Analysis of Economics implication for cotton production in southern Punjab of Pakistan

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Abstract

The present study was designed to explore the important factors that affecting cotton production such as socio-economic conditions of cotton growers which affect the yield directly .The data on various cost items including land, labour and capital inputs, marketing cost and physical and revenue productivity, net return, input-output ratio and cost benefit ratios and farm sizes during the year 2018-2019.By using multi-stages cluster sampling survey method .The poor production implies implication that the illiteracy ,ignorance, Inadequate canal water, insect pest and poor extension services soil quality implications of various inputs like cultivation, seed and sowing irrigation inter-culturing-hoeing, fertilizer, plant protection and labour cost on cotton yield could be the causes to this low production due to lack of marketing facilities at village level, less payment by the marketing agencies ,high prices of input ,lack of timely availability of genuine fertilizers. The practical results indicated that significant increase in output of cotton in the study area could be traced mainly to use to latest technology that plays the vital role in cotton productivity enhancement.

Keywords: Agri-economics, cotton productivity, input-output cost-benefit, net returns, Pakistan.

I. Introduction

The performance of agriculture during 2018-2019 remained subdued, On the aggregate, The sector grew by 0.85 percent, much lower than the target of 3.8 percent set at the beginning of the year. This Under performance of agriculture sector was mainly due to insufficient availability of water which led to a drop in cultivated area and a drop in fertilizer off take.

Cotton

Cotton is not only an export earning crop but also provides raw material to the local textile industries. Cotton accounts for 8.6 percent of the value added in agriculture and about 1.8 percent to GDP. The crop was sown on the area of 3075 thousand hectares. The production of cotton is provisionally estimated at 19.0million bales for 2018-2019.Lower production was attributed primarily to the 11 percent decline in area sown in Sindh due to excessive rains and floods. The crop yield in some areas was also affected by the cotton leaf curl virus and mealy bug. Other factors responsible for the decline in cotton production include excessive rain, delay sowing and late wheat harvesting which resulting in decline in area under the crop

Rice is high valued cash crop and is also a major export items. Rice stands second in Pakistan in the rank of food crops .A good quality of rice is consumed in Pakistan. It is grown in warm places that have plenty of moisture. For rice sowing June and July are the most suitable months. Mostly it is grown in Punjab and sindh. It accounts for 5.7 percent of the total value added in agriculture and 1.2 percent to GDP. Area and production target of the rice for the year 2018-2019 were set at 2575 thousand hectares and 5693 thousand tons respectively. Area sown for rice is estimated at 2581 thousand hectares. The size of the crop is estimated at 5438 thousand tons (5.438 million tons)the lower production is due to heavy rains in lower part of sindh and Punjab at the time of maturity logging phenomenon. Which affected the production of rice, especially Basmati varieties and shifting of area to sugarcane crop because of better prices offered by the millers for sugarcane crop last year.

Sugarcane is the most important cash crop .It is grown throughout the year. Generally it is sown in February .It needs high temperature and plenty of water. These major sugar-cane growing regions are Punjab, sindh and FWFP. Sugar and gur are made from sugar cane. Sugarcane crop serves as a major raw material for production of white sugar and gur. Sugarcane crop is highly water intensive and important crop. Sugar production in the country mostly depends on this crop, though a small quantity of sugar is also produced from sugar beet. Its share in value added of agriculture and GDP are 3.5 percent and 0.7 percent respectively. For 2018-2019 the area under sugarcane crop was targeted at 1005 thousand hectares. However sugarcane has been sown in the area of 1029thousand hectares. Sugarcane production for the year 2018-2019 is estimated at

54.8million tons. The higher sugarcane production is the result in area, timely rains and sensible application of fertilizer, improvement in culture practice, better management and attractive prices offered by the millers.

Wheat is a very important food crop and is grown in almost all parts of Pakistan. It is sown in the first week of November. It grows blooms and bears grains in the middle of April. It contributes 14.4 percent to the value added in agriculture and 3.0 percent to GDP. Area and production target of wheat for the year 2018-2019 were set at 8459 thousand hectares and 22.5 million tons respectively. Wheat was cultivated on an area of 8494thousand hectares. The size of the wheat crop is provisionally estimated 23.52 million tons-highest wheat production in the country.

Maize is grown in warm places with a moderate rainfall. Though maize is not grown on a large scale in Pakistan, yet it is an important food crop. It is mostly used in NWFP. It is used in many forms. Some eat it as bread, Some roast its corns on fire and eat .From maize edible oil is also extracted.

Table No.1 Area, Production and yield of Cotton

Year	Area		Production		Cost	
	(000Hec)	%Change	(000Bales)	%Change	(Kg/Hec)	%change
2013-14	2806	-	12769	-	774	-
2014-15	2961	5.5	13960	9.3	802	3.6
2015-16	2902	-2	9917	-29	582	-27.4
2017-18	2489	-14.2	10671	7.6	702	25.4
2018-19	2699	8.4	11935	11.8	752	3

(Economic survey of Pakistan, 2018-19)

II. Literature review

In Pakistan, freshwater bodies are being contaminated through runoff and leaching of nitrates from agricultural land (Azizullah et al., 2011) and similarly overuse and misuse of chemical pesticides have also deleterious impacts on crops and animals as well (Tariq et al., 2007). To get the high yield, mechanization has also intensified the use of non-renewable energy. Farm management practices, agro ecosystem and soil chemical and physical properties greatly influence the magnitude of environmental hazards and resource use in different forms and their effect varies with these practices (Choudhury and Kennedy, 2005). Furthermore, intensive input use, as a form of insurance for cotton yield and quality, comes with high production costs. Both environmental hazards and high costs of cotton production challenge its sustainability and farmer's income in Pakistan; therefore, analyzing and quantifying jointly environmental impacts and economic performances of cotton production are necessary.The issue underlying in this research is the trade-off between input use, environmental impact and economic performance in cotton cropping systems of Pakistan.

Cultivation of cotton (Gossypium hirsutum L.) is highly extensive farming that requires excessive utilization of resources to protect the crop from insect pest and synthetic chemicals are used extensively for better crop growth (Deguine et al., 2008; Hashemi and Damalas, 2011). There are many factors responsible for low cotton yield but insects are ranked at the top of biotic agents that not only deteriorate the quality of cotton produce but also reduce the yield. Farmers cannot afford high protective measures due to small land holdings in almost all the developing countries and their extensive use lead environment toward pollution (Fitt, 2000). Another important aspect of cotton cultivation is plant pathogens are also regarded a serious threat to some areas but their importance is less as compared to other factors such as inputs and agrochemicals (Oerke, 2006). Weed are most important biotic agent that poses another threat to its yield as it interferes with nutrients use and space and weeds affect cotton while creating competition. Although there is improvement in controlling these pathogens through chemical control, there is high harvest loss reaching almost 30%. Potential losses through non-utilization of inputs and weeds account altogether 40 percent and 9 percent of total losses being caused by pathogens and viruses (Oerke, 2006). Although large amount of synthetic chemical is used in cotton farming, losses account almost 29 percent despite the use of pest control measures.

III. Methodology

Present study consists of primary data which was collected by the researcher from the field. The study was conducted to estimate the economics of cotton crop, and marketing arrangements of cotton in district Muzaffargarh. Study primarily consists of primary data however some secondary data was also taken to support the results. Secondary data was taken from Economic survey of Pakistan, Agricultural statistics of Pakistan. While primary data was collected using a structured questionnaire from field. Total sample size was 30; sample was selected using the simple random sampling technique. The questionnaire was pretested in field and then

implemented for final data collection. In Muzaffargarh tehsil kallarwali,bhinda ishaq, baitaimshah. Villages were selected on convenience based. Interviews were taken from the cotton grower in which detail about economic, socio economic and marketing of cotton crop was taken the other aspects of cotton were also discussed. After the data collection the data was compiled in SPSS sheet. Data was initially cleaned to remove the outlier and mistakes. Simple descriptive analysis was used in which mean, frequency and standard deviation was calculated.

$$\text{Mean} = \frac{\Sigma x}{n}$$

X=Total number of observations

n= Total No of observation

Cost of production was calculated by adding both variables and fixed costs. Variable cost includes Land Preparation Costs, Seed and Sowing Cost, Fertilizer, Weeding and Irrigation Cost, Picking Cost while fixed cost includes Land Rent.

TC=TVC+TFC

IV. Results And Discussion

Socio Economic Attributes of Cotton Producers

Socio economic condition have very important role in agriculture. Socio economic attributes of farmers are presented in table no. 2. Results showed that then the average age of farmer is 41.70 year with standard deviation of 11.707. In study area majority of farmers have less education average mean education of farmer was reported as 4.67 with standard deviation of 4.978. Mostly people were attached with farming average farming experience was reported is 18.37. As agriculture is labor intensive activity so family labor is also or involved in farming, on average 2.467 family no. were reported who are full time or part time involved in farming. Part time family labor is involved in harvesting, picking time. Average of family member of farmer is 8.47.

Table No.3.1 Socio economic attributes of Cotton Producers

Socio-economic Attributes	Mean	Std. Deviation
Education (Years)	4.67	4.97
Age (Years)	41.70	11.70
Farming Experience-(Years)	18.37	10.91
Involvement in Farming	0.87	0.34
Primary source of Income	1.23	0.43
Family Size (Nos)	8.47	4.53
Person Involved in Farming (Nos)	2.46	1.40

Farm Equipment Water Quality and Soil Type

According to this study 100% of the farmer use tractor for farm traction purposes out of which 81.3% of the farmer have their own tractor while 12.5% arrange tractor on rent and the average rent of the tractor is 1500/day. The 100% farmer of study area depends on tube well irrigation and according to their reviews average 90.3% of water is of good quality and have 0% of brackishness problem. The canal irrigation is unavailable. The soil quality of the area is 100% good due to type of land which is 100% Clay loam and loamy which is perfect for cotton production.

Table No. 3.2: Farm Equipment water Quality and Soil Type

Indicator	Frequency	Percentage
Farm Traction Power	30	100
Own Tractor	26	86.58
Rented	04	13.42
Irrigation Source(Tube well)	30	100
Soil Quality (Good)	30	100
Water Brackishness	1	3.33

Land Ownership Detail

The average areas of operational land holdings were explored to assess base of farmers. A number of studies have indicated that the size of landholding affects the efficient utilization of resources and type of cropping pattern a farmer will follow. Land ownership detail is presented in table no.3. In study area mean land was irrigated by tube wells. Average landholding by farmer was reported 18.050 acre. Out of which 15.717 acre is irrigated. On average farmer owned area of 18.050 acre and 0.70 acre was reported on rent. Rent rate was 25000/acre for tube-well irrigated land. Usually the land was arable no uncultivated area was reported by the farmer. Land sharing practices was also absent in study area.

Table no.3.3 Land ownership detail

Indicators	Mean	Std. Deviation
Total Area Owned-Acres	18.05	21.72
Operational Holding-Acres	15.71	18.79
Rented in/Acre	0.17	0.91
Rent Paid(Rs/Acre)	833.33	4564.35
Rented out/Acre	0.50	2.73
Rent Obtained(Rs/Acre)	800.00	4381.78
Shared in	0.00	0.00
Shared out	0.00	0.00
Irrigated Area-Acres	15.71	18.79

Land Use and Cropping Pattern of Rabi Crops:

There are two crop season Rabi and Kharif crops growing in Muzaffargarh district. Pattern of rabi crops is presented in table no.5. Wheat was reported as major crop with 4.10 allocations to this crop out of total operational land holding. And some farmers also have mango orchards with average allocation of 1.933 acre. Other crops were grown in small fraction like berseem with average area of 1 acre.

Table no.3.4 Land use and cropping pattern of Rabi crops

Crops (Rabi) (2018-19)	Area (Ac)	Yield (40kg)
Wheat	4.1	30.9
Orchard	1.93	125
R. Fodder/	1	---
Fallow	0	---

Land use and Cropping Pattern of Kharif crops

Cropping Pattern of Kharif season is presented in table no. 6. In Kharif season Cotton was major crop with average allocation of 11.317 acre. After cotton the only major crop is sugarcane with average area of .20 acres. Other Kharif crops are monthly absent due to high trend towards major cops as that study area is mainly of cotton belt.

Table No.3.5 Land use Cropping Pattern of Kharif Crops

Crops (Kharif) (2018-19)	Mean	Std. Deviation
Cotton/Area-Acres	11.32	11.11
Cotton/Yield-mounds	14.53	2.90
Sugarcane/Area-Acres	0.2	1.09
Sugarcane/Yield-mounds	1.43	7.85

Cost of Production of Cotton Crop

The cost of production is very important part of this research as it plays an important role in finding the accurate economy of the cotton growers. The average no. of Rotavator is 1 and average price per Rotavator is 1888Rs and the cost per acre is 2775Rs. The cultivator no. is 3 and price is 800Rs and the average cost per acre is 2848Rs. The average seed rate is 15Kg and the average price per Kg is 200Rs and the total cost per acre is

3000Rs. The sowing method is choka so the number of labor is 6 and the wage per day is 400Rs the total cost per care is 2400Rs. To compete in yield stance farmer also apply FYM to reduce his cost of production the average no of trolley is 1 and the total cost per acre is 1937Rs. The fertilizers are also necessary to increase the yield the average no. of urea bags are 3 and the price of one bag is 1900Rs and the total cost of urea bags per acre is 5705Rs. To meet the scarcity of phosphorus cotton growers use DAP the average no of DAP bags use is 2.5 and the price per bag is 3127Rs and the total cost per acre is 7818Rs. The cotton growers of the area under study use sulphur to soften the soil and make it adoptable to use maximum of fertilizers the average Kg of sulphur use is 8 the average price per kg is 110Rs and the total cost per acre is 908Rs. The area under study have no canal irrigation source that's why the whole area depends upon tube well irrigations the average no of tub well irrigations applied are 9 and the average cost per irrigation is 1000Rs and the cost per acre is 9000Rs.Weeds are the major problem to resolve this issue farmer apply different types of weedicides the average no. of weedicides applied is 1 and the average cost per weedicides is 2407Rs which is also the total cost per acre. Pesticides sprays are also applied the average no sprays applied is 4 and the average price per spray is 2662Rs and the total cost per acre is 10649Rs. The last one is picking cost the most crucial and important part of cost of production the average no. of females are 16 and the average wage per day is 400Rs and the total cost of picking per acre is 6400Rs. The total variable cost is 55849Rs which is the sum of all farm inputs, land preparation practices and picking cost which is 55849Rs. The total cost of rate of interest is 5231Rs. While the fixed cost which Rent of the land is 12500Rs. Total cost is 73581Rs. The average yield is 25 mounds and the price per mound is 2545Rs and the total yield give price of 63625Rs. Cotton by-product which is sticks also cost 4000Rs. The total revenue is 67625Rs and the gross benefit is 6543rs. In the end the total net benefit is -5956Rs which is not good for farmer financial health.

Table no.3.6 Production Practices for Cotton Crop

Indicator	Qty	Price	Cost Per Acre
Rotavator	1.47	1888	2775.36
Cultivator	3.6	800.0	2848.0
Seed Rate (Kg)	15.0	200.0	3000.0
Sowing (Labor) No	6.0	400.0	2400.0
FYM Trolleys No	1.0	1874.1	1937.9
Urea Bags	3.0	1901.7	5705.0
DAP Bags	2.5	3127.4	7818.4
Sulphur-Kg	8.2	111.2	908.3
Tube-well irrigations (No)	9.0	1000.0	9000.0
Weedicides (No)	1.0	2407.2	2407.2
Pesticide Sprays (No)	4.0	2662.3	10649.2
Picking Cost (Rs)	16.0	400.0	6400.0
Total Variable Cost (Rs)			55849.2
Interest Rate			5231.8
Fixed Cost (Rs/ Acre)			12500.0
Total Cost			73581.1
Yield	25.0	2545.0	63625.0
Cotton By Product (sticks)			4000
Total Revenue			67625.0
Gross Benefits			6543.9
Net Benefit			-5956.1

Labor Engaged for Cotton

Cotton is very important crop of Pakistan and heavily contributes to the GDP. As it is discussed earlier that cotton is labor intensive crop the labor is engaged from different sources at different time. The average no. of permanent labor engaged is 1.067 with average wage/month is 3010 Rs. The average time or month for the engagement of labor is 4.20. While in picking season the whole picking is done by women the average no. of women for picking is 32.77 the average no. of women engaged per day is 27.93 the average wage for picking/day is 400 Rs. The whole statistics are in table no. 8.

Table no.3.7 Labor Engaged for Cotton Picking Activities

Indicators	Mean	Std. Deviation
Permanent Labour engage for Cotton	1.06	1.81
Wage per month	3010.00	4371.88
Months for engaging Labor-No.	4.200	5.71

Picking Female (No)	20	3.25
Picking Qty / Day/ Kg	30	8.82
Wages (Rs/Day)	400.00	0.00

Marketing of Cotton Crop

The Area under study contain small farmers they don't have enough good services and post harvest management practices knowledge due to which they are unable to gain better profits. The only way they have to sell their crop yield is Local Market dealer/beopari. The areas under study have no services like wholesale market, Retail market, and ginning mills. The farmer is not allowed to sell his produce directly to Ginning mills commission agents are involved due to which farmer have to face a lot of trouble in payments. That's why the farmers of the studied area sell their produce to Village market dealer/beopari. The all statistics about this dealing is in following table no. 9.

The farmer is small that's why he doesn't afford better packaging so he transport it open. The most of the farmer use his own tractor trolley for Transportation. The average distance from farm to local market is 7.97Km and the average cost to transport a mound of cotton is 23.43 Rs. The average market rate of cotton is 2561.50 Rs/mound in which the average commission percentage is 8.53% at whole produce.

Table no.3.8 Marketing of Cotton

Village Dealer/Beopari	Mean	Std. Deviation
Type of packaging	1.00	0.00
Mode of Transport	2.00	0.00
Distance (Km)	7.97	3.48
Transport Cost (Rs/mounds)	23.43	4.25
Price Rs./40 Kg	2561.50	391.78
Commission (%)	8.53	0.50

Dealing aspects with Commission Agent

Selection of Commission agent is another task for farmer that they have to arrange it for the season to sell their produce at good rates to earn profit. Most of the farmers rely on permanent selection of commission agents and they are in contract with them for years. The reason to change the commission agent is price issue and the main one is high interest rate and lack of understanding. The selection criteria for Commission agent is based on reputation of commission agent, price offered previous year experience, and farmer relation with the commission agent. The main or mostly average time of farmer to come to the commission agent is June, July. The facilities are none from commission agent.

Table no.3.9 Aspects of deal with Commission Agent
Marketing arrangements to select Commission Agent

		Frequency	Percent
Valid	Permanent arrangement	30	100
	Price issue	30	100
	Provision of facilities	2	6.66

Time to come to Commission Agent in Advance/Month

Month	Frequency	Percent
May	15	46.9
June	12	37.5
July	3	9.4

Discussion/ Information Sharing with Fellow Farmer

The discussion on connectivity of farmers with each other is the main and basic concern of this research is to explore the constraints in production and marketing of Cotton. There are few aspects of it like rate of cotton, Quality of cotton, Price of inputs, per acre yield, Last year yield and Price different at different markets. The whole schedule of this aspect is given in the following tables.

Table no.3.10Discussion with Fellow Farmer about Various attributes

Indicators	Percent Farmer
Rates of Cotton	37.5
Quality of Cotton	93
Prices of Inputs	87.5
Per acre Yield	50
Last year Yield	34.4
Price difference at different Markets	93.3

Table no .3.11 Price gathering Behaviors

Indicators	Frequency	Percentage
Everyday	6	20.0
Weekly	1	3.3
Fortnightly	9	30.0
Monthly	1	3.3
Once in season	13	43.3

Market Information and innovation in Marketing

If there is no innovation in market then there is no farmer growth. In this study the farmer is not satisfied with the received price of cotton due to some common reasons like involvement of commission agent, high taxes, and payments in installments. The average farmers get market information from Fallow farmer and Personal visit to market. The farmers of area under study are not educated and that's why there is no trend of training for markets. They have no know how about establishing cooperatives.

Credit Facilities for Cotton Production

Credit facilities are very important for the progress of the farmer and farmer need it very badly sometime but due to strict rules and regulations and high interest rates and lack of education farmer have no approach to commercial banks and banks related to agriculture sector and in case of commission agents the farmer have trust issues and commission agent is not able to provide amount of credit the farmer required and NGO's have no approach to the area under study. The only option left to farmer is relatives and friends. The average credit they gain from relatives and friends is 3-6lac and the average time to return is 6-7 months and the average interest rate on it 8-9 percent and mostly this credit serve is purchasing of farm inputs, purchasing of farm machinery and equipment and mostly the household needs. All the stats of credit facilities are in following table no. 11.

Table no.3.12 Source of Credit Facilities for Cotton Production

Source of credit	Frequency	Percentage
Relatives/Friends	27	90.3
Banks	03	9.7
Purpose of Loan		
Farm Inputs/ Fertilizer	28	93.7
Household Expenses	2	6.3

Cotton Production and Marketing Issues and Actions needed to solve Issues

Farmers of the studied area have almost same issues and the most common issues related to production of the cotton are lack of improved varieties and uncertified seeds, costly inputs, labor intensive crops, unsuitable weather condition, unimproved irrigation facilities. These issues can be resolved by proper check and balance by government and designated agriculture officers.

On the other hand farmer also has to face the marketing problems. The most important issues in marketing of cotton are low selling prices, lack of market information as the farmers have no education facilities, illegal charges/commission at market level because farmer have no direct access to market due to lack of market information due to these factors the marketing of farmer is not improving. The trend of the market stats is given below in table no. 12.

Table no.3.13 important issue in cotton production

Issues	Rank
Lack of Improved Varieties	1
Costly Inputs	2
Risky Nature of Cotton	3
No Canal water Availability	4
Marketing Issues	
Low Price of Cotton	1

Credit Selling	2
Payment in Installment	3
No Market Information	4

V. Conclusions and Recommendations

Muzaffargarh District of Punjab Province Study consists of both primary and secondary data. Secondary data was collected from Economic survey of Pakistan, Agricultural statistics of Pakistan, Pakistan Bureau of Statistics, Science direct, Google Scholar, and PARC official website. While primary data was collected using a structured questionnaire from field. Simple random sampling technique was employed to collect that data. Interviews were taken from the farmers in which the aspects of cotton were discussed. And at the end of the study it is concluded that the area under study have following problems.

Low literacy rate is the biggest problem which is the main hindrance for connectivity between farmer and farm capacities.

No marketing information is another issue due to which farmer is unable to achieve his benefits per requirement.

Farmer has no access to factory markets and due to this issue they have to handover their produce to local dealer/beopari.

The area under study have no canal irrigation due to which farmer have to invest a lot on tube well irrigation and his total cost increase and benefits decrease.

Due to costly inputs farmer have to take loans due to which his condition his hand mouth.

Lack of improved varieties and uncertified seeds cause less yield due to which farmer is not getting his proper benefits.

Cotton is labor intensive crop due to increase in dearness in daily utilities labor charges are also increase.

Low Selling price of farm produce is very painful for farmer higher taxes from government and no subsidies broke the backbone of farmer.

Recommendations

The literacy rate of the area under this study is very low that the average education years farmer have is 4 year which is below average my recommendations about that is there must be at least 10 year education to every farmer.

The area under study is near to river Chenab and head panjnad the canal system touch this area is bakhtwah which have two branches kallarwali and mesanwali which are closed for at least 5 years and providing zero irrigation facilities due to which farmers have to invest a lot on tube well irrigations and government tube well my recommendations about this is that canal system should be reopened so that farmer get benefits and become the cause in increase of GDP.

In the last 5 years the trend of prices of inputs are increased by 50% which is very critical for farmer financial health my recommendations about this is that the govt. bodies should have supervision and check n balance on price trend to control this rapidly growing factor.

The selling prices of cotton are fluctuating during the last five years due to high commission rates and high taxes my recommendations about this is that government should provide support to farmer. The main support to farmer is subsidies on farm inputs in the last five years the subsidies are decrease to 13-14 % there must at least 60-70 % recommended subsidies for farmer financial health.

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