



ASSESSMENT OF ADOPTION OF RECOMMENDED COTTON PRODUCTION TECHNOLOGIES AMONG FARMERS OF IRRIGATED PUNJAB

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ABSTRACT

Besides low prices of cotton nationally and internationally non adoption of recommended technologies of cotton production is also a limiting factor in cotton production. The present study was conducted at Social Sciences Research Institute (PARC) AARI, Campus, Faisalabad, Pakistan during the year 2014 to assess the awareness and adoption of recommended cotton production technologies in two districts i.e. Jhang and Khanewal. A total of 80 cotton growers were interviewed arbitrarily from the selected districts. The data were analysed using descriptive statistics involving frequencies, percentages and P value. The study concluded that awareness level of some production technologies like tillage, selection of varieties, time of sowing, seed rate, seed treatment, thinning and weed control was high as compared to other technologies like fertilizer application, irrigations, insect pest management and picking. It was concluded that high level of awareness leads to higher adoption of that particular production practice. Agriculture Department was found to be the major source of dissemination of cotton production technologies. It is suggested that modern methods of communication like internet, mobile and videos should be effectively used for dissemination of agricultural technologies to increase cotton production.

KEYWORDS: Cotton; *Gossypium hirsutum*; recommended technologies; farmers; awareness; adoption; Pakistan.

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INTRODUCTION

Cotton is an important commercial crop widely grown in Pakistan. It plays a significant role in foreign exchange earning of the country. It is an important source of raw material for textile industry. Besides fibre, cotton seed is also used in oil industry. Cotton being a non food cash crop accounts for 6.7 percent of value added in agriculture and about 1.4 percent to GDP. Cotton crop was cultivated on 2806 thousand hectares having production of 12.8 million bales during 2013-14 (GOP, 2014).

Non-adoption of recommended cotton production technologies developed through research system is a restrictive factor in cotton productivity and ultimately in total production. To achieve higher level of productivity, knowledge and adoption of recommended crop production technologies is important. The scientists working at various research institutes are generating improved cotton production technologies for higher production of crops (Abbas *et al.*, 2003; Sheikh *et al.*, 2006) .

Ample literature is available discussing and

assessing the adoption of crop production technologies. Abbas *et al.* (2003) concluded that majority of large farmers (53-85%) were aware of recommended sugarcane production technologies. Their adoption rate was also high among all farm size groups. Moreover, greater number of large farmers got information about sugarcane recommended production technologies from agriculture department than other farm size groups. Maraddi and Verma (2003) examined the adoption of cotton production technologies in Karnateka, India. The study revealed that majority of the farmers (95%) had medium to low adoption level of cotton production technologies. Further, they found that mass media exposure had positive and significant association with the adoption of cotton production technologies.

Mahmood *et al.* (2006) analysed the adoption of wheat production technologies in the Punjab, Pakistan. They findings of their study revealed that some production technologies like field preparation, varieties, irrigation and weed control were well adopted sowing time, sowing method, seed rate and fertilizer application were not well

adopted. Moreover, it was found that main source of information about recommended production technologies were fellow farmers followed by extension department. They suggested that mass media is critical for wider adoption of crop production technologies.

Sheikh *et al.* (2006) examined the adoption of rice technological package by the farmers of rice-wheat area in Punjab, Pakistan. Their empirical results showed that majority of the respondents was aware of rice production technologies. The rice production technologies like fertilizer application, seed treatment, use of weedicides and pesticides were partially adopted. They suggested that training of trainers, establishment of information exchange forum, authentication of recommended production technologies and mass media had always been recognized as important tools in dissemination and adoption of agricultural production technologies.

In an extensive study (Mustapha *et al.* 2012) adoption of improved rice production technologies was investigated in Nigeria. They found that majority of the respondents about 56.25 percent were aware of rice production technologies. Likewise, majority of the respondents applied rice production technologies with respect to improved varieties, use of weedicides and harvesting technique. Yadave *et al.* (2012) analyzed the awareness about cotton production technology of tribal farmers in India. They estimated that a large number of respondents fall in high category with respect to adoption of field preparation, method of sowing and time sowing practices.

Khalil *et al.* (2014) conducted a study with the overall objective to determine the extent of adoption of improved potato production technologies in some selected areas of Bangladesh. They found that majority of the respondents had high adoption of potato recommended varieties (74.9%), sowing time (86.1%) while medium adoption of quality potato seed (56.3%), balanced fertilizer doze (45%), fertilizer application method (72.9%), plant protection measures (74%) and low adoption of seed size (49.8%) and spacing (55.8%). The study revealed that improved adoption of recommended potato production technologies correlated with

higher level of education, farm size, annual income and contact with sources of information. Knowledge and skill about these technologies must be disseminated among the end users in a more efficient and effective way. This will lead to their wider adoption and higher production of the crop.

In view of above, the overall objective of present study was to assess the awareness and adoption of recommended cotton production technologies in the Punjab with following goods:-

- To investigate the role of socioeconomic attributes of farmers in the adoption of recommended cotton production technologies.
- To suggest measures for improving the adoption of recommended cotton production technologies among the farmers of the Punjab.

METHODOLOGY

This study was conducted at Social Sciences Research Institute (PARC), AARI Campus, Faisalabad, Pakistan during the year 2014. The study was confined to district Jhang and Khanewal of the Punjab province as there was no such work was previously undertaken in these districts. The information on different aspects of cotton production was gathered. For this purpose, a document "Cotton Production Technologies" published by the Agricultural Department, Government of the Punjab was considered as reference for standard technological package for cotton production. A questionnaire was designed with the help of primary and secondary sources of information about cotton production. This questionnaire was pretested before formal survey. A total of 80 cotton growers were interviewed through arbitrarily from the selected districts. The distribution of respondents is further explained in Table 1.

Table 1. Distribution of sampled respondents (Number).

Districts	Farm size categories		All
	Small (≤20 acres)	Large (>20 acres)	
Jhang	25 (44.6)	15 (19.7)	40
Khanewal	31 (55.4)	9 (11.8)	40
All	56 (70.0)	24 (30.0)	80

The collected data were edited, entered and analysed using SPSS software. The respondents were divided into two main categories i.e. small

farmers with operational land holding less than or equal to 20 acres and large farmers with operational land holding more than 20 acres of land. This categorization of farmers was done to make logical findings and inferences from survey. The data were analysed using descriptive statistics involving frequencies, percentages and P value.

RESULTS AND DISCUSSION

Socio-economic characteristics of cotton growers

Farmer's personal characteristics play an important role in the adoption of agricultural technologies.

These include age, education, farming experience, tenancy status and involvement in farming. The survey results revealed that average age of respondents on overall basis was about 45 years (Table 2). There was no difference in age across farm size categories. The respondents were quite experienced and had about 17 years of farming experience on overall basis. Similarly their education level was about 8 years of education. Majority of the respondents, (about 51%) on overall basis fall in the category of owner cum tenant (Table 2). The average operational land holding of respondents was about 17 acres.

Table 2. Socioeconomic characteristics of cotton growers.

Characteristics	Farm size categories		All	P value
	Small	Large		
	Years			
Age	45.5	45.8	45.6	0.01 ^a
Education	7.1	8.7	7.5	4.30 ^c
Farming experience	19.0	19.5	19.1	0.03 ^a
Tenancy status	Percent			
Owner	46.4	41.7	45.0	0.42 ^c
Tenant	5.4	-	3.8	
Owner cum tenant	48.2	58.3	51.3	
Operational land holding	Acres			
Land holding	13.1	27.0	17.3	0.00 ^b

^a Significant at 5 percent level, ^b Significant at 1 percent level, ^c Insignificant

Awareness and adoption of recommended cotton production technologies

Recommended cotton production technologies involve recommended use of inputs like seed, fertilizer, pesticides, etc and production practices like land preparation, sowing time and method, fertilizer application time and method, etc. In this connection, 11 recommended cotton production technologies were taken as reference. These include land preparation, improved varieties, time of sowing, seed rate, seed treatment, thinning, weed control, fertilizer application, irrigation, insect pest management and picking. The farmers practices were assessed in the light of recommended practices and gap identified.

In the study area, farmers were inquired about land preparation practices and it was found that majority of the respondents about 79% were aware about recommended cotton land preparation practices (Table 3). Similarly, about 78% of the respondents were aware of improved cotton varieties on overall basis. The survey results indicated that about 86% of the respondents were aware of recommended

time of sowing. There was significant difference in awareness level of sowing time among the small and large farmers. The awareness about recommended cotton practices of seed rate, seed treatment and thinning was about 79, 76 and 82% of total number of respondents, respectively. Knowledge about recommended practices of weed control, fertilizer application, irrigation, insect pest management and picking was about 82, 61, 66, 68 and 56% of the total farmers, respectively (Table 3).

Awareness about recommended production technologies is necessary but not sufficient condition for adoption of technologies. Among other factors, the adoption of technologies also depends on the educational status and socioeconomics condition of the farmers.

Land preparation is the first and foremost activity involved in cotton production. About 60% of the respondents on overall basis performed the tillage operation as per recommendations of the agricultural department (Table 4).

Table 3. Awareness about recommended cotton production technologies of sampled respondents.

Production technologies	Farm size groups		All	P value
	Small	Large		
	Percent			
Land preparation	78.6	79.2	78.8	0.60 ^c
Improved varieties	73.2	87.5	77.5	0.13 ^c
Time of sowing	80.4	100	86.3	0.01 ^a
Seed rate	73.2	91.7	78.8	0.05 ^b
Seed treatment	71.4	87.5	76.3	0.10 ^c
Thinning	78.6	91.7	82.5	0.13 ^c
Weed control	82.1	83.3	82.5	0.58 ^c
Fertilizer application	58.9	66.7	61.3	0.34 ^c
Irrigation	64.3	70.8	66.3	0.38 ^c
Insect pest management	66.1	75.0	68.8	0.30 ^c
Picking	50.0	70.8	56.3	0.06 ^b

^a Significant at 5 percent level, ^b Significant at 10 percent level, ^c Insignificant

Table 4. Adoption level (%) about recommended cotton production technologies by the sampled respondents.

Production technologies	Farm size groups		All	P value
	Small	Large		
	Percent			
Land preparation	58.9	62.5	60.0	0.48 ^c
Improved varieties	69.6	79.2	72.5	0.27 ^c
Time of sowing	75.0	91.7	80.0	0.07 ^b
Seed rate	60.7	83.3	67.5	0.04 ^a
Seed treatment	66.1	75.0	68.8	0.30 ^c
Thinning	57.1	66.7	60.0	0.29 ^c
Weed control	73.2	75.0	73.8	0.55 ^c
Fertilizer application	35.7	41.7	37.0	0.39 ^c
Irrigation management	57.1	62.5	58.8	0.42 ^c
Insect pest management	55.4	58.3	56.3	0.50 ^c
Picking	41.1	54.2	45.0	0.20 ^c

^a Significant at 5 percent level, ^b Significant at 10 percent level, ^c Insignificant

The adoption of land preparation practices was higher (62.5%) among the large farmers as compared to small farmers (59%). Choice of variety is important for higher crop yield. Generally farmers desire to cultivate that varieties which can increase their yield. About 72% of the respondents on overall basis adopted recommended cotton varieties in study area (Table 4). The survey results showed that on overall basis 80% of the cotton growers sown their crop in time. The adoption of timely sowing practice was higher in large farmers (91.7%) than small farmers (75%). The recommended seed rate for cotton production is 6-8 kg per acre. The results showed that about 67.5% of the farmers applied seed rate as per departmental recommendations (Table 4). There was significant difference in the adoption of seed rate among the farm size categories. The agricultural experts recommend seed treatment to control insect pest and diseases before sowing of crop. About 69% of the respondents on overall basis adopted recommended seed treatment

practice. Thinning is an important activity to get appropriate number of plants in cotton field. About 60% of the respondents on overall basis adopted thinning practice as suggested by the agricultural experts. This production practice adoption rate was higher in large farmers than small farmers.

Weed control is important to get better yield of the crop. The survey results indicated that about 74% of the respondents on overall basis adopted weed control practice as per recommendations of the department. Fertilizer plays vital role in the productivity of any crop. The dose of fertilizer, time and method of application are very important aspects in crop production. It was found that only 37% of the total respondents applied fertilizer in line with the recommendations of department. Cotton crop require about 10-12 irrigations during the crop season. About 59% of the respondents applied irrigations in accordance with the departmental recommendations.

Insect pest management is very important in cotton crop and involve high expenditures. About 56% of the respondents adopted insect pest management practice as per recommendations of the department. About 45% of the total farmers adopted picking practice as per recommendations of the department. The adoption rate of this practice is high in large farmers than small farmers.

Sources of information of recommended cotton production technologies

There are different sources of dissemination of technologies like Agricultural Extension department, mass media, input dealers, etc. On overall basis, about 53% of the respondents got information about recommended cotton production technologies from agriculture department. This is followed by fellow farmers (21.3%), input dealers (17.5%) and mass media (5%) (Table 5).

Table 5. Sources of information of recommended cotton production technologies of sampled respondents.

Sources of information	Farm size groups		All	P value
	Small	Large		
	Percent			
Agriculture department	53.6	50.0	52.5	0.93 ^{NS}
Fellow farmers	21.4	20.8	21.3	
Input dealers	17.9	16.7	17.5	
Mass media	3.6	8.3	5.0	
Other	3.6	4.2	3.8	

CONCLUSION AND RECOMMENDATIONS

The study concludes that awareness level of some production technologies like tillage, selection of varieties, time of sowing, seed rate, seed treatment, thinning and weed control is high as compared to other technologies like fertilizer application, irrigations, insect pest arrangement and picking. It is also concluded that high level of awareness leads to higher adoption of that particular production practice. Agriculture Department is found to be the major source of dissemination of cotton production technologies.

First step in the adoption of technologies is to create awareness of those technologies. Therefore, awareness level of the cotton production technologies viz; fertilizer application, irrigation management, insect pest management and picking needs to be improved in the light of study findings.

Once the awareness level is improved, their adoption ultimately will increase. In case of production technologies like fertilizer application, irrigation management, insect pest management and picking where the adoption level is low, it is suggested that availability of these inputs (fertilizer, and pesticides) at affordable prices should be ensured for better adoption of these practices.

It is also suggested that farmers should be educated in an effective way regarding the

recommended cotton production technologies. In this connection, the modern methods of communication like internet, mobile and videos should be used for creating awareness of recommended cotton production technologies among the farming community. The message developed and delivered through various agencies should be clear and uniform. It is also suggested that area specific recommendations should be developed and disseminated instead of general recommendations for the whole province.

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CONTRIBUTION OF AUTHORS

M. Ather Mahmood	Conceived the idea, entered and analyzed data through SPSS
Mazher Abbas	Collected the data
Arshed Bashir	Prepared write-up
Muhammad Qasim	Helped in results and discussion