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Constraints in Cotton Cultivation Reported by Growers and Suggestive Measures

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Cotton cultivation is of immense importance for farmers in Odisha tribal regions as it is a ways of sustenance for their livelihood. A study was undertaken on 240 cotton growers from four blocks of two districts, Gajapati and Rayagada, of Odisha State. The objective of this research is to find out the constraints faced by the cotton growers and suggestive measures The tribal people of these districts have been cultivating cotton since a long time. The research methodology followed was through primary data collection. Data was collected personally on constraints in cotton cultivation as reported by farmers and suggestions to increase cotton production and productivity through a semi-structured schedule and analysed using appropriate statistical methods. The respondents of both Gajapati and Rayagada districts gave priority to the suggestion that cotton growers should be organized properly. They suggested that soil testing needs to be done at appropriate time to assess the soil fertility status of the soil and suitable recommendations on application of fertilizers should be made available to ensure better productivity. Also, there should be transparency in

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grading and measurement. The respondents also emphasized the need for immediate payment for the produce to fulfill their prime financial obligations. The growers need to be educated about collection of market information enabling them to obtain better price for their product. Organizing the growers facilitates better supervision and management of various farm operations. Participatory decision facilitates better planning and management. Cluster approach helps in minimizing the cost of watch and ward and timely implementation of the various crop management practices. The officials of agricultural extension that promote cotton cultivation in these districts have to create more awareness about cluster approach of farmers through group formation as organizing better growers facilitates supervision of operations and an integrated crop management.

Keywords: Cluster approach; cotton production; organizing growers; soil testing; supervision.

1. INTRODUCTION

Cotton is one of the most important fibre crops in India as well as the entire world. It plays a major role in the industrial and agricultural economy of the country. It supplies the basic raw material to the textile industry [1]. In addition to this, biodiversity is an important indicator of sustainability of cotton cultivation. About 500 known varieties of cotton are found around the world. Varieties have been developed to suit geographical conditions and include many fascinating characteristics and traits such as coloured cotton, extremely long and fine stapled cotton, and native indigenous or wild cotton [2]. Cotton is a long duration crop in India in which flowering starts during the end of monsoon and continues for about 80-90 days after the end of this season. The crop suffers severe water stress under rain-fed conditions in India and nutrient deficiency mainly at flowering and boll formation stage, resulting in low yields [3]. If the roots stand in water for too long, the cotton crop can be adversely affected. Creating ridges for planting and applying water along the furrows drastically reduces water use and improves the growth of plants [4]. In a study [5], it was found that labour cost occupies about 10 to 35% of total operational cost across states.

In a study among 200 farmers in Amreli and Bhavnagar District of South Saurashtra Agro-climatic zone of Gujarat State, the constraints faced by cotton growers are non-remunerative price, non-availability of certified seeds, high price of improved seeds, high price of insecticides/pesticides and fungicides and main suggestions by the respondents are ensuring quality seed supply, remunerative price of farm produce, input supply at subsidized rate, availability of crop insurance to farmers at cheaper rate [6]. The farmers are always facing some problems in cotton cultivation and maximum time their suggestions are not taken into consideration. The purpose of this research work is to find out what are the constraints faced by the cotton growers in tribal districts of Odisha and suggestive measures as reported by them.

2. MATERIALS AND METHODS

The study was undertaken in the Odisha tribal regions. Two tribal dominated districts, Gajapati and Rayagada, growing cotton crop were selected. Rayagada and Kashinagar blocks in Gajapati district as well as Gunupur and Ramanaguda blocks in Rayagada district were randomly selected. In Indian villages, gram panchayat is a basic village governing institute. At the grass-roots level in India, it is a democratic structure. It is a political institute acting as cabinet of the village (Panchayat Raj System in India, [7]). Four gram panchayats in each block, *viz.* Sanatundi, Kumelsingha, Karadasingi, and Rayagada in Rayagada block, and Budura, Khandaba, Alada, and Goribandha in Kashinagar block, Gadhikhala, Sirijholi, Chalkamba, and Jaganathpur in Gunupur block as well as Buting, Nilamguda, Bhamini, and Golumunda in Ramanaguda block were randomly selected. Around 15% of the farmers cultivating cotton from all these gram panchayats were also selected randomly.

So, 67 farmers from Rayagada, 53 from Kashinagar, 62 from Gunupur, and 58 from Ramanaguda blocks were selected randomly as respondents for the study, with the total sample size being 240. Questions were asked to the respondents on planning, technological support and marketing. The data collected on the scale point of most essential, essential, and not required were analysed with the score value of 3, 2 and 1, respectively. The statistical tools used for analysis are mean score, difference (%), and pooled mean score.

Table 1. District Gajapati

Sl. No.	Block	Gram Panchayat	No of respondent cotton farmers taken for data collection
1	Rayagada	Kumelsingha	18
2	Rayagada	Rayagada	16
3	Rayagada	Sanatundi	11
4	Rayagada	Karadasingi	23
5	Kashinagar	Budura	13
6	Kashinagar	Khandaba	17
7	Kashinagar	Jogibandha	12
8	Kashinagar	Alada	10

Table 2. District Rayagada

Sl. No.	Block	Gram Panchayat	No of respondent cotton farmers taken for data collection
1	Gunupur	Gadiakhala	18
2	Gunupur	Sirijholi	12
3	Gunupur	Chalakamba	11
4	Gunupur	Jagannathapur	21
5	Ramnaguda	Buting	16
6	Ramnaguda	Neelamguda	15
7	Ramnaguda	Bhamini	19
8	Ramnaguda	Golumunda	8

3. RESULTS AND DISCUSSION

3.1 Planning

Cotton crop requires appropriate planning for proper management. Organizing the growers, cluster approach, participatory decision making, resource generation and timely management of practices are some of the considerations in planning.

The respondents of both Gajapati and Rayagada districts gave priority for organizing the cotton growers and developing leadership among them as shown by the pooled mean score values in Table 1. The respondents of both the districts gave low emphasis for exploration of additional resources, site selection with common agreement, and establishing good harmony among the growers.

Organizing the growers facilitates better supervision and management of various operations. It will help for proper coordination between the group members and cumulative decision maing. Participatory decision facilitates better planning and management. It helps for group decision making. Soil testing is very much essential to assess the fertility status and application of fertilizers to ensure better production. Cluster approach helps in minimizing the cost for watch and ward and implementation of various crop management practices. Hence, these are pertinent suggestions of the respondents for effective crop management which should be addressed while planning for cotton cultivation.

3.2 Technological Support

Several risk factors were involved in cotton cultivation, particularly in management of insect pests, diseases, harvesting, post harvesting, as well as various intercultural operations. The growers often could not get good production due to lack of technological management capability. Therefore, they need technological support for successful crop management. The suggestions towards technological support have been presented in Table 4 after analysis of data collected from the respondents.

Table 3. Suggestions of the respondents for planning

Serial number	Suggestion	Mean score		Diff (%)	Pooled mean score (n=240)	Rank
		Gajapati district (n=120)	Rayagada district (n=120)			
1	Organizing cotton growers	2.50	2.80	10.71	2.65	2
2	Emphasis on cluster approach	2.55	2.56	0.39	2.55	5
3	Site selection with common agreement	2.25	2.09	7.11	2.17	8
4	Participatory decision making	2.65	2.63	0.75	2.64	3
5	Establishing harmony among growers	2.34	2.18	6.84	2.26	7
6	Developing leadership to lead growers	2.88	2.79	3.13	2.83	1
7	Exploring additional resources	2.29	2.04	10.92	2.17	8
8	Timely management of practices	2.49	2.46	1.20	2.48	6
9	Soil testing to assess fertility status	2.58	2.65	2.64	2.62	4

Table 4. Suggestions of the respondents towards technological support

Serial number	Suggestion	Mean score		Diff (%)	Pooled mean score (n=240)	Rank
		Gajapati district (n=120)	Rayagada district (n=120)			
1	Intermediary training for knowledge and skill enrichment	2.58	2.66	3.01	2.62	3
2	Exposure visit to gain experience	2.61	2.54	2.68	2.58	4
3	Supply of literatures for reference	2.70	2.58	4.44	2.64	2
4	Regular guidance and supervision	2.28	2.24	1.75	2.26	9
5	Immediate action to solve field problems	2.34	2.38	1.68	2.36	8
6	Adequate demonstrations to develop confidence	2.71	2.73	0.73	2.72	1
7	Supply of mini-kits to assess feasibility	2.38	2.39	0.41	2.38	7
8	Skill competency in use of inputs and materials	2.46	2.38	3.25	2.42	6
9	Good knowledge and understanding on management practices	2.48	2.48	0	2.48	5

Table 5. Suggestions towards marketing support

Serial number	Suggestion	Mean score		Diff (%)	Pooled mean score (n=240)	Rank
		Gajapati district (n=120)	Rayagada district (n=120)			
1	Educating to collect market information	2.48	2.66	6.77	2.57	3
2	Informing minimum support price	2.20	2.22	0.90	2.21	9
3	Liasoning for early opening of mandi	2.56	2.57	0.39	2.56	4
4	Liasoning for early lifting of produce	2.33	2.46	5.28	2.39	6
5	Negotiating with traders for early procurement	2.54	2.43	4.33	2.48	5
6	Transparency in grading and measurement	2.58	2.66	3.01	2.62	2
7	Liasoning for remunerative sale price	2.37	2.39	0.84	2.38	7
8	Prior intimation of deduction of unknown charges	2.41	2.23	7.47	2.32	8
9	Grading in presence of growers' representatives	2.68	2.74	2.19	2.71	1
10	Immediate payment	2.55	2.69	5.20	2.62	2

Table 4 revealed no significant differences in the opinions among the respondents of Gajapati and Rayagada districts on suggestions towards technological support. The respondents had emphasized support for adequate demonstrations to develop confidence. Integrated crop management practices created awareness and motivated farmers to adopt appropriate cotton production technologies. Demonstration is conducted on new technologies. The respondents will acquire new technologies by participating in the demonstration. They will not only acquire new knowledge and skills but also develop confidence by observing the performance that will motivate them to adopt. Literature on cotton cultivation can be prepared easily and the respondents will refer at the time of need as well as use the recommendations. Training in critical stages of the cotton crop will be helpful to apply recommendations for which intermediary training is suggested by the respondents to acquire new knowledge and skills. Exposure visit to ideal places will develop confidence of the respondents and take decisions to adopt. Hence, these suggestions given by the respondents are justified and extension officials need to provide technological support on these educational approaches.

3.3 Marketing

The cotton growers are always interested for immediate disposal with remunerative price to minimize the risk of storage loss and investment in other farm activities. They are always being exploited by the traders and businessmen to sale with low price with the plea of low quality on market glot. The data collected from the respondents on their suggestions towards marketing support have been analysed and calculated with the mean score value. The results obtained from the analysis of data are presented in Table 5.

The respondents had not suggested much towards support on informing minimum support price, prior intimating in deducting unknown charges, liasoning for remunerative sale price, liasoning for early lifting of the produce and negotiating with traders for early procurements. It indicates that the respondents had adequate knowledge on these aspects and take decisions at their level.

Often the procurement agencies noted comparatively low quality by grading at their level but this should be done in the presence of growers' representatives to take common decisions. There should be transparency in grading and measurement. The respondents had also emphasized for immediate payment for produce to fulfill their prime financial requirements. Also, the growers need to be educated on collection of market information to enable them to obtain better and genuine price for produce. The respondents demanded early opening of mandis. The district administration and authorities involved in the marketing process have to take necessary steps to extend these supports enabling the farmers to market their produce at better price.

3.4 Constraints

The cotton crop is affected by a wide range of insects. A variety of insects such as jassids (*Amrasca biguttala*), aphids (*Aphis gossypii*), whiteflies (Bemisia tabaci), mealy bugs (*Phenacoccus solenopsis*), thrips (*Thrips tabaci*), army worms (*Spodoptera frugiperda*), hairy caterpillars (*Spilosoma obliqua*), semi-loopers (*Anomis flava*), Spodoptera, spotted bollworm (*Earis fabia*), American bollworm (*Helicoverpa armigera*), and pink bollworm (*Pectinophora gossypiella*) cause damage to cotton frequently [3]. Due to monocropping, insect pests and diseases affect cotton crops more and cause nutrient deficiencies. Cotton is cultivated round the year from June to May in large parts of India. The use of fertilizers in cotton cultivation is almost the highest in the world. Due to declining soil health, the crop is not responding well to fertilizer use. Indian cotton crop yields are low due to low plant density as compared to yields of other major cotton growing countries such as China, USA, Brazil, Mexico, and Australia [3].

Diverseness of cotton hybrids, unauthentic seeds, wide use of poor quality and adulterated insecticide chemicals and pesticide abuse are major problems. These lead to decreased yields and consequent social problems in otherwise high yielding areas of Andhra Pradesh. Climate may cause crop destruction due to heavy rains. Extended wet spell during October and results in the outbreak of pests and causes damage to cotton production. Heavy dose of imbalanced chemical fertilizers and monocropping of cotton are the major drawbacks in Andhra Pradesh. Wide use of pesticide chemicals from the seedling stage disturb and destroy the parasites and predator populations. Due to this, cotton is

affected by serious pest damage, mainly by bollworms, aphids (*Aphis gossypii*), jassids (*Amrasca biguttula*), thrips (*Thrips tabaci*) and whiteflies (*Bemisia tabaci*) [8]. Bollworms are the most destructive. Major efforts are required to save the crop from them. Of the insecticides used annually on all crops in India, about half are used on cotton alone [9,10]. Inadequate input usage, rainfed cultivation, untimely field operations, and inefficient crop production technologies result in low cotton yields in India [11]. The low productivity of cotton is due to use of poor quality seeds and pesticides. The cost of cultivation is increased [12].

3.5 Suggestive Measures

For ecological control of pests in organic cotton, neem tree (*Azadirachta indica*), a native tree that grows naturally all over the Indian cotton regions plays important role. The neem fruit contains very powerful alkaloids with insecticidal properties. It is recognized as very effective against a wide range of pests, including those of cotton crop [13].

Availability of quality seed at a reasonable price needs to be ensured. The public and private sectors should make greater effort. The cost of hybrid seed production should be reduced. Acid delinting in cotton was found to be totally discontinued in a study of rice fallow cotton in Thanjavur. Acid delinting involves the complex process of buying loose quantities of chemicals. These should be taken home safe in public transport and adherence to strict application timing should be maintained. The farmers wanted already delinted seeds, community acid delinting, or an alternative process [14].

Desi species, *Gossypium arboreum* and *Gossypium herbaceum*, are ideal for tough conditions with low inputs. Short duration Desi varieties under high density planting can provide good yields with low inputs in rainfed farming. Intercropping with legume crops such as soybean, green gram, black gram, or cowpea for nitrogen fixation and integrated pest management is essential [3]. Growing a variety of crops on a farm is beneficial for farmers as it can act as an insurance against the failure of one particular crop as the farmers can get the returns from other crops. Scientists have found that crop diversity improves soil fertility, reduced use of chemical inputs, and sustainable high yields can be maintained [15].

4. CONCLUSION

In this research paper, efforts are put for getting the suggestions for increasing the production in cotton cultivation as cotton is the primary source of income for many farmers in tribal dominated Gajapati and Rayagada Odisha districts. Based on the constraints faced by the growers and necessary recommendations given by them, the farmers need adequate demonstration and various educational materials, such as leaflets and folders to gain enough knowledge and develop confidence. The agricultural extension officials promoting cotton cultivation in these districts have to create more awareness for cluster approach of farmers through group formation, as organizing the growers facilitates better supervision and management of various operations and integrated crop management practices. They should take appropriate approaches to enrich the knowledge and skills of the farmers by increasing their capacity building to enable them to adopt suitable crop management practices to enhance crop yields and generate more income. The respondent farmers also emphasized the need for immediate payment for their produce to fulfill their prime requirements. The growers need to be educated on collection of market information to enable them to obtain better and genuine price. The mandis under Government sector usually function late and the private traders get chance to exploit the farmers. The respondents therefore demanded early opening of mandis under Government control.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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