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Socio-psychological, Technological and Input based Strategies to be Adopted by Cotton Growers of Odisha to Manage Risks and Stresses in Cotton Cultivation

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ABSTRACT

Background: The cotton cultivation in India is influenced by high inputs and expenditure. But the farmers do not get sufficient access to institutional credit; hence the farmers borrow money at the higher interest from other sources. Higher risks due to the impacts of climate change furtherincrease the economic burden and uncertainty of getting reasonable income to the farmers. Furthermore, the crop suffers due to incidence of pests and diseases. Because of this situation, farmers encounter risks and pressures, yet they seldom openly reveal the psychological strain that accompanies their agricultural work. Hence, the current study was carried to identify strategies to be adopted by cotton growers to manage risk and stress in crop management, agricultural extension and input arrangement.

Methods: The study was conducted by collecting information from 240 cotton growers of four blocks in Gajapati and Rayagada districts of Odisha. The opinion on socio-psychological, technological competency and input supply strategies to be adopted was collected individually through a semi-structured schedule and analyzed.

Result: The opinion of cotton growing farmers on the strategies to be adopted in minimizing the risks and stresses in cotton production on socio-psychological, technological competency and input supply showed that the farmers preferred to have participatory decision on cluster approach, developing good drainage facility and advance supply of inputs and materials, periodical visits by extension officials' to the farmers' field and create awareness on latest varieties availablewith high yield and training on latest technologies and ensuring quality and timely input supply, providing information on market price and immediate payment for their produce.

Key words: Cluster approach, Cotton, Marketing, Risks, Strategic approaches, Stress, Technological competency.

INTRODUCTION

Cotton is one of the most important commercial crops grown in India and it contributes 25% of all cotton produced worldwide. There are 6 million cotton growers and 40-50 million workers in cotton industries in India.Cotton crop is prone to a wide range of pests and diseases at all stages of its growth due to wide plant to plant and row to row spacing, indeterminate growth habit and long duration (WWF India, 2010). India, the USA, China, Brazil, Pakistan and Turkey are the top six cotton-producing nations. The cotton crop in these countries is subject to heightened climate risk, notably from wildfires, droughts and extreme rainfall and also due to pest and disease incidence (Wilson, 2021).

Farmers live with risk and make decisions every day that affect their farming operations. Several variables influencing farmers' decisions are inherently unpredictable. These include fluctuating weather conditions, potential unavailability of hired labor during critical operational periods, unexpected machinery breakdowns precisely when they are most needed, price declines during harvest periods and shifts in government policies (Kahan, 2013). In a study, it was found that financial debt when accrued within a web of family results in patterns of personal and familial humiliation, producing a profound sense of hopelessness in the self. This loss of hope and pervasive humiliation is cultivated by a cascade of decisions taken by others with little or no responsibility to the farmers and the land they hope to cultivate as they follow different cultural and financial logic (Kannuri and Jadhav, 2021).

Risks in agriculture arise from a variety of sources. Therefore, to deal with them effectively, there are various types of tools available that are suitable to deal with either a single specific risk or multiple risk situations. Some risks are systemic (*e.g.* droughts and floods) affecting a large part of a geographic area,while, some are non-systematic

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or idiosyncratic. Some risks can be managed with traditional farm management solutions, some risks are insurable through markets and some can be minimized with government support (Gunjal, 2016).

Water scarcity and extremes in rainfall, from insufficient in some regions to extreme and more intense in others will present increased risk. This will affect the yields and potentially threatening to cause conflict and societal disturbance (Forum for the future.org, 2021). Further, insufficient access to institutional credit borrowed by farmers at high interest to pay for input adds to the farmers' woes. Higher risks due to the impact of climate change are increasing the economic burden and uncertainty for the farmers.

Farmers require the integration of new technologies to enhance their productivity and produce higher yields Further, the extension services and training programs do not reach farmers and the ineffective information dissemination may constrain a farmer's ability to assess a new technology (Jameel, 2018). Farmers receive most benefits from the extension activities and services in the form of field visits to experimental farms (Al-Zahrani *et al*., 2021).

Keeping the above points in view, the present study was conducted in Gajapati and Rayagada districts of Odisha to find out the socio-psychological, extension and input strategies to be followed by the farming communities of Odisha to manage risks and stresses in cotton cultivation.

MATERIALS AND METHODS

Rayagada and Kashinagar blocks of Gajapati district and Gunupur and Ramanagda blocks of Rayagada district of Odisha where cotton is grown were chosen at random for the study. At random, four panchayats were chosen for studying the risks and stress strategies of cotton growing farmers, in each of the block. Sanathundi, Kumelsingha, Karadasinghi and Rayagada in Rayagada block; Budura, Khandaba, Alada, Jogibandha in Kashinagar block; Gadiakhala, Sirijholi, Chalakamba, Jagannathpur in Gunupur block; Buting, Neelamguda, Bhamini and Golumunda in Ramanagda block were randomly chosen from each of the above panchayats. A total of 240 farmers (67 from Rayagada block, 53 from Kashinagar block, 62 from Gunupur block and 58 from Ramanagda block) were selected.Data was individually collected through a semi-structured schedule after pretesting. Data on strategic approaches to socio-psychological issues, such as land preparation, technological competency, input arrangement, cultural management, plant protection measures, harvesting and post-harvesting and marketing was gathered from the farmers by using the scale points of always, sometimes and not possible for different strategic practices and it was then scored as 3, 2 and 1 for analysis. Results were analyzed using statistical methods including mean score, gap percentage and rank order.

RESULTS AND DISCUSSION

Socio-psychological aspects

The opinion of cotton growing farmers on socio-psychological aspects were collected through questionnaire on participatory decision on cluster approach, use of implements and machineries for timely operation, advance supply of inputs and materials, good coordination and harmony among growers, helping each other at the time of need, routine surveillance and security, cooperating each other for timely operation, approach for life saving irrigation, attempt for conservation of rain water and developing good drainage facility (Table 1). The farmers expressed that the participatory decision has to be taken on operational activities which will be the most important one so that improved management, supervision and monitoring will be done. The second point was to develop good drainage facility as the rainfall in the region is high (1400 mm). The soils of these two districts where cotton

Table 1: Opinion of cotton growers of Gajapati and Rayagada districts of Odisha on socio-psychological aspects in cotton cultivation to mitigate stress and risk.

Approach	Mean score		Difference (%)	Pooled mean score (n=240)	Rank
	District Gajapati (n=120)	District Rayagada (n=120)			
Participatory decision on cluster approach	2.74	2.85	3.86	2.80	1
Use of implements and machineries for timely operation	2.29	2.28	0.44	2.29	9
Advance supply of inputs and materials	2.63	2.51	4.56	2.57	3
Good coordination and harmony among growers	2.55	2.37	7.06	2.46	6
Helping each other at the time of need	2.32	2.31	0.43	2.31	8
Routine surveillance and security	2.13	2.28	6.58	2.20	10
Cooperating each other for timely operation	2.41	2.49	3.21	2.45	7
Approach for live saving irrigation	2.50	2.46	1.60	2.48	5
Attempt for conservation of rain water	2.63	2.48	5.70	2.55	4
Developing good drainage facility	2.71	2.83	4.24	2.78	2

crop is grown are clay and clay loam in nature. It has been reported that water logging results in reduced oxygen in the root zone and the cotton plant grow poorly and yield low under ill drained condition of the soil (Yanjun Zhanga *et al*., 2021 and Christianson *et al*., 2010). The waterlogging inhibits dry matter accumulation and thereby lint production (Nazeeb *et al*., 2015 and Zhang *et al*., 2015) and the yield decrease will be higher with increased duration of water logging (Zhang *et al*., 2016). The third most important aspect is advance supply of inputs and seed material. The farmers face problems of timely availability of seed and other chemicals required for crop production which is an important parameter for getting higher yields. It has been observed that timely availability of inputs will enable the farmers to apply the inputs (fertilizers and pesticides) at proper time which improves the yield of crop. The fourth most important aspect is the conservation of rainwater. The crop faces adversity during its growth phase because of extended periods without rainfall. The conservation of rainwater and water stored in ponds help in providing irrigation to the crop. The conservation and irrigation thus increases the yield of crop (Giulia Vico *et al*., 2020).

Technological competency

Regarding the strategies for technological competency, the farmers opined to use the recommended practices and to acquire the necessary expertise. The information collected from respondents on their technical competency shows that there were no considerable variations in the respondents' judgement on the dimensions of technological competency between Gajapati and Rayagada districts (Table 2). The respondents opined that there should be frequent meetings with extension agents and use of technical material, visits to nearby research stations and Krishi Vigyan Kendras will form strategies in reducing the risk and stress of cotton farmers.

Regular contacts with the extension officials enable the respondents to acquire need based knowledge and understanding. Discussion on available literature with the extension functionaries and farmers will make them to

Table 2: Opinion of cotton growers of Gajapati and Rayagada districts on agricultural extension of Odisha to mitigate stress and risk in cotton cultivation.

Approach	Mean score		Difference (%)	Pooled mean score (n=240)	Rank
	District Gajapati (n=120)	District Rayagada (n=120)			
Information sharing among the growers	2.62	2.69	2.60	2.65	5
Discussion over available literature	2.80	2.83	1.06	2.81	2
Regular meeting with extension agents	2.21	2.14	3.17	2.18	8
Discussion with progressive grown from other villages	2.67	2.71	1.48	2.69	4
Visit to nearby research farms/ centres	2.64	2.45	7.20	2.55	7
Contacting extension officials for their visit	2.85	2.81	1.40	2.83	1
Contacting KVK scientists for training	2.72	2.73	0.37	2.72	3
Participating in KVK training	2.61	2.58	1.15	2.60	6

(Maximum obtainable score-3).

Table 3: Opinion on approaches to be adopted in input arrangement by cotton growers by Gajapati and Rayagada districts of Odisha to mitigate risk and stress in cotton cultivation.

Approach	Mean score		Difference (%)	Mean score	Rank
	District Gajapati (n=120)	District Rayagada (n=120)			
Discussion with experts on good varieties	2.82	2.83	0.35	2.82	2
Ensuring on source of availability	2.75	2.67	2.91	2.71	3
Liaisoning with local dealers to supply the selected variety	2.31	2.31	0.00	2.31	9
Ensure availability of other inputs	2.56	2.50	2.34	2.53	6
Promote green manuring	2.39	2.45	2.45	2.42	8
Skill in preparing quality manure	2.58	2.48	3.88	2.53	6
Timely information on input supply by Govt.	2.56	2.73	6.23	2.65	4
Timely supply of quality inputs by the dealers	2.58	2.38	7.75	2.48	7
Checking quality of inputs intermediary	2.62	2.60	0.76	2.61	5
Taking expert advice about quality of inputs	2.90	2.79	3.79	2.85	1

(Maximum obtainable score-3).

understand when to take decision for adopting the technological information. The farmers' visit to research stations and Krishi Vigyana Kendras will help them to acquire knowledge and skills on latest developments on cotton cultivation. Similarly, discussion with the progressive cotton growers of other villages helps in information sharing and which builds confidence among farmers and gain detailed understanding about new practices adopted in cotton cultivation. Further, it will help in attaining timely information on the market performance and support that help farmers in obtaining right price for their produce (Desai, 2020). These results are in agreement with earlier research that indicates that most of the growers depend on personal experience, friends, family and neighbours, merchants and sellers of agricultural production supplies as sources of agricultural information for enhanced crop yields (Al-Zahrani *et al*., 2021).

Input arrangement

The suggestive strategic approaches by cotton farmers'input arrangements did not very considerably from that of Gajapati and Rayagada districts (Table 3). The most crucial strategic approach, according to the respondents to seeking advice from specialists for the application of high-quality inputs, followed by engaging in discussions with experts regarding the selection of suitable varieties, sourcing availability, ensuring timely input supply, quality assessments and the availability of other necessary inputs. However, the respondents did not place much emphasis on working with local dealers in supply of selected variety, promoting green manuring and delivering quality supplies. Earlier reports state that access to inventory credit and input supply increases the inorganic fertilizer and seeds use (John *et al*., 2008). Further, there was positive impact linked to the use of fertilizer which increased the productivity of fertilizer use. From these observations, it can be summarized that good variety, quality inputs and their timely availability are the indicators for good production.

CONCLUSION

The cotton farmers of southern Odisha preferred a participatory decision-making process using a cluster approach, developing better drainage systems and advance supply of inputs and materials as a strategy for better management, supervision and monitoring. Cluster approaches become more useful through participatory decision-making processes. The respondents suggested that the necessary knowledge and understanding has to be obtained through regular contact with agricultural scientists and extension officials and discussion on available literature with the extension functionaries and farmers that make them to adopt the technologies in cotton cultivation. They also feel that the farmers can acquire knowledge and skills on latest developments on cotton cultivation by discussion with KVK scientists and also progressive cotton growers of other villages. These discussions help in information sharing and gain detail understanding about new practices to be adopted by the farmers.By following some of these techniques, the risk and stress can be reduced among farmers in cotton cultivation.

Conflict of interest

All authors declare that they have no conflict of interest.

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