A Study on Brand Preference and Brand Switching Behaviour of Bt Cotton Farmers in Andhra Pradesh

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Abstract

After the introduction of transgenic cotton, Bt cotton gained popularity amongst the farmers in Andhra Pradesh. It created interest among the seed companies to release more transgenic cotton varieties in the country. To reduce the difference between prices of Hybrid and Bt cotton varieties, the Government of Andhra Pradesh forced the seed companies to reduce the prices to curb monopolistic practices. Price reduction motivated the farmers to adopt Bt cotton, which led to the introduction of more varieties from the companies' side. This study was carried out in Tamsi and Jainath mandals of Adilabad district in Andhra Pradesh. The results of the study indicated that dealers were the major source of information for farmers to purchase various Bt cotton seed brands. Brahmma and Mallika were the most popular brands among the farmers in the study area. Majority of the farmers purchased Bt cotton seeds from the district private dealers by paying in cash. The sample farmers ranked high-yielding character of brands as a major influencing factor for the purchase of Bt cotton seeds and majority of the sample farmers were highly satisfied with fiber quality and were highly dissatisfied with the germination of Bt cotton seeds. Majority of the farmers were not ready for brand switchover, and the irrigated farmers were more loyal to their brands than the rainfed farmers. Variables such as yield performance, resistance to pest and disease, seed germination, new varieties, and new technology were found to be an important reason for brand switching.

Keywords: **brand preference, brand switching, Bt cotton seeds, Garrett Ranking, Factor Analysis**

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Cotton is an important commercial crop in India. The country ranks second in both area and production in the world and contributes 34% and 22% to the world area and production, respectively. However, productivity of cotton is very low in India (486 Kg / Ha) when compared to the world average productivity (754 Kg / Ha). India is the second largest exporter of cotton after USA, with an annual export of 1.2 million tonnes. Cotton plays a key role in the national economy in terms of generation of direct (35 million people) and indirect employment in the agricultural and industrial sectors. The textile industry contributed about 14% to industrial production, 4% to gross domestic product (GDP), and 17 % of the country's export earnings (Ministry of Textiles, 2012).

India is the only country to grow all the four species of cultivated cotton. It has been cultivated in three distinct agro-ecological regions (North, Central, and South) of the country. Nearly 65% of India's cotton is produced on dry land and 35% on irrigated land. The Northern zone is almost totally irrigated, while the percentage of area

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under irrigation is much lower in the Central and Southern zones. Due to various factors, the productivity of cotton is very low throughout the country when compared to the world average productivity. However, due to introduction of transgenic cotton and other favourable factors, the productivity of cotton within the country improved from 191 Kg / Ha in the year 2002 to 512 Kg / Ha in 2010 (Choudhary & Gaur, 2011).

Transgenic Cotton in India

In India, 162 species of insect pests attack different stages of cotton. Among the cotton pests, American bollworm *(Helicoverpa)* is a key pest causing huge losses (nearly 80%) to the cotton crop in the country. Out of the ₹ 33.8 billion worth of total pesticide used in agriculture, nearly ₹ 16 billion worth of pesticides were used on cotton crop alone in the country, out of which ₹ 12 billion of pesticides were used to control cotton bollworm (Gupta, Janakiraman, Raghuraman, & Gupta, 2001). Realizing the detrimental effects of bollworms and contribution of cotton to the economy, MAHYCO (Maharashtra Hybrid Seed Company), a leading Indian seed company, took the initiative to introduce transgenic technology in India in collaboration with Monsanto Company. Based on the recommendation of the Review Committee on Genetic Manipulation (RCGM) and the Genetic Engineering Approval Committee (GEAC), Bt cotton (the first genetically modified crop in India) was officially allowed for commercial cultivation in 2002. Bt cotton, with the trade name of Bollgard-I, developed by Mahyco-Monsanto Biotech Ltd., was released in the same year. The Bollgard-II with two Bt genes was released during the year 2006. Due to the better performance of Bt cotton, the adoption level increased from 50,000 ha in 2002-03 to 10.6 million hectares in 2011-12 in the country (Choudhary & Gour, 2015 ; Ramachandran 2002).

Research Setting

Andhra Pradesh is the third largest cotton growing state in the country. The area under cotton in the state was 2.40 million hectares, and the production was 7.35 million bales in the year 2012-13. After the introduction of transgenic cotton, Bt cotton varieties suddenly gained popularity and surpassed the traditional varieties and hybrids. However, there is a huge gap between the price of Bt cotton hybrid and non-Bt hybrid due to the monopolistic market structure for the cotton seed market. Concerns were raised that high seed prices may restrict access of technology for resource-poor farmers (Lalitha, 2004). Due to the above reason, the Government of Andhra Pradesh imposed a ceiling of ₹ 750 (inclusive of technology fee) on Bt cotton seed price in the state to make the technology affordable and accessible to the small and marginal farmers. The other states of India also imposed the same ceiling (Arora & Bansal, 2012).

Furthermore, due to the increase in the cost of Bt cotton seed production and trade margin, the Government of Andhra Pradesh allowed the seed companies to increase the seed price from ₹ 750 to ₹ 930 per 450 grams of seeds. Fortunately, the price controls have positively impacted the diffusion of transgenic technology in India. This situation has created interest among the seed companies to release more transgenic cotton varieties in the country. Hence, the number of Bt cotton hybrids increased from three in 2002-03 to more than 780 in 2011-12. The large number of brands in the market motivated the farmers to switch over from one brand to another. The brand switching behaviour of the farmers has been recently considered as a prime factor for the growth of the seed industry. The performance of the seed industry and preference of cotton farmers has not been fully captured and documented in past studies. Hence, this study is warranted to take up the research on the magnitude of brand preference and brand switching behaviour of cotton farmers in Adilabad district of Andhra Pradesh. The present study was conducted to measure the farmers' preference and brand switching behaviour of transgenic cotton seed brands in Adilabad district of Andhra Pradesh.

Table 1. Scale Values for Likert -Scaling Technique

S.No.	Response	Score
1.	*Highly satisfied*	5
2.	*Satisfied*	4
3.	*Neutral*	3
4.	*Dissatisfied*	2
5.	*Highly dissatisfied*	1

Methodology

Andhra Pradesh was purposively selected for this study as it occupies the third position in both area and production of cotton amongst the states in India. Among the 23 districts of Andhra Pradesh, Adilabad district was selected for the study based on the largest area under Bt cotton cultivation. In the selected district, the mandals were arranged in descending order based on the area under cotton cultivation. From the list of mandals, two mandals were selected randomly, that is, Tamsi and Jainath.

List of villages for the selected mandals was collected from the Assistant Director of Agriculture, Adilabad district. The villages were arranged in descending order based on the area under cotton cultivation. From the list of villages, five villages were randomly selected from each mandal, from each village, five irrigated and five rainfed farmers were selected through pre- stratified random sampling method. Thus, the total number of sample constituted of 100 farmers - with 50 irrigated and 50 rainfed farmers. The survey work was conducted from January - April 2013.

(1) Likert Scale : Major attributes, that is, price, germination, pest resistance, yield, availability, and fiber quality were considered in determining the level of satisfaction in using Bt cotton seeds. The scale values are given in Table 1.

The scores were summed up, and the mean of each attribute was calculated and satisfaction levels were ranked based on it. The mean score was used for simple comparison of level of perception and satisfaction. The mean score was calculated by using the following formula (1) :

$$\text{Mean Score} = \frac{\Sigma^{n}_{i=1} W_i X_i}{\Sigma^{n}_{i=1} X_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

W_i = Weight of the variable
X_i = Variable.

(2) Garrett Ranking Technique : The sample farmers were asked to rank each factor and these ranks were converted into percent position by using the following formula (2) (Garrett & Woodworth, 1966).

$$\text{Per cent position} = 100\,(R_{ij} - 0.5)/N_j \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where,
R_{ij} = Rank given to i^{th} attribute by j^{th} individual.
N_j = Number of factors ranked by j^{th} individual.

By referring to the Garrett's table, the estimated percent position was converted into the Garrett score. Then, for

Table 2. Sources of Information for Purchase of Bt Cotton Brands

(Numbers)

S. No	Source of Information	Irrigated Farmers	Rainfed Farmers	Overall
1.	Company Representatives	13 (26.00)	9 (18.00)	22 (22.00)
2.	Dealers/Retailers	17 (34.00)	15 (30.00)	32 (32.00)
3.	Radio /Television	5 (10.00)	8 (16.00)	13 (13.00)
4.	Journals /Newspapers	4 (8.00)	2 (4.00)	6 (6.00)
5.	Neighbours	7 (14.00)	11 (22.00)	18 (18.00)
6.	Friends /Relatives	4 (8.00)	5 (10.00)	9 (9.00)
	Total	**50 (100.00)**	**50 (100.00)**	**100 (100.00)**

Figures in parentheses indicate percentage to total

each factor, the score of various farmers were added, and the mean value was estimated. The mean score values were arranged in the descending order. The attribute with the highest mean was considered as the most important problem and the others followed in order.

(3) Factor Analysis : Factor analysis is a statistical approach that is used to analyze the interrelationship among a large number of variables and to explain the variables in terms of their common underlying dimensions (factors). The statistical approach involves finding a way of condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information (Hair, Anderson, Tatham, & Black, 1998).

Mathematically, factor analysis makes it possible to describe a set of variables ($X_1, X_2 \ldots X_k$) in terms of a smaller number of factors and hence explain the relationship between these *k* variables. The formula (3) used in the factor analysis is given below.

The general form of a factor is :

$$F=X_1+X_2+\ldots X_K \quad \text{------ (3)}$$

Factor Loadings = correlation of each variable with the underlying factor,
Factor score = subjects' response × factor loadings

To identify the underlying constructs and to investigate the relationship among the variables that influence and determine the farmers' preference towards Bt cotton brands, factor analysis was applied. For this study, a total of 15 variables on various aspects were selected. The farmers were asked to indicate their responses on a 5 point scale, whether they were *highly satisfied*, *satisfied*, *neutral, dissatisfied*, and *highly dissatisfied.*

The responses of the farmers were recorded and score was given for each factor, then the scores were added to obtain the total score. To test the sampling adequacy, the Kaiser-Meyer-Olkin measure of sampling adequacy was calculated. Principal component analysis was employed for extracting the factors. The Varimax normalized method was used to find a new factor that was easier to interpret. The variables with commonalities greater than 0.50 were retained. The factors with Eigen- values greater than 1.0 were considered, and the analysis was conducted.

Table 3. Mode of Payment used by the Sample Farmers

(Numbers)

S.No	Mode of Purchase	Irrigated Farmers	Rainfed Farmers	Overall
1.	Cash	31 (62.00)	18 (36.00)	49 (49.00)
2.	Credit	7 (14.00)	20 (40.00)	27 (27.00)
3.	Cash & credit	12 (24.00)	12 (24.00)	24 (24.00)
	Total	**50 (100.00)**	**50 (100.00)**	**100 (100.00)**

Figures in parentheses indicate percentage to total

Table 4. Place of Purchase

(Numbers)

S .No	Place of purchase	Irrigated Farmers	Rainfed Farmers	Overall
1.	Government counters	14 (28.00)	7 (14.00)	21 (21.00)
2.	Private dealer (Local)	1 (2.00)	16 (32.00)	17 (17.00)
3.	Private dealer (District)	35 (70.00)	27 (54.00)	62 (62.00)
	Total	**50 (100.00)**	**50 (100.00)**	**100 (100.00)**

Figures in parentheses indicate percentage to total

Results and Discussion

Buying Behaviour of the Sample Farmers

(i) Source of Information for Purchase of Seeds : Source of information plays a critical role in the purchase of seeds and also influences the preference of brands. Therefore, source of information for purchase of seeds was studied and the results are presented in the Table 2.

It can be observed from the Table that among various sources of information, dealers (32%) were the major source of information for the farmers to purchase Bt cotton seed brands followed by company representatives (22 %), neighbours (18%), radio/television (13%), friends / relatives (9%), and journals/newspapers (6%). These results indicate that dealers and company representatives were the major source of information for farmers to buy the seeds. In contrast, neighbours were the major source of information for rainfed farmers. These results are in line with Yatnalli's (2010) findings that nearly 46% of the farmers got information from fellow farmers and 36% got information from the seed companies and dealers. Hence, the Bt cotton seed firms can concentrate on their dealers and company representatives to increase the market share of their products.

(ii) Mode of Purchase : Cash and credit are the major modes of purchase of Bt cotton seeds from the dealers by the sample farmers. The results of mode of purchase used by sample farmers are presented in the Table 3.

It can be concluded from the Table that majority of the farmers (49%) purchased the Bt seeds by paying in cash followed by credit purchase (27%), and the rest bought the seeds partially by cash and credit purchase (24%) from the dealers. However, majority of the rainfed farmers (20%) purchased the seeds by credit. The overall results indicate that most of the farmers purchased the seeds by paying in cash. Hence, companies can formulate a separate strategy for cash and credit sales of the Bt cotton seeds.

(iii) Place of Purchase : The place of purchase of seeds has a significant impact on the access to information about different brands. The place of purchase of seeds was enquired, and the results are presented in the Table 4.

Table 5. Bt Cotton Brands Cultivated by the Sample Farmers

(Numbers)

S.No	Year	Brand	Total sample farmers	Percentage to the total
1	2012-13	Brahmma	22	22
		Mallika	21	21
		Sudharshan	13	13
		Jaadu	11	11
		MCH2	8	8
		RCH2	9	9
		Hanuman	6	6
		Bunny	3	3
		Jackpot	7	7
		Total	**100**	**100**
2.	2011-12	Brahmma	23	23
		Mallika	20	20
		Bunny	5	5
		RCH	8	8
		Maycho	6	6
		JK2	5	5
		Sita	10	10
		Geetha	11	11
		Haritha	12	12
		Total	**100**	**100**
3	2010-11	Brahmma	24	24
		Mallika	18	18
		Bunny	12	12
		Maycho	10	10
		RCH	9	9
		JK2	16	16
		Chirutha	7	7
		Pravardhan	4	4
		Total	**100**	**100**

It can be inferred from the Table 4 that majority of the farmers (62 %) purchased Bt cotton seeds from the district private dealers followed by government counters (21%), and local private dealers (17%). Furthermore, it is observed that majority of the irrigated and rainfed farmers purchased Bt cotton seeds from the district level private dealers. However, comparatively more number of rainfed farmers purchased Bt cotton seeds from the local private dealers (32%) when compared to their counterparts.

However, these results are different from the place of purchase of non-Bt cotton farmers as Balasubramanian and Easwaran (2008) observed that nearly 53% of non-Bt cotton farmers purchased seeds from marketing societies and 30% purchased from traders. Hence, it can be concluded that district-level dealers were found to be the major source of purchase of Bt cotton seeds.

Table 6. Satisfaction Level of the Farmers Towards Bt Cotton Brands

S.No	Particulars	Mean score
1.	Fiber Quality	4.58
2.	Resistance to bollworms	4.12
3.	Price	3.60
4.	Yield	3.14
5.	Availability	2.26
6.	Germination	1.94

Table 7. Factors Influencing Brand Preference

S.No.	Factors	Mean Score	Rank
1.	Higher yield	83.80	I
2.	Pest/disease resistant	66.46	II
3.	Credit availability	64.81	III
4.	Dealers' influence	61.95	IV
5.	Easy availability	57.93	V
6.	Quality	49.84	VI
7.	Suitable to the region	49.76	VII
8.	Sales representatives' influence	49.24	VIII
9.	Brand loyalty	42.14	IX
10.	Price difference	41.43	X
11.	Discount /Rebates	34.61	XI
12.	Advertisement	37.27	XII

Brand Preference of Sample Farmers

Brand preference of Bt cotton of the sample farmers is presented in the Table 5. The results show that the majority of the farmers had been using Brahmma (Monsanto Holding Private Ltd.) Bt cotton brand for the past three years, followed by Mallika (Nuziveedu seeds), and RCH2 (Rasi seeds). Furthermore, Sudharshan (Monsanto Holding Private Ltd.) and Jaadu (Kaveri Seeds) brands were also used by farmers during the past years. The results indicate that there could be definite brands loyalties among the sample farmers.

Satisfaction Level of the Farmers

The satisfaction level of the farmers with Bt cotton hybrids is an important factor which plays a major role in future purchase decisions of farmers. Hence, the satisfaction level of farmers regarding Bt cotton brands was assessed based on six parameters, using a 5-point Likert scale namely, *highly satisfied* (5), *satisfied* (4), *neutral* (3), *dissatisfied* (2), and *highly dissatisfied* (1). The details of the satisfaction level of the sample farmers were analyzed, and the results are presented in the Table 6.

It can be inferred from the Table that majority of the farmers were highly satisfied with the fiber quality (4.58) of Bt cotton brands and resistance to bollworms (4.12). They were also satisfied with the price (3.60). However, the farmers were highly dissatisfied with germination (1.94) and availability (2.26) of Bt cotton brands. Hence, we can conclude that majority of the farmers were not satisfied with the following product characteristics - seed germination and firms' distribution channels.

Table 8. Brand Switching Behaviour of Sample Farmers

(Numbers)

S.No	Brand switch over	Irrigated Farmers	Rainfed Farmers	Overall
1.	Yes	15 (30.00)	31 (62.00)	46 (46.00)
2.	No	35 (70.00)	19 (38.00)	54 (54.00)
	Total	**50 (100.00)**	**50 (100.00)**	**100 (100.00)**

Figures in parentheses indicate percentage to total

Table 9. Variance Explained by the Factors

Factor No.	Name of Factors	Initial Eigen values		
		Total	% of variance	Cumulative %
F1	Varietal Characteristics	2.02	13.52	13.52
F2	Technological Factors	1.86	12.45	25.98
F3	Promotional Activities	1.69	11.26	37.24
F4	Supportive Activities	1.40	9.33	46.58
F5	Proximity	1.26	8.44	55.02

Extraction Method: Principal Component Analysis

Factors Influencing Brand Preference

There are many factors which influence farmers' preference for a particular technology, variety, and brand. Identification of factors that influence brand preference would be helpful in developing brands by seed producers. The results of Garrett's ranking technique for the factors that influenced brand preference of farmers are furnished in the Table 7.

The Table 7 shows that the high-yielding character of the brand was found to be the most influencing factor with a mean score of 83.80 followed by pest and disease resistant character (66.46), credit availability (64.81), dealer influence (61.95), and easy availability (57.93). Discounts and advertisements were the least preferred factors for brand preference among the sample farmers.

Brand Switching Behaviour

Brand switching behaviour of the sample farmers was analyzed, and the results are presented in the Table 8. The Table 8 shows that majority of the farmers were not ready to switch from their existing brands (54%) and 46% were ready to switch from their current brands. However, majority of the irrigated farmers (70%) were not ready for the brand switchover. It can be observed from the results that the irrigated farmers were more loyal to their brands than the rainfed farmers.

Reasons for Brand Switching

Factor analysis was carried out to analyze the reasons for the brand switching behaviour of the sample farmers. Explanation of the variables is one of the most important representations for factor analysis as it defines the percent of variance defined by each component. Since those components with Eigen value greater than 1.00 were considered, the first five components were taken as factors. The variations explained by each factor for all the particulars are given in the Table 9.

Table 10. Rotated Component Matrix

S .No	Variables	Factor					Communalities
		1	2	3	4	5	
1.	Resistance to pests and diseases	**.668**	-.107	-.164	.004	-.243	.544
2.	Fiber quality	.187	.077	-.716	-.065	-.215	.604
3.	Seed germination	**.603**	-.123	.350	.078	.156	.532
4.	Yield performance	**.760**	-.025	-.022	-.332	-.019	.689
5.	Soil suitability	-.183	**.529**	-.059	-.155	.175	.372
6.	New brands	.103	**.734**	.025	.017	-.174	.581
7.	New technology	.012	**.722**	-.088	-.267	.067	.605
8.	Packing	-.520	-.190	.058	-.161	-.101	.346
9.	Credit	.136	-.112	**.749**	-.117	-.183	.639
10.	Advertisement	.018	.426	**.547**	.153	.143	.525
11.	Price	-.248	-.163	.412	-.026	-.601	.620
12.	Approach of the company representatives	-.079	-.205	.010	**.544**	-.126	.361
13.	Field demonstration	.052	-.100	.028	**.861**	.179	.788
14.	Location of the store	-.199	-.286	.074	-.354	**.508**	.489
15.	Availability of the brand	-.024	.063	.180	.079	**.719**	.561

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

It is observed that the first five components could explain 55.02% of the total variance. Factor 1 explains about 13.52% of the variation followed by Factor 2 (12.45%), Factor 3 (11.26%), Factor 4 (9.33%), and Factor 5 explains only about 8.44% of the variance.

Factor Analysis

(1) Rotated Component Matrix : Varimax rotation was applied in the factor analysis to determine the number of factors. The criteria used for the analysis were that a component loading of 0.5 or more was considered to be a significant loading and with a Eigen value of more than 1. There are five factors that have an Eigen value of more than 1 and hence, the rotated components of these five factors are considered. The component loadings for these five factors are presented in the Table 10.

It can be inferred from the Table 10 that Factor 1 (Varietal Characteristics) is the most important factor, and it explains 13.52% of the variation. This factor defines the variables like yield performance (0.760), resistance to pest and diseases (0.668), and seed germination (0.603). It can be inferred from the results that varietal characters of the brands influenced the brand switching behaviour of the farmers. New brands (0.734), new technology (0.722), and soil suitability (0.529) have loaded on Factor 2 (Technological Factors). This indicates that Factor 2 - named as Technological Factors - is the second most important significant factor (12.45%) that influenced the variations in brand switchover. Attributes in the Factor 2 are closely related to technological aspects, which influenced the farmers to switchover to new brands and new technology. Credit facility (0.749) and advertisements (0.547) are the two important variables that loaded on the Factor 3 (Promotional Activities), and explain 11.26% of the variation. It is inferred from the Factor 3 that promotional activities of the companies influenced the farmers to switch their brands of Bt cotton. The Factor 4 (Supportive Activities) explains the significance of field demonstration (0.861) and approach of the company representatives (0.544) in facilitating brand switchover. The Factor 4 - Supportive Activities - for cotton cultivation explains 9.335% of the variation

Table 11. Grouping of the Factors

Factor No.	Variable under factors	Factor loadings
F1	Yield performance	0.760
	Resistance to pests and diseases	0.668
	Seed germination	0.603
F2	New varieties	0.734
	New technology	0.722
	Soil suitability	0.529
F3	Credit	0.749
	Advertisements	0.547
F4	Field demonstration	0.861
	Approach of the company representatives	0.544
F5	Availability of the brand	0.719
	Location of the store	0.508

in brand switching behaviour of the farmers. Availability of the brand (0.719) and location of the store (0.548) are listed in the Factor 5 (Proximity) and explain 8.44% of the variation. It is inferred that proximity of a store was a major factor for brand switchover by the farmers.

(2) Grouping of the Factors : The variables which had influenced the brand switchover behaviour of the farmers were grouped based upon a loading of 0.5 or greater than 0.5. The named factors are listed in the Table 11.

Managerial and Policy Implications

Considering the findings of the study and opinions of the sample farmers in the study area, the following managerial and policy implications are suggested for managers and policymakers :

(1) Performance of yield, pest resistance, and seed germination were considered as prime factors for the switching over from one brand to another. Hence, the seed industry has to improve these attributes to gain brand loyalty.

(2) Availability of the product in the local market was the most important deciding factor for brand preference and brand switchover. So, the seed firms have to develop a strong market network with an active participation of regional distributors and local private dealers.

(3) More incentives and special packages need to be extended to the private dealers and sales representatives who can act as a major source of information for purchase of seeds.

(4) Credit availability was a major factor influencing brand preference. So, the seed firms must involve in facilitating farm credit to farmers.

Conclusion

Among various sources of information, dealers were the major source of information for farmers to purchase

various Bt cotton seed brands followed by company representatives. The majority of the farmers purchased Brahmma (Monsanto Holding Private Ltd.) brand followed by Mallika (Nuziveedu seeds) brand. Majority of the farmers purchased Bt cotton seeds from the district private dealers by paying in cash. The sample farmers ranked high-yielding character of the brand as a major influencing factor for the purchase of Bt cotton seeds followed by resistance to pests and credit availability. Majority of the sample farmers were highly satisfied with fiber quality and were highly dissatisfied with the germination of the Bt cotton seeds.

Majority of the irrigated farmers (70%) were not ready to switchover to another brand of Bt cotton as compared to the rainfed farmers (38%). The irrigated farmers were more loyal to their brands than the rainfed farmers. Variables such as yield performance, resistance to pests and diseases, seed germination, new varieties, and new technologies were found to be important with the component loadings of 0.760, 0.668, 0.603, 0.734, and 0.722, respectively.

Limitations of the Study and Scope for Further Research

The study was conducted in Adilabad district of Andhra Pradesh, where Bt cotton is grown both in rainfed and irrigated condition. The results of the study are confined to Adilabad district of Andhra Pradesh, and care should be taken to extrapolate the results of the study to a broader level. Since more than 90% of the area under cotton is covered by Bt varieties, and a limited number of studies have been conducted on farmers' brand preferences, there is a good scope for future studies to study brand preference of Bt cotton seeds among the farmers in India.

References

Arora, A., & Bansal, S. (2012). Diffusion of Bt Cotton in India: Impact of Seed Prices and Varietal Approval. *Applied Economic Perspectives and Policy, 34* (1), 102-118.

Balasubramanian, M., & Eswaran, R. (2008). Marketing practices and problems of cotton cultivars in Virudhunagar District. *Indian Journal of Marketing, 38* (7), 27-32.

Choudhary, B., & Gaur, K. (2011). *Adoption and impact of Bt Cotton in India, 2002 to 2010*. New Delhi: ISAAA Biotech Information Centre.

Choudhary, B., & Gaur, K. (2015). *Biotech cotton in India, 2002 to 2014*. ISAAA Series of Biotech Crop Profiles. New York: ISAAA Biotech Information Centre.

Garret, H. E. & Woodworth, R.S. (1966). *Statistics in psychology and education.* Bombay: Vakis, Febber, and Simons Ltd.

Gupta, G.P., Janakiraman, S., Raghuraman, M., & Gupta, R.P. (2001). Status of transgenic cotton and its prospects in India. *Agrolook, 2* (1), 7-19.

Hair, J.F. Jr., Anderson, R.E., Tatham, R.L. & Black, W.C. (1998). *Multivariate data analysis.* New Jersey: Prentice Hall.

Lalitha, N. (2004). Diffusion of agricultural biotechnology and intellectual property rights: Emerging issues in India. *Ecological Economics, 49* (2), 187 - 198. doi:10.1016/j.ecolecon.2004.03.022

Ministry of Textiles (2012). *Annual report 2011-12*. New Delhi: Government of India.

Ramachandran, R. (2002). Green signal for Bt Cotton. *Frontline, 19* (8), 45-48.

Yatnalli, C.S. (2010). Adoption of Bt cotton and its impact : A case study of Haveri District, Karnataka. *Indian Journal of Marketing, 40* (12), 8-18.