

PERCEPTION OF *Bt.* COTTON GROWERS REGARDING ECO-FRIENDLY FARMING PRACTICES

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ABSTRACT

The study aimed to assess the perception of Bt. cotton growers on eco-friendly farming practices with their various components. The present investigation was undertaken in Botad district of Gujarat state, as it comes under the jurisdiction of Anand Agricultural University, Anand, with a sample size of 160 Bt. cotton growers who were growing cotton in their field for 5 years. The Bt. cotton growers were interviewed personally by well a structured and pre-tested interview schedule. Suitable statistical techniques were used to analyse the collected data. From the study, it was found that a majority of Bt. cotton growers had a medium to low level of the overall perception of eco-friendly farming practices.

Keywords: *Bt. cotton growers, eco-friendly farming, perception*

INTRODUCTION

Eco-friendly farming practices are an agricultural system aiming to cultivate land in such a way that the soil remains dynamic with healthy living activities while keeping the environment clean, maintaining ecological balance, and maintaining production levels without polluting the soil, water, or area. The usage of chemicals is limited to a minimum level in this technique. Eco-friendly farming focuses more on biological inputs than conventional agricultural techniques, which are largely dependent on the usage of pesticides and fertilizers. As a result, it is critical to assess the depth of perception of the concerned farmers on it, which is required to build a plan to effectively implement eco-friendly farming practices programs in a certain farming community. Perception is the process of gaining information about external things and events via the use of one's senses. Therefore, the current study intended to measure the perception of eco-friendly farming practices of *Bt.* cotton growers were conducted.

OBJECTIVE

To measure the perception of the eco-friendly farming practices by the *Bt.* cotton growers

METHODOLOGY

The study was conducted in the Botad district which comes under the jurisdiction of Anand Agricultural University. Botad district was purposively selected for the investigation due to cotton is the major predominant crop

of this district. Botad district consists of only four talukas viz., Botad, Ranpur, Barvala and Gadhada. Therefore, all these four talukas were selected for the research study. The list of the *Bt.* cotton growers who growing cotton for at least the last five years were collected from village-level workers, progressive farmers, and local leaders of the selected villages. Ten *Bt.* cotton growers were selected randomly from each selected village for the study. Thus, all 160 *Bt.* cotton growers were selected for the study. The data was collected following the study's objectives using a well-structured pre-tested Gujarati version interview schedule. A scale was designed by the researcher to assess farmers' perceptions of eco-friendly farming practices. To assess the numerous eco-friendly practises components included in the study, several scales and scoring systems developed by specialists were used with appropriate modifications. An ex-post facto research design was used for the study. The statistical techniques used like percentage, arbitrary approach for data categorization, and coefficient of correlation.

RESULTS AND DISCUSSION

An attempt was made to ascertain the perception of the *Bt.* cotton growers in specific eco-friendly farming practices of *Bt.* cotton crop. Different major four components of eco-friendly farming practices of *Bt.* cotton crops were identified as below:

1. Seed Treatment (ST), 2. Integrated Weed Management (IWM), 3. Integrated Nutrient Management (INM), and 4. Integrated Pest Management (IPM)

Seed Treatment (ST)**Table 1 : Perceptions of eco-friendly farming seed handling practises among *Bt.* cotton producers**

(n=160)

Sr. No.	Seed treatment practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
1	Purchase of certified and government-approved seed	145 (90.63)	15 (09.37)	00 (00.00)
2	Sowing of non-Bt. cotton	24 (15.00)	112 (70.00)	24 (15.00)
3	The seed should be shown after the germination test of seed	12 (07.50)	67 (41.88)	81 (50.62)
4	Seed should be shown after hot water treatment	17 (10.62)	36 (22.50)	107 (66.88)
5	Application of <i>Azotobacter</i> as a biofertilizer	16 (10.00)	39 (24.38)	105 (65.62)
6	Sowing of early maturity varieties to reduce the infestation of pink ball worm	82 (51.25)	46 (28.75)	32 (20.00)

Note: Figures in the parenthesis indicate the percentage

The results reported in Table 1 depict that among the six seed treatment practices of eco-friendly farming, the vast majority (90.63 per cent) of *Bt.* cotton growers had a highly favourable perception of the purchase of certified and government-approved seed, and the majority of them had perceived sowing of early maturity varieties to reduce the infestation of pink ball worm (51.25 per cent). While more than two-thirds (70.00 per cent) of the cotton growers had a moderately favourable perception of the sowing of non-Bt.

cotton. As far as concerned to less favourable perception, the majority of the *Bt.* cotton growers had a less favourable perception about seed should show after hot water treatment (66.88 per cent), Application of *Azotobacter* as a biofertilizer (65.62 per cent), and Application of *Azotobacter* as a biofertilizer (50.62 per cent). The results are in line with the findings of Patel et al. (2022), Prajapati et al. (2022), Rathwa et al. (2022).

Integrated Weed Management (IWM)**Table 2: Perception regarding integrated weed management practices of eco-friendly farming among the *Bt.* cotton growers**

(n=160)

Sr. No.	Integrated weed management practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
1	Hand weeding	135 (84.38)	25 (15.62)	00 (00.00)
2	Removing the weed by inter-culturing operation	87 (54.37)	72 (45.00)	01 (00.63)
3	Removing weed with improved tools	69 (43.12)	43 (26.88)	48 (30.00)
4	Keeping weeds free from the field boundary	85 (53.12)	49 (30.63)	26 (16.25)
5	Use of weed as an organic fertilizer	27 (16.87)	43 (26.88)	90 (56.25)
6	Purchase of government-approved and certified seed	51 (31.88)	46 (28.75)	63 (39.37)

Note: Figures in the parenthesis indicate the percentage

The results reported in Table 2 presented that the great majority (84.38 per cent) of *Bt.* cotton growers had a highly favourable perception of hand weeding, followed by removing weeds by inter-culturing operation (54.37 per cent), and keeping weeds free from field boundary (53.12 per cent). Less than half (45.00 per cent) of the *Bt.* cotton growers had a moderately favourable perception of removing the weed by inter-culturing operation, followed by keeping weeds free from the field boundary (30.63 per cent), destroying

insect-infested weeds by dumping (28.75 per cent), removing weed with improved tools (26.88 per cent), and use of weed as an organic fertilizer (26.88 per cent). More than one-half (56.25 per cent) of the *Bt.* cotton growers had perceived less favourable eco-friendly farming practices of use of weed as an organic fertilizer, followed by destroying insect-infested weeds by dumping (39.37 per cent), and removing weeds with improved tools (30.00 per cent).

Integrated Nutrient Management (INM)

Table 3: Perception regarding integrated nutrient management practices of eco-friendly farming among the *Bt.* cotton growers (n=160)

Sr. No.	Integrated nutrient management practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
1	Use of FYM/ Compost fertilizer	148 (92.50)	10 (06.25)	02 (01.25)
2	Use of vermicompost	42 (26.25)	78 (48.75)	40 (25.00)
3	Use of Bio-fertilizer <i>Azotobacter</i>	22 (13.75)	56 (35.00)	82 (51.25)
4	Use of Biogas slurry	12 (07.50)	48 (30.00)	100 (62.50)
5	Use of Dhaincha /Cluster bean /Pulse as a green manuring	24 (15.00)	86 (53.75)	50 (31.25)

Note: Figures in the parenthesis indicate the percentage

The findings reported in Table 3 reveal that the overwhelming majority (92.50 per cent) of *Bt.* cotton growers had a highly favourable perception of the use of FYM/Compost fertilizer and the majority of them moderately favourable perception towards the use of Dhaincha /Cluster bean /Pulse as green manuring (53.75 per cent). Whereas, the majority of the *Bt.* cotton growers had perceived less favourable eco-friendly practices such as the use of Biogas slurry and the use of Bio-fertilizer *Azotobacter* with 62.50 per

cent and 51.25 per cent, respectively.

Integrated Pest Management (IPM)

Hence, it is necessary to know the perception of *Bt.* cotton growers towards eco-friendly farming practices of integrated pest management. Thus, three major methods of eco-friendly farming practices were identified.

1) Cultural Methods, 2) Mechanical Methods and 3) Biological Methods

Table 4: Perception regarding integrated pest management practices of eco-friendly farming among the *Bt.* cotton growers (n=160)

Sr. No.	Integrated pest management practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
(A) Cultural methods				
1	Deep ploughing in summer	154 (96.25)	06 (03.75)	00 (00.00)
2	Crop rotation	87 (54.38)	72 (45.00)	01 (00.62)

Sr. No.	Integrated pest management practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
3	Timely sowing as recommended	112 (70.00)	46 (28.75)	02 (01.25)
4	Pest resistance varieties	143 (89.38)	17 (10.62)	00 (00.00)
5	Intercropping of sesamum and maize	15 (09.38)	41 (25.62)	104 (65.00)
6	Mix cropping	26 (16.25)	70 (43.75)	64 (40.00)
7	Destroying the holes of ants from the field	04 (02.50)	43 (26.88)	113 (70.62)
8	Use of recommended fertilizer and water	96 (60.00)	42 (26.25)	22 (13.75)
(B) Mechanical methods				
1	Use 40 pheromone traps per hectore for control of pink ball worm	36 (22.50)	92 (57.50)	32 (20.00)
2	Change the pheromone trap lure every 21 days to control the pink ball worm	22 (13.75)	77 (48.12)	61 (38.13)
3	Destroy distorted flower/leaves/wasps <i>etc.</i> before spraying insecticide	82 (51.25)	48 (30.00)	30 (18.75)
4	Use a yellow sticky trap to control aphids and leaf hopper	49 (30.63)	93 (58.12)	18 (11.25)
5	Use light traps	75 (46.88)	45 (28.12)	40 (25.00)
6	Pick larvae of pests from the field by hand	77 (48.12)	12 (07.50)	71 (44.38)
7	Keep birds' nests in the field	38 (23.75)	47 (29.37)	75 (46.88)
8	Spray water thoroughly after using of wooden plough or mechanical implements in mealybug-infested fields	48 (30.00)	69 (43.12)	43 (26.88)
9	Do not allow sheep/goats/cattle to graze in the mealybug-affected field	27 (16.27)	23 (14.38)	110 (68.75)
10	Catch sucking pests from evening to midnight with the help of light traps or a torch	34 (21.25)	60 (37.50)	66 (41.25)
11	Smoke around the cotton field in the evening time	81 (50.62)	46 (28.75)	33 (20.63)
(C) Biological methods				
1	Spray a mixture of 200 grams of crushed neem seeds and 10 grams of washing powder in 10 litres of water	105 (65.62)	52 (32.50)	03 (01.88)
2	Spray a mixture of 20 ml neem seed oil and 10 grams of washing powder in 10 litres of water	19 (11.88)	126 (78.75)	15 (09.37)
3	Spray a mixture of 20 to 30 ml of neem-based pesticides and 10 grams of washing powder in 10 litres of water	27 (16.88)	43 (26.87)	90 (56.25)
4	Spray 50 gm of <i>Lecanicilliumlecani</i> or <i>Buveriabesiana</i> fungus mixed in 10 litres of water	22 (13.75)	46 (28.75)	92 (57.50)

Sr. No.	Integrated pest management practices	Perception of eco-friendly farming practices		
		Highly favourable	Moderately favourable	Less favourable
5	Use <i>Buveribesiana</i> for control of white fly/leaf hopper	58 (36.25)	82 (51.25)	20 (12.50)
6	Use neem-based pesticides instead of toxic pesticides when natural beneficiary insects are present in the cotton crop	107 (66.88)	34 (21.25)	19 (11.87)
7	Spray 20 gm powder of <i>Lecanicilliumlecani</i> fungus in 10 litres of water in the evening, when there is high humidity	42 (26.25)	28 (17.50)	90 (56.25)
8	Prepare organic manure from the stalk of the cotton crop	31 (19.37)	67 (41.88)	62 (38.75)
9	Toxic temptation (1 kg jaggery + 20 ml vinegar/fruit juice + 20 ml dichlorvos 76 EC + 10 litres water) in a plate-like container and place it in 40 to 50 places in one hectare of land	36 (22.50)	37 (23.12)	87 (54.38)
10	Use egg parasitic <i>Trichogrammachilonis</i> for control of pink ball worm	73 (45.62)	19 (11.88)	68 (42.50)
11	Spray NPV virus for control of <i>helichoverpaarmigera</i> larvae	18 (11.25)	76 (47.50)	66 (41.25)
12	Establishment of sanctuary for parasite-parasitic insects in 1 or 2 bundles next to the cotton field	34 (21.25)	19 (11.87)	107 (66.88)

Note: Figures in the parenthesis indicate the percentage

The results reported in Table 4 show that for the cultural eco-friendly practices of integrated pest management, almost 100.00 per cent of Bt. cotton growers had a high to moderately favourable perception towards deep ploughing in summer, pest resistance varieties, crop rotation and timely sowing as recommended. Whereas, the vast majority (86.25 per cent) of Bt. cotton growers perceived highly to moderately favourable toward the use of recommended fertilizer and water. From this investigation, it was also observed that an overwhelming (97.50 per cent) of the Bt. cotton growers had less to medium favourable perception towards destroying the holes of ants from the field and intercropping of sesamum (94.38 per cent). Whereas, the vast majority (83.75 per cent) of them had perceived medium to less favourable about mixed cropping system for cotton cultivation.

In the case of the mechanical method, the majority of the Bt. cotton growers had a highly favourable perception towards destroying distorted flower/leaves/wasps *etc.* before spraying insecticide (51.25 per cent), followed by smoke around the cotton field in the evening time (50.62per cent), pick larvae of pests from the field by hand (48.12per cent) and use light traps (46.88per cent). It was also found that the majority of the Bt. cotton growers had a medium favourable perception towards using a yellow sticky trap to control aphids and leaf hopper (58.12per cent), using 40 pheromone traps per hector for control of pink ball worm (57.50 per cent), changing the pheromone trap lure every 21 days to control the pink ball worm (48.12per cent) and spraying water thoroughly

after using of wooden plough or mechanical implements in mealybug-infested fields (43.12per cent). Moreover, slightly more than two-thirds of the Bt. cotton growers had a less favourable perception towards don't allow sheep/goats/cattle to graze in the mealybug-affected field (68.75per cent), followed by keeping birds' nests in the field (46.88per cent) and catching sucking pests from evening to midnight with the help of light traps or a torch (41.25per cent).

As far as concerned biological methods, slightly more than two-thirds (66.88 per cent) of the Bt. cotton growers had a highly favourable perception towards using neem-based pesticides instead of toxic pesticides when natural beneficiary insects are present in the cotton crop, followed by spraying a mixture of 200 grams of crushed neem seeds and 10 grams of washing powder in 10 litres of water (65.62 per cent) and using egg parasitic *Trichogrammachilonis* for control of pink ball worm (45.62 per cent). It was also detected that more than three-fifths (78.75 per cent) of the Bt. cotton growers perceived medium favourable about spraying a mixture of 20 ml neem seed oil and 10 grams of washing powder in 10 litres of water, followed by using *Buveribesiana* for control of white fly/leaf hopper (51.25per cent), spraying NPV virus for control of *helichoverpaarmigera* larvae (47.50per cent) and preparing organic manure from the stalk of the cotton crop (41.88per cent). From this study, it was also observed that slightly less than two-thirds (66.88 per cent) of the Bt. cotton growers had a less favourable perception towards the establishment of sanctuary for parasite-parasitic insects in 1

or 2 bundles next to the cotton field, followed by spraying of 50 gm of *Lecanicilliumlecani* or *Buveria besiana* fungus mixed in 10 litres of water (57.50 per cent), spraying a mixture of 20 to 30 ml of neem-based pesticides and 10 grams of washing powder in 10 litres of water (56.25 per cent), spraying 20 gm powder of *Lecanicilliumlecani* fungus in 10 litres of water in the evening, when there is high humidity (56.25 per cent), and toxic temptation (1 kg jaggery + 20 ml vinegar/fruit juice + 20 ml dichlorvos 76 EC + 10 litres water) in a plate-like container and place it in 40 to 50 places in one hectare of land (54.38).

Table 5 : *Bt.* cotton growers according to overall perception towards eco-friendly farming practices (n=160)

Sr. No.	Category	Frequency	Per cent
1	Very low (Up to 67.20)	11	06.88
2	Low (67.21 to 86.40)	44	27.50
3	Medium (86.41 to 105.60)	56	35.00
4	High (105.61 to 124.80)	40	25.00
5	Very high (124.81 to 144.00)	09	05.62

It is apparent from Table 5 that slightly more than one-third (35.00 per cent) of the *Bt.* cotton growers had an overall medium perception of eco-friendly practices of the cotton crop, followed by low, high, very low and very high perceptions with 27.50 per cent, 25.00 per cent, 06.88 per cent and 05.62 per cent, respectively.

To summarize the findings, less than two-thirds (62.50 per cent) of the *Bt.* cotton growers had a medium to low level of overall perception toward eco-friendly farming practices in *Bt.* cotton crop production. This might be due to the eco-friendly farming practices are long-term effective while chemical pesticide has a knockdown effect on the pest.

CONCLUSION

The study revealed that the majority of *Bt.* cotton growers possess a medium to low level of perception toward eco-friendly farming practices. The reason behind this result is due to most of the *Bt.* cotton growers wants rapid result of their pest and disease in their cotton field. Thus, the efforts may be applied by the authorities and associated action agencies for a better and more successful implementation of the programme associated with eco-friendly technology to

reduce environmental dangers through cotton cultivation so that their perception regarding eco-friendly farming will be increased.

CONFLICT OF INTEREST

This is to declare that there is “No conflict of interest” among researcher.

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