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STUDY ON TECHNOLOGICAL GAP IN BT-COTTON PRODUCTION

DR. DEVENDER KUMAR[1] & DR. R. S. HUDDA[2]

[1,2] *Department of Extension Education, C C S Haryana Agricultural University Hisar*

ABSTRACT

The present study was conducted in the native state Haryana. Out of 21 district, in the state, two districts namely Sirsa and Hisar has largest area and production under Bt-cotton among all the district of Haryana state and contributes about 50 per cent of Bt cotton production in the state. Cotton is soft, staple fiber that grows around the seeds of the cotton plants (Gossypium sp.), a shrub native to tropical and subtropical regions around the world, including the America, India and Africa. All the commercial cotton is Native American species (Gossypium hirsutum and Gossypium barbadense). The overall technology gap was found to be about 47.50 per cent. Aspect wise per cent respectively). It was observed from the data that 49.17 high level of sowing methods of the respondents were found to be having high level of manures and fertilizer application 50.83 per cent. It was very much clear from the table that 54.58 per cent of the respondents had high level of technology gap in pest and disease management.as for as picking of cotton was concerned, the most of the respondents 41.25 farmers belong to high technology gap When asked about their interest and needs for various training programme, almost all the farmers showed their interest in obtaining the training for the Bt-cotton growers farmers in different subject matter areas Insects scoutin, (88.75%) Application and use of chemicals (86.66%) Features of Bt-cotton technology (83.75%), Bt-cotton varieties/hybrid (82.50%).

***KEY-WORDS**: Bt-Cotton, technology gap, training, staple fiber, seeds and plants.*

INTRODUCTION

Bt-cotton was introduced in India in 2002 for commercial production in Southern states followed by that in Northern states (Haryana, Punjab, and Rajasthan) in 2005 (APCoAB2006). In India, biotechnology made its long-awaited entry into commercial agricultural in March 2002 with the approval of three (MECH-12, MECH-162 and MECH184) Bt-cotton hybrids for commercial cultivation. The Genetic Engineering Approval committee (GEAC), Ministry of Environment and Forest, Government of India granted the approval, at its 32nd meeting held in New Delhi. The transgenic hybrids were developed by MAHYCO (Maharashtra Hybrid Seed Company Limited) in Collaboration with Monsanto. Later five more events were undertaken namely: MON 15985, Event-1,

GFM Event, Cry 1 Ac Event and Cry 1 Ac Event 9124. In Haryana, cotton is grown during kharif season. Cotton accounts for an area of 610 thousand ha in Haryana with total production of 24,000 thousand bales and yield of lint is 664.50 kg/ha (Statistical Abstract of Haryana, 2013-14). Cotton is attacked by several insect pests reducing the crop yield largely. The insect pests that attack cotton crop may be classified into sap sucking insects (Aphids, Jassids and White fly) or chewing insects (Bollworms, leaf eating caterpillars etc.). Of the total pesticides used in Indian Agriculture, about 45 per cent is sprayed on cotton crop alone. To reduce pesticide usage in cotton, several strategies like use of Genetic Resistance to insect pests, Integrated Pest Management (IPM), Insecticide Resistance Management (IRM) etc. are advocated. In recent times, Bt cotton technology is found to be one of the best strategies to manage bollworms, the most important pest of cotton. of the respondents fall in high level of technology gap. It was high in case of varieties and agronomic practices (52.08 per cent and 45.42).

Cotton is soft, staple fiber that grows around the seeds of the cotton plants (Gossypium sp.), a shrub native to tropical and subtropical regions around the world, including the America, India and Africa. All the commercial cotton is Native American species (Gossypium hirsutum and Gossypium barbadense). It is grown in temperate and tropical regions of more than 70 countries. Specific areas of production include India, China, USA, Pakistan, Uzbekistan, Egypt, Turkey, Australia, and Greece etc. Cotton popularly known as "White Gold" is a major fiber crop of the world and is used by about 75 per cent of world's population for textile purposes. Its fiber is used universally as a textile raw material. In India, it is important cash and commercial crop valued for its fiber and vegetable oil. It is a source for earning the valuable foreign exchange by providing employment to millions of people and hence plays a significant role in national economy. The diverse products obtained from cotton include textile raw material, cotton seed is a major source of vegetable oil and cotton cake as a rich source of high quality protein for livestock feed. Cotton is primarily grown as fiber crop. It is harvested as 'seed cotton', which is then 'ginned' to separate the seed and lint. The long 'lint' fibers are further processed by spinning to produce yarn that is knitted or woven into fabrics. Cotton is the most important commercial crop contributing upto 75 per cent of total raw material needs of textile industry and provides employment to about 60 million people. India has the largest area under cotton cultivation with relatively low productivity primarily due to the large area under rainfed cultivation with inadequate supply of inputs. Area-wise, India ranks first in world, whereas, it ranks second in production next to China. India accounts for approximately one third of the total cotton area planted in the world. World cotton production was estimated at 116.67 million bales of 480 lb in 2013-14 (USDA, February, 2014) which is 6.402 million bales lesser than the previous year 2012-13. India continued to maintain the largest area under cotton and second largest producer of cotton next to China with 35.29 per cent and 24 per cent of world cotton area and production, respectively. India also sustained the position of being the second largest consumer and exporter of cotton and is expected to export 7.5 million bales and expected to consume 23 million bales in 2013-14. In India, cotton contributes about 85 per cent raw material to textile industry, occupying an area of 115.53 lakh ha with a production of about 375 lakh bales. In Haryana, during 2013-14, the area under cotton crop was 5.57 lakh ha with production of 20 lakh bales (Anonymous, 2013-14). Tripp (2011) examined the performance of transgenic, insect-resistant cotton in four countries (China, India, Colombia and South Africa) are used to examine the adequacy of the institutions required to support the development and delivery of transgenic crops for resource poor farmers. These institutions include the formal seed sector, the basic regulations that support it, conventional agricultural research and the provision of information to farmers. He argued that inadequacies in these institutions in many developing countries represent significant barriers to the hopes for a rapid uptake of transgenic crops.

MATERIAL AND METHODS

The study was conducted in native state Haryana. Out of 21districts in the state, two districts namely Sirsa and Hisar has largest area and production under Bt- cotton among all the districts of Haryana State. Multistage sampling technique was used for the selection of district, block, village and respondents. Two blocks from each district were selected randomly .There were Hisar-II, Hansi-I, Sirsa, and Nathusari Choupta. Four blocks were prepared and four villages from each block were again selected randomly. Total sample of 240 famers in the 16 villages were selected randomly. To gather the background information of the farmers (respondents) self developed interview schedule was used and data gathered were tabulated and computed for frequency distribution and percentages.

RESULTS AND DISCUSSION

Technological Gap in Bt-Cotton production technology

Technology gap, was conceived as the gap between the level of recommendation and the extent of adoption,(against recommendation) (Tripathy,1977 and Sadamate,1978).The technological gap in respect of different aspects of the technology was computed in percentage by the following formula:

Technology gap index = R-A

Were,

R = Maximum possible adoption score that a respondent could be awarded in respect of a given component of technology,

A = Score obtained by a respondent by virtue of his adoption of a given component of technology.

Table: 4.1 Profile of the respondents

Variable	Category	Score range	Frequency	Percentage
Age	Young	Less than 35 yrs	102	42.50
	Middle	35-50 yrs	86	35.83
	Old	More than 50yrs	52	21.67
Education	Low	Less than 3	85	35.42
	Middle	3-4	114	47.50
	High	More than 4	41	17.08
Socio-economics status	Low	Less than 15	55	22.92
	Middle	15-30	71	29.58
	High	More than 30	114	47.50
Landing	Low	Less than 3	135	56.25
	Middle	3-4	73	30.42
	High	More than 4	32	13.33
Irrigation	Low	Less than 2	76	31.66
	Middle	2-3	92	38.34
	High	More than 3	72	30.00

Change Proneness	Low Middle High	Less than 7 7-12 More than 12	15 56 9	18.75 70.00 11.25
Mass media exposures	Low Middle High	Less than 6 6-12 More than 12	99 84 57	41.25 35.00 23.75
Risk Orientation	Low Middle High	Less than 11 11-20 More than 20	128 78 34	53.33 32.50 14.17
Extension contact	Low Middle High	Less than 14 14-26 More than 26	92 84 64	38.33 35.00 26.67

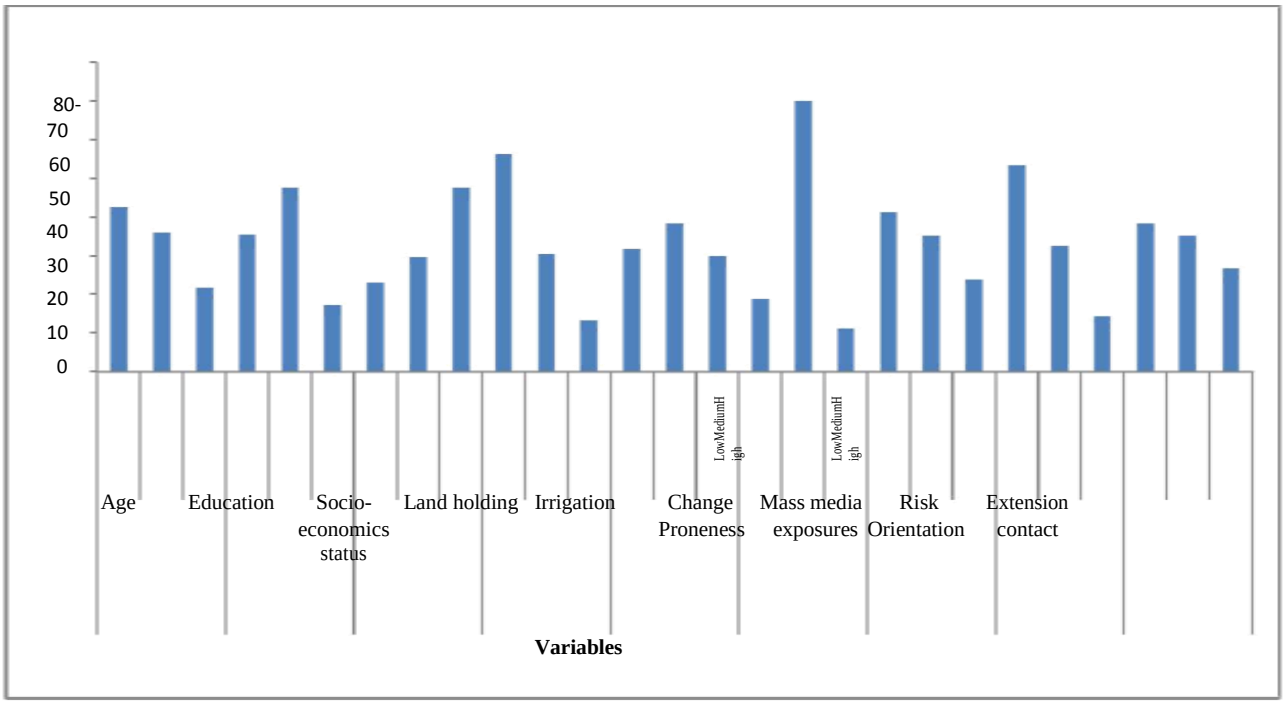

Fig. 1: Profile of the respondents

The background information of the respondents on some of the important socioeconomic traits was collected. The distribution of the respondents according to their socioeconomic traits is p resented in Table 4.1 as given below:

4.1.1 Age: It is clear from table 4.1 that about two-fifth (42.50 per cent) of the Bt-cotton growers were of young age group i.e. upto 35 years, followed by 35.83 per cent in the age group of 35-50 years and rest of the Bt-cotton growers 21.67 per cent were old i.e. above fifty years. In nutshell, 4/5th of the farmers were young to middle age group.

4.1.2 Education: The data presented in table 4.1 regarding education indicates that 35.42 per cent of the respondents were falling in low category. The educations belonging to medium and high category were 47.50 per cent and 17.08 per cent respectively. It is very much clear from the table that a little more than half of the respondents were having moderate level of their education.

4.1.3 Socio-economic status: The table 4.1 shows that about one-fourth 22.92 per cent of the Bt-cotton growers were having socio-economic status of low category, followed by 29.58 per cent of them having medium socio-economic status and remaining 47.50 per cent of the farmers having socio-economic status of high category.77.00 per cent of the farmers having socio-economic status from medium to high category.

4.1.4 Land holding: As rural people are mainly engaged in agriculture, land holding is the major factor determining the economic status and it gives the estimates of family income. It is evident from the table 4.1 the regarding land holding, above fifty per cent of the respondents i.e.56.25 per cent were having low sized farmers followed by 30.42 per cent respondents were having medium sized farmers and 13.33 per cent respondents were having high sized farmers. It was observed that a big majority of the farmer's i.e. 86.67 per cent of the respondents were having less than fifteen ha.

4.1.5 Irrigation: It can be very well as certain from the table 4.1 that as much as seventy-six Bt-cotton growers were having irrigation of low category, followed by 38.34 per cent of them were having irrigation with the extension personnel in the medium category and remaining seventy-two of them having high level of irrigation.

4.1.6 Change proneness: The table 4.1 also revealed that 70 per cent of Bt- cotton growers were having change proneness in medium category, followed by 18.75 per cent of the Bt-cotton grower farmers for low level of change proneness and remaining 11.25 per cent of the respondents were having high level of change proneness.

4.1.7 Mass Media Exposure: Data in 4.1 reveals that 41.25 per cent of the Bt-cotton growers were having low level of mass media exposure followed by about one-third (35.33 per cent) of them well having medium level of mass media exposure. Remaining one-fourth (23.75 per cent) of the respondents were have high level of mass media exposure.

4.1.8 Risk Orientation: Further, it is evident from the table 4.1 that as high as one hundred twenty-eight Bt-cotton growers having low level of risk orientation having score range of less than 11. About one-third seventy-eight of them were of medium category of risk orientation and only thirty four Bt-cotton growers having high level of risk orientation having score rang more than 20.

4.1.9 Extension contact: It can be predicted from the table 4.1 that as much as ninety-two Bt-cotton growers had extension contact of low category, followed by about one-third eighty-four of them were having extension contact with the extension personnel in the medium category and remaining sixty-four of them were having extension contact in the high category group.

Table 4.2: Aspect-wise distribution of farmers based on their technological gap about Bt-cotton production technology
(N=240)

Variables	Category	Score range	Frequency	Percentage
Variety/Hybrid	Low	0	54	22.50
	Medium	1	61	25.42
	High	2	115	52.08
Agronomic Practices	Low	Less than 5	49	20.42
	Medium	5-10	82	34.16
	High	More than 10	109	45.42
Sowing Methods	Low	Less than 3	56	23.33
	Medium	3-6	66	27.50
	High	More than 6	118	49.17
Manures and Fertilizer Application	Low	Less than 2	51	21.25
	Medium	2-3	67	27.92
	High	More than 4	122	50.83
Pest and disease management	Low	Less than 4	48	17.50
	Medium	4-8	61	25.42
	High	More than 8	131	54.58
Picking of cotton	Low	Less than 2	69	28.75
	Medium	2-3	72	30.00
	High	More than 3	99	41.25

The data further analyzed to know the technological gap of the different aspects as shown in table 4.2

It is seen from the table that the technological gap in varieties/hybrid, above fifty per cent of the respondents i.e.(52.08 per cent) were having high technology gap followed by 25.42 per cent respondents having medium gap and (22.50 per cent) of the respondents possessed low gap. Nagaraja *et al.* (2014) observed that there was a favourable attitude towards the Bt-cotton than Hybrid cotton till recent past. The personnel perceived that the Bt-cottonseeds are costlier beyond the capacity of small and marginal farmers and they require training on IPM and INM before the season commence. The farmers of the Haveri area obtained more yield in Bt-cotton than Hybrid cotton. The farmers faced major constraints such as high seed cost of Bt-cotton, high pest and disease incidence other than bollworm, in turn less yield and low market price.

As far as agronomic practice, 45.42 per cent of the respondents were having high technology gap followed by 34.16 per cent of the respondents were having medium level of technology gap. The lowest number of the respondents (20.42 per cent) were having low technology gap in the agronomic practice. Sowing methods based on their technology gap about Bt-cotton production technology 49.17 per cent were having high. Above one fourth of the respondents i.e.27.50 per cent replied that they were having medium, while 23.33 per cent of the respondents low technology gap in sowing methods. Kumar (1992) found that 79.04 per cent technological gap in gram production technology. Highest technological gap was reported in varieties, while in agronomic practices it was comparatively low.

It is very much clear from the table that the number of respondents technology gap in manures and fertilizer application were also high that was 50.83 per cent. Followed by medium level 27.92 per cent, while 21.25 per cent respondents had low level of technology gap, in the manures and fertilizer application. Regarding pest and disease management, it was found that 54.58 per cent respondents were having high level of technological gap. It is also stated that 25.42 percent respondents had medium level of technological gap about pest and disease managements whereas; only 17.50 per cent of the respondents were having low level of pest and disease managements. Bangarva et al. (1993) found that technological gap in case of improved variety, seeds rate, seed treatment, spacing, depth of sowing, fertilizers application, irrigation application and plants protection measures were 50.26, 20.00, 74.82, 10.89, 24.80, 49.51 and 69.17 per cent respectively in respect of groundnut production technology.

The data further revealed that most of the respondent'si.e.41.25 per cent possessed high level of technological gap about picking of cotton followed by 30.00 per cent, respondent was in medium level technological gap while 28.75 respondents had low level of technological gap about picking of cotton. The Haryana state plays an important role in the production of cotton country by sharing 11.25% of the total area under production and hence it occupies 4th position after Maharastra, Gurat, and Andra Paredesh. The total area of cotton in Haryana is 5.5 lakh hectare, production 20 lakh bales and productivity 408 kg per hecter against potential yield 1875 kg/ha (1999-2000) (Agricultural Statistical at a galance,2001).

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