost: The coefficient of regression for the variable of the animal cost was negative (-0.0593), with a non-significant effect on wheat yield, which revealed that 1% increase in the animal cost would decrease yield by 0.0593% (Table 8).

Conclusions and Recommendations

The study was carried out in 2018 in three villages of district Charsadda namely, Kamran Kalay, Aspandehri and Sarfaraz Kalay to calculate the net return of wheat crop. The second objective was to find out the main determinants of wheat yield. A sample of 41 wheat-growing farmers was selected through the proportional allocation method.

The study found land rent as the leading cost of cultivation, followed by fertilizer and harvesting costs. The total cost per acre of wheat was Rs. 39150. Per acre net return was estimated Rs. 12714. The profit margin was 32.48% and the gross margin was Rs. 22714 per acre. The study concluded that the wheat

crop is a profitable agro-enterprise in the Charsadda district of Pakistan.

The results of the log-transformed linear regression model revealed that inputs such as; seed, tractor, fertilizer, and pest weed cost were positive and significant factors while human labour and animal were insignificant. Wheat growers should invest more in good quality seed, tractor and fertilizers for more production.

It was noticed that most of the growers were illiterate. The growers who were educated had inadequate knowledge about the efficient and modern farming techniques and do not use the verified seeds and appropriate quantity of fertilizers. Moreover, prices of inputs were reported very high, which could not be applied in the required quantity leading to low crop production.

The following recommendations are suggested on the basis of the main study findings.

1. Provision and timely availability of major inputs especially verified high-quality seed should be ensured by the Government, which will not only enhance crop production but also will help in minimizing production cost.
2. Most of the wheat-growers were found poor who barely fulfilled their basic needs. It is hard for them to purchase costly inputs, especially chemical fertilizers. Therefore, it is suggested to provide an interest-free micro-credit facility so that they can easily buy and apply the costly inputs in time.
3. Similarly, majority of the growers were reported to have a lack of knowledge in the efficient crop cultivation methods; therefore, the Government should arrange field days and demonstration plots to boost the potentials and capabilities of the hardworking farming community.

Novelty Statement

This research study has been conducted for the purpose to assess economic analysis of experienced farmers to evaluate their productivity.

Author's Contribution

Shahzad Khan: Presented the idea of the research, conducted the research and wrote the manuscript.
Munir Khan and Arif Alam: Contributed in analysis, results and discussion and review of literature.
Ikram Shah: Helped in interpretation of results.
Mahfooz Khan: Contributed in dicussion part of the manuscript.
Fida Muhammad Khan: Helped in referencing and formatting the manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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