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FARMERS' PERCEPTION REGARDING THE QUALITY OF COTTON SEED IN THE COTTON BELT OF THE PUNJAB, PAKISTAN.

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Abstract
In Pakistan, a significant portion of the population is connected to agriculture, either directly or indirectly, since it serves as the foundation of the nation's economy. The overall efficiency of the agricultural industry, particularly in cotton production, relies on high-quality seeds. It is essential to examine the cotton grower's perspective on the quality, availability, and planting methods of cotton seed. The present research aimed to ascertain the parameters influencing the quality of cotton seed as evaluated by cotton cultivators. The research locale of the present investigation was the cotton region of Punjab. Two districts were deliberately chosen based on their per acre cotton yield among the eleven districts within the Punjab cotton belt. A sample size of 384 participants was determined with the sample size calculator. Data were gathered via a well-organized interview. 69.3% of the participants said that there is no concern about quality. Seventy-nine-point four percent of the participants said that the seed they acquired is consistent. 69.8% of participants said that their seed had genetic purity. It is recommended that appropriate checks are being established to check the quality of the seed.

INTRODUCTION

Pakistan is the fifth biggest producer of cotton in the world, behind China, India, the United States, and Brazil. Furthermore, it has the status of the fifth-largest cotton exporter, trailing after China, Bangladesh, Vietnam, and Turkey. Cotton is considered a vital cash crop in Pakistan, benefiting both rural populations and the national economy as a whole (Khalid et al., 2022). Numerous factors affect cotton yield in Pakistan, such as inadequate quality seeds, insufficient inputs (e.g., fertilizers, pesticides, water supply, agricultural gear), and farmers' ignorance of contemporary technology. Insect infestations and seed quality are the main elements that diminish cotton yield globally. The primary hindrance in cotton cultivation is the scarcity of superior seed (Ali and Khan, 2007). The grade of locally sourced seeds used by farmers is subpar owing to insufficient storage amenities. The use of these tainted and inferior seeds results in lower germination rates and decreased plant resilience to diseases and insect attacks (Ali et al., 2015). Unofficial seeds are often disseminated in brown packaging by several leading organizations within the seed industry, such as seed companies and agricultural supply retailers. Consequently, there exists less proof or certainty about the quality or provenance of the seed. Certain governmental

entities and research institutes also disseminate unaccredited seeds of unregistered varieties into the marketplace (Ali et al., 2015). The total lack of a framework for official endorsement leads to the unofficial transfer of seed innovations, which severely compromises seed quality and eventually impacts farmers' interests (Malik and Ahsan, 2016: Abdullah, 2010). The dissemination of inferior cotton seeds leads to diminished cotton yields, adversely affecting the overall resilience of the cotton crop and negatively impacting farmers' adoption rates as well (Ali et al., 2010). The primary function of Agriculture Departments (Extension) is to disseminate information for improved agricultural methods, with the goal of attaining increased crop production and yield. This is accomplished by informing farmers about innovative technologies and enhanced resources, while motivating them to embrace these developments. The predominant portion of cotton seed is generated and provided by the informal sector to small-scale farmers, while authorities from the Agriculture Department (Extension) and the commercial sector engage with farmers about seed knowledge (Shahbaz and Ata, 2014). A little reduction in seed purity results in a significant decline in crop output, adversely impacting the farmer's interests (Rana, 2010). There exists little information or certainty about the quality or provenance of the seed (Ali et al., 2015). It is essential to ascertain the farmers' perception of seed quality.

Objectives:

1.To explore the demographic characteristics of the respondents.
2.To find out the perception of the respondents regarding the quality of cotton seed.

Review of literature

Jafri et al. (2022) said that improved cultivars serve as a potent method to increase agricultural production, emphasizing that both seed quality and quantity are crucial for boosting agricultural output. The widespread use of unverified seeds and farmers' apathy might result in the complete neglect of the seed certification system.

Afzal et al. (2020) observed that cotton seed plays a crucial role in the vegetable oil, protein, and textile industries. The quality of cottonseed is somewhat neglected, since cotton cultivators mostly concentrate on fiber output and its quality. Edmisten and Collins (2024) concluded that seed batches with elevated germination rates and vigor potential are categorized as premium cotton seeds. Standard germination, a measure of a seed's capacity to produce a typical, vigorous seedling under ideal circumstances, is a concept familiar to most cultivators.

Geng et al. (2024) posited that the market worth of cotton is dependent on the proportion of lint present in the cotton, a crucial element influencing both the cost and quality of seed cotton. Moreover, the fiber and seeds of cotton have considerable economic importance.

Du et al. (2023) argued that the widespread use of digital single-hole, single-seed precision planting technology across China has resulted in heightened attention to cotton seed quality.

Kedisso et al. (2023) said that farmers often get their seeds from ginners or local seed processors that do not use certified, pre-basic, or basic seed. Several private seed enterprises generate second-generation seeds in very restricted amounts.

Tursunovich et al. (2023) contended that the size and shape of seeds have paramount importance. In the majority of research, seeds are shown as spherical, while they really take on an ellipsoidal shape; yet, the two configurations display minor distinctions, being more rounded at the chalaza and narrowing near the micropyle.

Methodology

Selection of study area:

This research was carried out in the cotton region of Punjab. Punjab consists of 41 administrative divisions. Two districts were chosen based on the cotton yield per acre. These regions encompass Vehari due to its superior per acre yield and Dera Ghazi Khan owing to its minimal per acre cotton output, as per the crop reporting service, 2023. A total of 384 participants were chosen by simple random selection. The 384 participants have been split into two equal groups. Data was gathered from 192 participants in district Vehari, while an

additional 192 respondents were interviewed from district Dera Ghazi Khan.

Validity and reliability of the research instrument

The validity of a tool relates to its capacity to accurately measure the specific construct or trait it aims to examine. The interview timetable was meticulously examined to enhance its efficacy and guaranty its authenticity. The study instrument was assessed by specialists from the Institute of Agricultural Extension, Education, and Rural Development, together with the Department of Agronomy at the University of Agriculture, Faisalabad. The research tool's reliability was assessed by calculating the Cronbach's alpha coefficient using SPSS (Statistical Package for Social Sciences). The total reliability coefficient for the assessment instrument was 0.83.

Data collection and statistical analysis:

The data were analyzed with the help of Statistical Package for Social Science (SPSS)

1. Demography

1.1 Age

The demographic factor of age significantly impacts farmers' perceptions and adoption of modern agricultural technology.

Table 1.1: Farmers' distribution based on their age

Age	f	%
Below 25	13	3.4
25-45	211	54.9
Above 45	160	41.7
Total	384	100.0

The information shown in table 1.1 indicates that respondents in the medium age bracket (25 to 45 years) constituted a significant majority at 54.9%, followed by older individuals (above 45 years) at 41.7%.

1.2 Education

Education has a crucial role in enhancing farmers' comprehension, access to information, use of technical innovations, and other facets associated with technological advancement.

Table 1.2: Farmers' distribution based on their education

Education	f	%
Illiterate (having no education)	64	16.7
Below Matric	123	32.0
Matric – Graduation	169	44.0
Above Graduation	28	7.3
Total	384	100.0

The data specified in table 1.2 shows that a small percentage (7.3%) of the respondents were above graduation. Less than half (44.0%) of the respondents were in between the matric and graduation. Thirty-two percent were below matric and (16.7%) of the respondents were illiterate.

1.3 Landholdings

Land tenure is another factor that influences the perspectives and involvement of the farming community in diverse agricultural practices. A larger agricultural area facilitates the adoption of diverse farming methodologies, including many cropping systems that would not be feasible on a smaller farm.

1.3: Farmers' distribution regarding their land

Landholding of the farmers (acre)	f	%
Below 10	129	33.6
10-20	162	42.2
Above 20	93	24.2
Total	384	100.0

Table 1.3 reveals that around 42.2% of participants had a farm area ranging from 10 to 20 acres. Approximately one third (33.6%) of the participants had a farm area of less than 10 acres. Approximately 24.2% of the participants said that their farm size exceeded 20 acres.

1.4 Area under cotton cultivation

Table 1.4: farmers' distribution regarding area under cotton cultivation

Area under cultivation in acres	f	%
Below 10	226	58.9
10-20	141	36.7
Above 20	17	4.4
Total	384	100.0

The figures presented in Table 1.4 reveal that a significant proportion (58.9%) of participants had fewer than 10 acres of land dedicated to cotton farming. Over one third (36.7%) of the participants cultivated cotton on 10-20 acres. A scant proportion (4.4%) of the participants were engaged in cotton cultivation on more than 20 acres.

2. Quality of the seed

The quality of seeds is a crucial factor to investigate in this research, since understanding the condition of seeds is essential for accurately determining the reasons behind the decrease in cotton yield.

2.1 Issues related to the quality of seed

The term seed quality pertains to the seed's purity and its effective propagation. It is crucial to ascertain if farmers have any problems with the quality of their seeds, since this directly impacts their productivity and livelihood.

Table 2.1: Issues faced by the farmers related to the quality of seed purchased in the last two years by them

Do you have you encountered any issue related to the quality of cotton seeds, purchased by you in the last two year	f	%
Yes	118	30.7
No	266	69.3
Total	384	100.0

The information shown in table 2.1 indicates that 30.7% encountered issues with the quality of cotton seeds obtained during the last two years, while 69.3% did not express any such worries. This suggests that most farmers were mostly satisfied with the seed quality.

2.2 Seeds physical purity

Physical purity refers to the observable characteristics that may be readily monitored via visual assessment. These are the discernible qualitative characteristics, such as seed morphology, dimensions, hue, and more attributes. It is also evident that there is

contamination from other seeds or the presence of weed seeds, among others.

Table 2.2: Farmers' distribution based on the physical purity of the seed purchased by them

Sr. #	Question	Yes		No		Total	
		f	%	f	%	f	%
i	Seed purchased by you was uniform	305	79.4	79	20.6	384	100.0
ii	The shape of the seed purchased by you was uniform	300	78.1	84	21.9	384	100.0
iii	Seed size of the seed purchased by you was uniform	270	70.3	114	29.7	384	100.0
iv	Seed purchased by you was weed free and did not carry any seed of the weed in it	210	54.7	174	45.3	384	100.0

The information presented in table 2.2 reveals that 79.4% of farmers reported the bought seed as uniform, whilst 78.1% observed the seed shape to be uniform. About 70.3% noted that the seed size was uniform. Merely 54.7% of farmers said that the seed was completely free of weed seeds, while 45.3% experienced the presence of weed seeds in the purchased seed lots.

2.3. Seeds Genetic Purity

Genetic integrity specifically denotes the genetic composition of the seed, which is characterized by its genetic integrity, robust vigor, effective germination, absence of contaminants, and lack of virus incorporation. In relation to the farmers, they are very specialized phrases, hence the inquiry about tagged seed is also included.

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Table 2.3: Farmers' distribution regarding the seeds' genetic purity regarding the seed they had purchased

Sr. #	Question	Yes		No		Total	
		f	%	f	%	f	%
i	Seed purchased by them was genetically pure, and bag was carrying same variety of the seed as told or mentioned	268	69.8	116	30.2	384	100.0
ii	Was any mixing of other varieties in the seed purchased	120	31.3	264	68.8	384	100.0
iii	Seed was properly tagged and fulfilled all the certified requirements	248	64.6	136	35.4	384	100.0
iv	Was the seed vigor good	271	70.6	113	29.4	384	100.0
v	Was the seed sprouting good	303	78.9	81	21.1	384	100.0
vi	Vas the seed free from viral contamination i.e. CLCV	247	64.3	137	35.7	384	100.0

The information shown in table 2.3 indicates that 69.8% of farmers said that the cotton seed they received was genetically untainted and matched the variety indicated on the lot, whilst 30.2% disagreed. Regarding physical blending, 31.3% of farmers reported the occurrence of other varieties mingled with their seed, whilst 68.8% did not. Concerning certification, 64.6% confirmed that their seed was suitably labeled and certified, while 35.4% said it was not. A notable fraction of farmers (70.6%) described their seed as exhibiting strong vigor, although an even larger segment

(78.9%) said that germination was adequate. Merely 64.3% of participants said that their seed was free from Cotton Leaf Curl Virus (CLCV), while 35.7% revealed signs of disease infection.

Table 2.4: Chi Square findings about the correlation between farmers' frequency of seeking advice from agricultural specialists or extension services for cotton seed selection and quality, and their contentment with information and assistance provided.

Tests	Value	df	Asymp. Sig (2-Sided)
Pearson Chi-Square	155.675[a]	12	.000
Likelihood Ratio	135.125	12	.000
Linear by linear association	4.031	1	.045
N of Valid cases	384		
a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .73.			

Table 2.4 illustrates the correlation between the frequency with which farmers visit agricultural specialists or extension services about cotton seed selection and quality, and their happiness with the information and assistance obtained, analyzed by the Chi-Square test. The examination uncovered a statistically meaningful correlation, shown by a Pearson Chi-Square value of 155.675 ($df = 12$, $p < .001$), with the likelihood ratio corroborating this finding ($\chi^2 = 135.125$, $p < .001$). The Linear-by-Linear Association was significant ($\chi^2 = 4.031$, $p = .045$), indicating a slight linear correlation between the frequency of consultations and levels of satisfaction. A cumulative count of 384 legitimate replies was used into the study. Six cells (30.0%) exhibited anticipated counts below 5, with the lowest projected count being 0.73; while this suggests some scarcity in certain categories, the total sample size permits significant analysis of the findings.

These results suggest that growers who more often seek advice from agricultural specialists or extension organizations generally express greater contentment with the information and assistance about cotton seed quality. The notable correlation indicates that consultation activity is intricately connected to the perceived sufficiency of advisory services, while the slight Linear-by-Linear Association implies that this connection is not entirely consistent across varying levels of consultation frequency.

Conclusion

The assessment of seed quality was rather positive. The predominant number of participants did not express significant issues with the seed's quality, purity, or physical attributes throughout the last two years. The prevailing belief among most farmers is that their seeds are adequately verified and genetically untainted. Certain apprehensions persisted about the presence of weed seeds and the absence of illness. This highlights several domains where more enhancement is required, particularly with regulatory and quality assurance aspects.

Recommendation

Farmers are advised to use only certified and appropriately labelled quality seeds, as this will improve their yield. Farmers must choose certified seeds from trustworthy sources rather than relying only on informal marketplaces. Advisory services for the appropriate resources are very important so farmers should get the information from the reliable resources.

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