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Analysis of knowledge transferred by agricultural field staff to cotton growers and its impact on rural development: evidence from Pakistan

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Abstract

Cotton is the main cash crop in Pakistan and it contributes 0.8% shares in GDP (Gross domestic product). The area of cotton in Pakistan is increased in recent years but its production is decreasing due to unfavorable climatic conditions. COVID-19 outbreak has also an effect on cotton consumption. From August 2019 to July 2020, the COVID-19 pandemic reduced global cotton consumption by 15%. Agricultural extension and advisory activities play an important role in agricultural development and can help to improve the living conditions of farmers. Keeping in view the importance of working in agriculture field staff for cotton, the present study was designed to analyze the quality of knowledge transferred by agriculture field staff. The present study was based on primary data and conducted in the district Muzfargarh becsasue it is one of major cotton producing district of Pujnab, Pakistan. A total of 180 respondents were taken from Tehsil Alipur of Muzfargarh from different union councils through a simple random sampling technique and interviewed through a pretested structured interview schedule. The data collected was analyzed using the Statistical Package for Social Sciences (SPSS). About 58% of the respondents identified that extension meetings are good source of information and 37.7% of the respondent said that agricultural field staff visit them on monthly basis.Impact of improved cotton management practices on health rated satisfactory by 52.77% of respondents. Based on findings it is recommended that the government should work with all stakeholders to implement regular training programs for cotton farmers in all areas.Monitoring of agricultural field staff should also be done on regular basis. Modern ways of communications should be implemented in rural areas for the quality of knowledge transfer among cotton growers.

Keywords: Rural development, Agricultural Field Staff, Cotton

Introduction

In Pakistan, most of the population (65%) lives in rural areas, and their livelihoods directly or indirectly depend on agriculture, where it plays an important role in economic development, food security, poverty reduction, livelihood, rural development, and the environment. The shares of agriculture in GDP(Gross domestic product) is 19.3% and workforce contribution is 45%(Govt. of Pak., 2020).

Cotton is Pakistan's main cash crop and accounts for around 0.8% of GDP and 4.1% of the total value added in

agriculture. In the period 2019-20, cotton planted on an area of 2,527 hectares, with an increase of 6.5% compared to last year (2018-19,2,373 hectares). Cotton production is estimated at 9.178 million bales, down 6.9% from 9.861 million bales last year(2018-19). Although the total area has increased compared to last year, the overall performance has remained lower due to unfavorable weather and poor water availability during the important stages of plant development, as well as pest attacks (Govt. of Pak., 2020).

Global cotton production in 2019/20 is estimated at 125.8 million bales, 5% incresae (almost 6.5 million bales) compared to 2018/19, and the second-highest production recoreed after 2011/12 which was 127.2 million bales. In 2019/20, cotton production estimates for the major-producing countries are mixed, which is likely to be increased. World cotton harvested area is forecast at 34.7 million hectares (85.8 million acres), 3.5 percent above 2018/19 and the highest since 2011/12; most of the 2019/20 area increase is attributable to the United States, where expected abandonment is reduced considerably from 2018/19 as a result of improved moisture in the Southwest. The 2019/20 global cotton yield is forecast at 789 kilograms/hectare (kg/ha) (704 pounds per acre), slightly above the previous 3-year average (USDA 2019).

Global cotton production continues concentrated among a few countries. In 2019/20, the top five cotton-producing countries are forecast to account for more than 78 percent of total production, similar to 2018/19 but 2 percentage points above the 2015/16-2017/18 average. India is forecast to be the leading producer in 2019/20, contributing 23 percent of the global crop estimate, while China and the United States are projected to account for 22 percent and 17 percent, respectively. Meanwhile, Brazil is expected to contribute 10 percent, and Pakistan accounts for an additional 6 percent (USDA 2019).

Cotton is grown worldwide and is usually harvested by machines, but sometimes by hand. Around 25 million tonnes of cotton are produced every year worldwide. From August 2019 to July 2020 the COVID-19 epidemic resulted in a 15 percent drop in global cotton consumption(USDA 2020).

Cotton is an important commercial crop in rural areas as it holds a significant potential in economic production (Jayne, 1994; Aboudou, 2019). When it comes to the use of cotton, the country with the world's largest textile industry is the largest importer of cotton lint. In the late 1990s, China's largest textile producer accounted for more than a quarter of the world's cotton production (Baffes, 2005; Kholikova, 2020).

Despite being one of the largest cotton-producing countries, Pakistan's cotton production is lower than other countries. The low cotton production is due to weather conditions, pest attacks, and low response by farmers to scientific and pest control techniques. It is the public judgment that government agencies are building vigorous efforts to stimulate the well-being of the rural community, try to close the gap in cropping crops, and start various agricultural extension programs in Punjab (FAO, 2002) as it is major cotton production province in Pakistan (Memon, 2019; Ur Rahman et al., 2020).

As extension services have a vibrant segment in agricultural development. It brings information for the agricultur-

al community and new skills that can be adopted to recover production, income, and living conditions. Agricultural field staff is responsible for dissemination of latest technologies and information to farmers. The previous failure in the adaptation of latest technology is due to the inefficiency of agriculture extension services. (Khan, 2012; Olorunfemi, 2020).

The researchers believed that developing countries needed to localize their extension schemes and develop other management developments to deal with many of these issues and to recognize rural development goals such as the reasonable distribution of financial development and mitigation.

There is a lot of research done to assess the work efficiency and knowledge transferred by agricultural extension workers to cotton growers. However, none of the research has met the target and does not meet farmers' requirements. Farmers are still looking for satisfaction with field staff performance. The agricultural staff is expected to serve as a solid bridge between the field and research institutions and provide equal services to all farmers, regardless of the social status of the client and their properties. The study was designed to investigate the level of expectations and satisfaction of the agricultural community with the knowledge imparted by agricultural workers to cotton producers.

Keeping in view the importance of working of agricultural field staff concerning cotton crops, the present study is designed to analyze the quality of knowledge transferred by staff. It is hoped that the results of the study will help put efforts in a more effective way of achieving the desired objectives.

Materials and Methods
The present research is based on primary data and data was collected from the cotton growers in the study area.

Study area
Muzaffargarh is the one of the major cotton growing district in Punjab. District consist of 4 Tehsils Alipur, Jatoi, Kot Addu and tehsil Muzaffargarh. The present study was conducted in district Muzaffargarh because this district is convenient for the researcher to collect and analyzes the data.

Sampling and its procedure
Tehsil Alipur is selected through simple random sampling among the 4 Teshils. The Tehsil comprises of 14 union councils. Out of a total of 14 union councils the study was conducted in 4 union councils which were selected using simple random sampling. From 4 union councils, twelve villages were selected by using a random sampling technique. From each village, 15 cotton growers were selected randomly. Thus making a total of 180 cotton growers as a sample for the study.

Study tool
Many considerations can allow the interviewer maximum comfort and minimum confusion during the interview process (Fontana & Frey, 2000). An interview schedule was planned based on the basic objectives of the study in such a way to gather complete and actual information. It was consist of open and closed ended questions. The interview schedule was in English and the interview was given in Urdu and local languages.
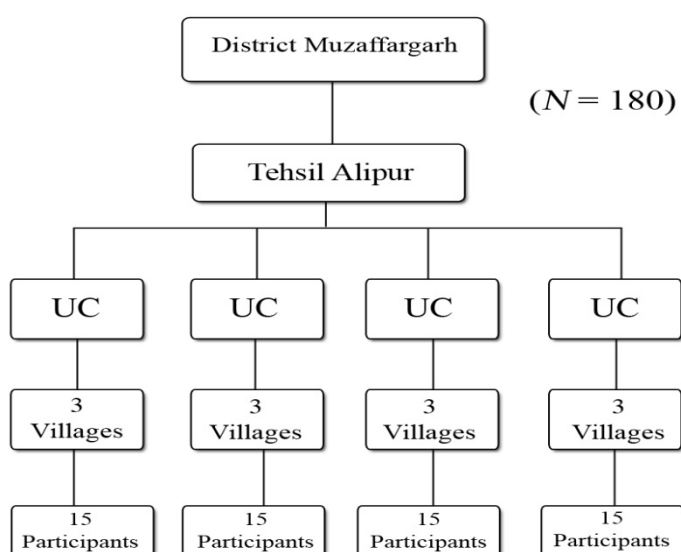
Pre-testing

The research tool was previously tested on 10 randomly selected respondents and the interview schedule was modified with the necessities.

Interviewing the Respondents

The interview was conducted from farmer respondents at their fields. Questions were asked in local language.

Data analysis

The data were analyzed with the Microsoft excel and statistical package for social sciences (SPSS).

Results and Discussion

The present study was conducted to evaluate the knowledge transferred by Agricultural field staff to cotton growers and their impact on rural development The collected data was analyzed to draw a conclusion and to provide a measure that will help to highlight the role of agricultural field staff in providing knowledge to cotton growers in tehsil Alipur.

Farmers' perception regarding sources of information of cotton crop management

Data Plotted in figure 1 shows that the majority of the respondent (90-95%) reported that they get information from Radio, Television and friends/family members and other 62% from newspapers and 58% from the Extension meetings while other also get information from govt. agencies. This showed that farmers mainly rely on agriculture field staff, local people radio, and newspapers and they do not depend on only one source for fulfilling their needs regarding best crop management.
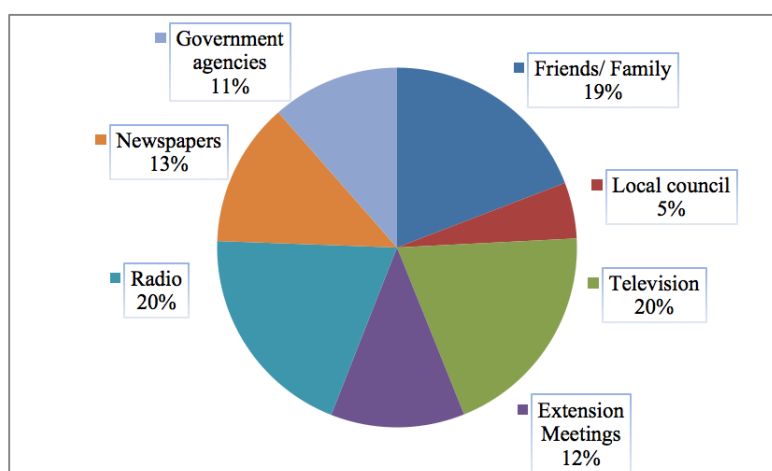

Figure 1. Sources of information regarding Cotton crop management

Locals views about staff visits to the respondents

The respondents were inquired about the frequency of extension visits. More than 41.11% of respondent reported that agriculture field staff visit often fortnightly and 37.7% of the respondent reported that about the monthly visit and 21.11% of respondent reported that agriculture field staff visit on a weekly basis (Figure 2).
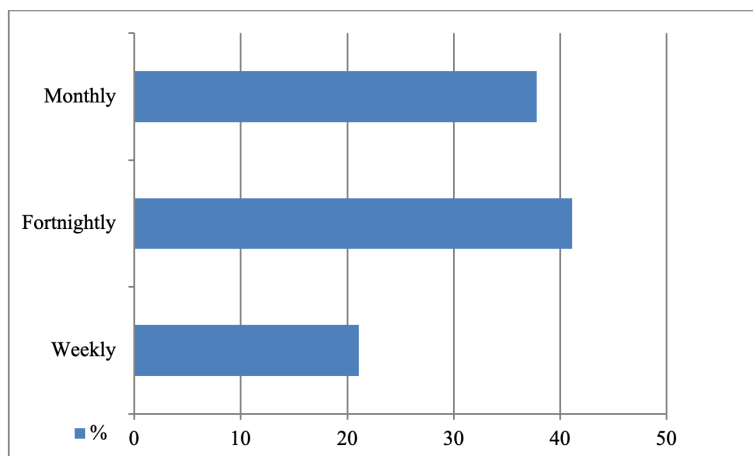

Figure 2. Frequency of visit to field by agricultural staff

Farmer's perception regarding different kinds of extension methods used in the study area

Farmers were asked about which kinds of methods are being used by agriculture statt. Data in figure 3 shows that majority (93.01%) of the respondents said that extension teaching methods used by the extension field staff were farm visit. Less than half (45.56%) of the respondents said that extension field staff did not use audio video cassette as extension teaching method. Majority (91.11%) of the respondents said that extension field staff used pamphlets for teaching method. Farmers (84.44%)also responded that group meetings has been done by private agriculture workers on regular basis. Radio still has the most common source of information for rural people in the remote areas of Pakistan. Farmers (87.77%) responded that agriculture department publish information regarding cotton management but due to lack of education they can't read these information. A local responded that " I can't read and write but when I see the practical demonstration of different agricultural technologies I can easily implement these in my field. He further suggested that these kinds of activities should be on regular basis".
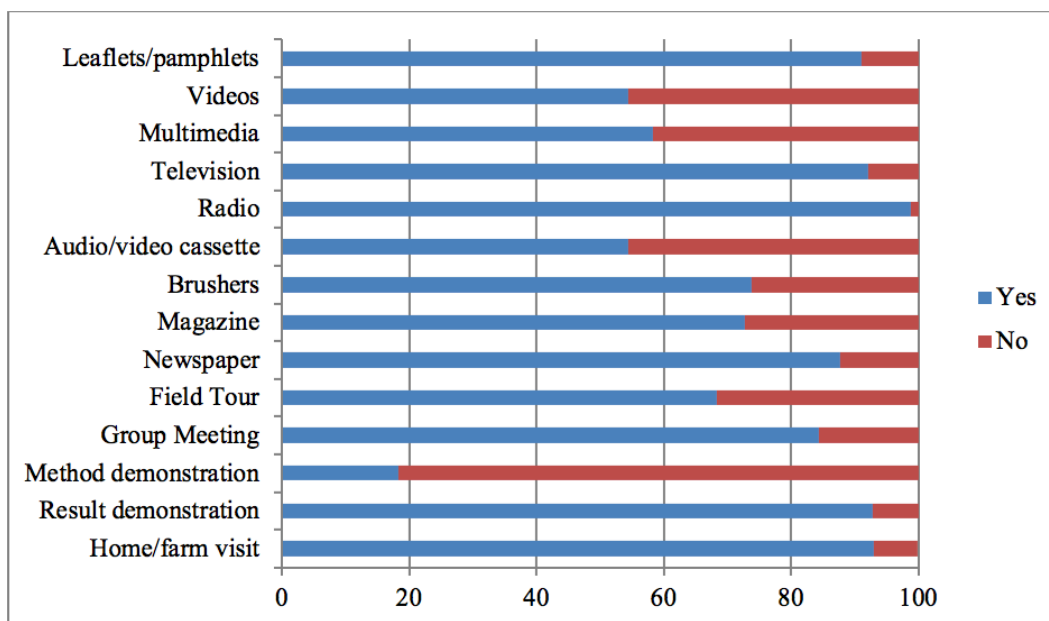
Figure 3. Teaching methods performed by agricultural staff

Ranking order of teaching methods according to their effectiveness

As data in figure 4 shows the ranking order of the teaching methods according to their effectiveness. Results shows that radio stood first as most effective source of information for farmers with weighted score of 432 and mean value of n=4.32. In this modern era people believes what they see information provided through television found be effective and stood 2nd in

the table with weighted score of 389 and mean value of 3.89. A local responded that "I can't read and write but when I see the practical demonstration on television of different agricultural technologies I can easily implement these in my field. He further suggested that these kinds of activities should be on regular basis". Newspaper, leaflets, field tour stood 4th, 5th and 3rd respectively in the ranking table.

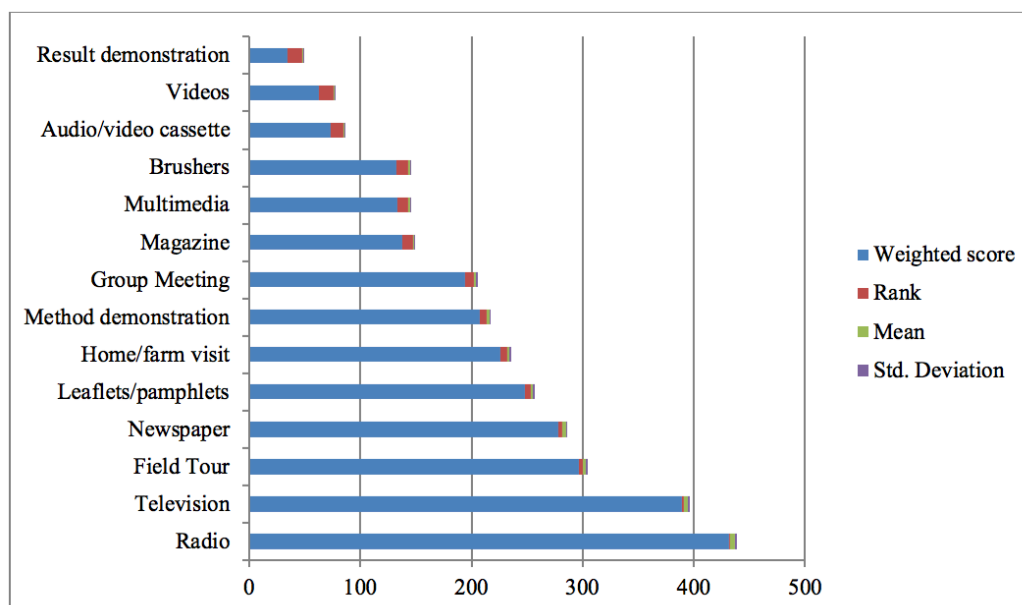
Figure 4. Ranking order of effective methods used in providing services

The ranking order of different agricultural practices given by the agricultural field staff

The table 1 shows that 42.22% of the respondent stated that training and information regarding agronomic practices related to Time of sowings are good and they are getting benefits to some extent in their overall productivity. The given data reported that practices about fertilizer application were rated Satisfactory by 58.8% of the respondent and practices

about the selection of varieties rated poor by 2.22% of the respondent and other practices are also satisfactory to some extent and practices regarding Thining and gap-filling fell in between satisfactory and good categories but shows its tendency towards good category (mean = 3.49). Information and training regarding land preparation rated fair by 47.77 percent of the respondents.

Table 1.Agronomic practices suggested by Agricultural field staff

Agronomic Practices	Poor	Fair	Satisfactory	Good	Excellent	
	%	%	%	%	%	Mean
Time of sowing	2.22	-	35.55	42.22	20	3.77
Thinning and gap filling	3.33	25.55	15	30.55	25.55	3.49
Seed rate and spacing	-	9.44	45	41.66	3.89	3.4
Picking and harvesting	11.66	-	47.77	22.77	17.77	3.46
Fertilizer application	9.44	-	58.88	13.88	17.77	3.4
Selection of variety	2.22	35	26.11	6.66	30	3.27
Irrigation	1.11	23.88	28.88	40.55	5.55	3.25
Weeding and inter culturing	14.44	5.55	37.22	38.33	4.44	3.12
Land preparation	-	47.77	40	12.22	-	2.64

Source: Own calculation through interview

The ranking order of agronomic practices given by the agricultural field staff

The Figure 5 shows that the time of sowing and thinning and gap-filling stood first and second in the ranked order with a weighted score of 378 and 349 respectively. Time of sowing fell in between satisfactory and good category but shows its tendency towards good category (mean= 3.77). Fertilizer application stood 5th in the ranked order with a weighted score of 331. Fertilizer application fell in between good and satisfactory categories but show it trends towards satisfactory category (mean=3.40). land preparation stood 9th in the ranked order with weighted score of 264.
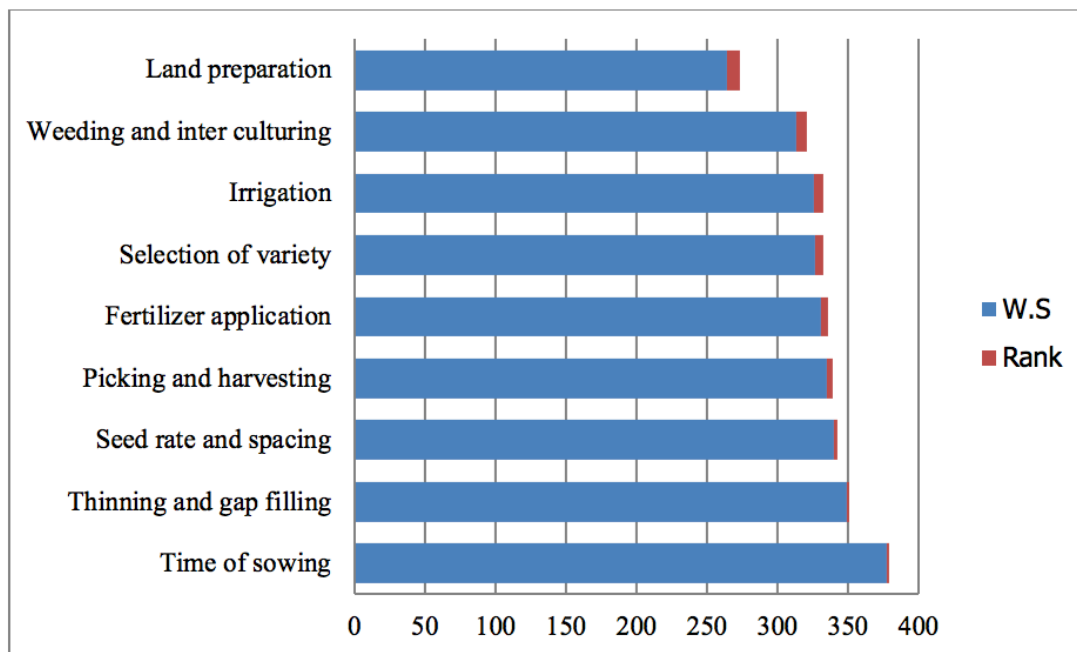
Figure 5. Ranking order of agronomic practiced adapted suggested by

Quality of knowledge transferred by agricultural field staff

As figure 6 shows that 55.5% of the respondent rated the quality of knowledge transferred by EFS as Satisfactory while 30.55% of the respondents rated the quality of knowledge fair and 5% of the respondent rated the quality of knowledge Excellent while 2.22% rated poor.

Figure 6. Farmer's response about quality of perceived knowledge

The role of agricultural field staff in providing information regarding best crop management practices

Berdegue and Escobar (2002) have stated that the efficient supply and use of agricultural extension services have direct and indirect effects on reducing rural poverty. They believe that the direct impact of technological innovation on poverty reduction is the cumulative benefit of farmers who have implemented t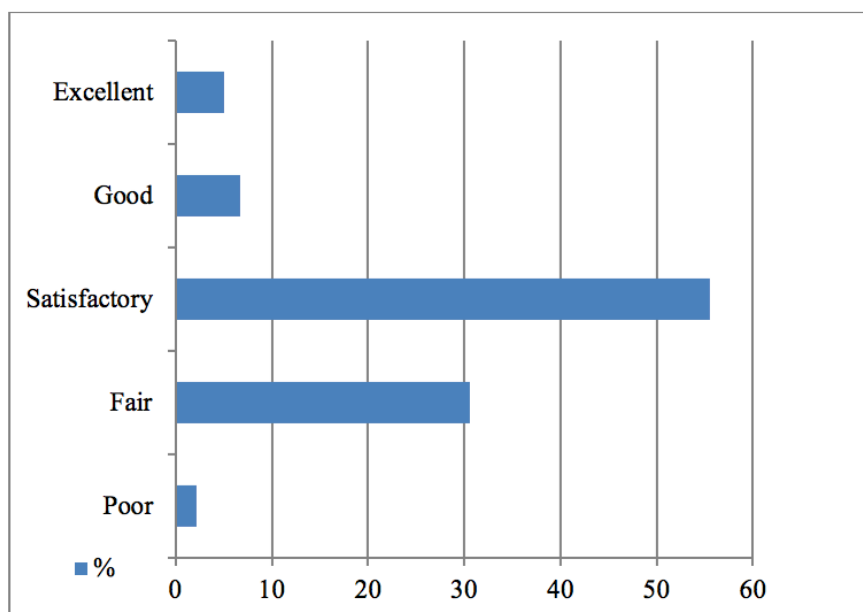he changes. Table 2 shows that the practices about soil management regarding the seedbed preparation rated poor by 17.22% of the respondent and practices about furrows management rated good by 58.8% of the respondent and 11.6% Satisfactory about ridges table also reveals that information provided by agricultural field staff about fertilizer management Di Ammonium Phosphate rated Satisfactory by 51.11% of the respondent and FYM rated 23.33% Excellent by the respondent. Surface Irrigation rated good by 40% of the

respondent and furrows irrigation rated poorly by 2.22% of the respondent.

IPM practices suggested by agricultural field staff

It is estimated that about 10% of synthetic pesticides and 20–25% of insecticides are used every year in cotton farming. Developing countries use about 50% of the total (EPA, 2002). The frequent and improper use of pesticides has led to the development of insect resistance and pest outbreaks in cotton. (Kranthi et al., 2002).

Cultural practices

The results show that in cultural practices information provider by agricultural field staff about resistant varieties is rated fair by 51.11 % of the respondent and rated Excellent by 6.11% of the respondent while about Earthling up 46.6 % of the respondent rated Satisfactory and about thinning 35.6% is poor.

Table 2. Information regarding best crop management practices

Production management practices	Poor	Fair	Satisfactory (%)	Good	Excellent	Mean
Soil management						2.07
Seedbed preparation	17.22	62.22	16.67	3.88		3.62
Ridges	3.33	5.56	48.89	9.44	32.78	3.43
Furrows	2.22	21.67	11.67	58.88	5.56	3.42
Fertilizer management						
Nitrogen phosphorus potassium	1.11	22.78	35.56	13.88	26.67	2.81
Di Ammonium phosphate	1.67	35	51.11	4.44	7.78	3.12
Farm yard manure	1.11	36.67	29.44	9.44	23.33	3.31
Irrigation management						2.9
Surface irrigation		18.33	36.67	40	5	2.68
Furrows irrigation	2.22	20	68.33	3.88	5.56	3.65
Cultural practices						
Resistant varieties		51.67	33.89	8.33	6.11	3.74
Rotating annual plants	1.11	14.44	25	37.22	22.22	3.19
Intercropping	1.11	4.44	40	27.77	26.66	2.3
Earthling up	1.67	23.89	46.67	8.88	18.88	3.56
Thinning	35.56	18.89	29.44	12.22	3.88	3.46
Hoeing	2.78	8.89	45	15.55	27.77	2.82
Physical practices						
Hand picking	2.22	18.89	32.22	23.88	22.77	2.86
Pruning		39.44	48.33	2.77	9.44	3.33
Mulching	2.78	33.89	40.56	19.44	3.33	2.51
Trapping	17.78	3.33	15	55	8.88	2.94
Biological practice						
Beneficial insect	25.56	25.56	31.67	6.11	11.11	3.38
Microorganisms	2.78	41.67	17.22	35	3.33	3.12
Parasitic nematodes	8.33	6.11	41.11	27.77	16.66	3
Chemical Practices						
Insecticidal soap	6.11	26.11	23.89	36.67	7.22	2.66
Horticultural oils	7.78	26.67	25	38.88	1.66	3.67
Botanical insecticides	16.67	20.56	50	5.55	7.22	3.48
Inorganic fungicides	3.33	7.22	23.88	49.44	16.11	2.8
Inorganic insecticides	3.33	3.33	57.77	12.22	23.33	3.42

Source: Own calculation through the interview

Physical practices

The results show that in physical practices information related to handpicking is rated fair by 18.9% of the respondent and poor by 2.2% of the respondent while information regarding mulching is rated satisfactory by 40.6% of the respondent and about trapping by 3.3% of the respondent rated fair.

Biological practice

The results show that information regarding biological practices delivered by agricultural field staff about Microorganisms rated Excellent by 3.3% of the respondent. Beneficial insect regarding information were rated poor and fair by 25.6% of the respondent

Chemical Practices.

In Chemical practices information spread by agricultural field staff about Horticultural oils is rated poor by 7.78% of the respondent and inorganic fungicides rated good by 49.44% of the respondents.

Impact of improved cotton crop management practices

Table 3 shows that most (63.88%) of the respondents reported that skill factors were good and respondents were satisfied with the skill practices. A few (8.88%) of the respondents said that the impact of improved cotton crop management practices on health was excellent. More than one-fifth (23.88%) of the respondents said that the impact of the improved cotton crop on the environment was very poor.

Table 3. Impact of improved cotton crop management practices

	Poor	Fair	Satisfactory (%)	Good	Excellent	Mean	Std. Deviation
Skill	1.66	18.33	16.11	63.88		3.42	0.84
Management	1.11	12.77	52.77	28.33	5	3.23	0.77
Finance	2.22	5	65	25	2.77	3.21	0.67
Production	5	29.44	52.22	7.22	6.11	2.8	0.88
Health	21.66	5.55	52.77	11.11	8.88	2.8	1.16
Environment	23.88	61.66	8.33	2.77	3.33	2	0.85

Source: Own calculation through the interview

Conclusions and Recommendations

Cotton is an important crop in the southern part of Punjab, but according to recent studies, its production is decreasing in the areas of Pakistan. Different factors are responsible for the decrease in cotton production, the most important factor is climate change and lack of the latest knowledge and skills in cotton management. The present study is conducted to evaluate the quality of Knowledge transferred by the agriculture field staff to the cotton growers and their impact on rural development. The study found that farmers need training in their field activities with the help of the Department of Agricultural Extension through which they can increase their production and quality of life. The availability of modern technology and effective skills are two essential conditions for productivity. There is considerable dissatisfaction in agriculture and related communities regarding the performance of extension services.

Based on the findings it is recommended that the government, in cooperation with all stakeholders, conduct regular training programs for farmers and agricultural workers about good agricultural practices (GAP) of cotton and ensure timely access to information on modern agriculture to improve the quality of cotton growers. Also, it is recommended to implement an effective system for monitoring and evaluating agricultural workers' performance and management practices about cotton crops for the betterment of the agriculture sector of Pakistan.

Compliance with Ethical Standards
Conflict of interest
The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution
The contribution of the authors to the present study is equal. All the authors read and approved the final manuscript. All the authors verify that the Text, Figures, and Tables are original and that they have not been published before.
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Data availability
Not applicable.
Consent for publication
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