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Constraints and suggestions of the cotton growers for effective implication of integrated pest management technology

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Abstract
Integrated Pest Management (IPM) is one of the important tool in pest management. A study was conducted in two districts Aurangabad and Nanded of Marathwada region of Maharashtra state. A sample of 240 cotton growers were selected for present study which categorized into 120 IPM-cotton growers and 120 non- IPM cotton growers. The constraints faced by IPM-cotton growers were studied and it was found that, unavailability of quality pheromone traps and scientific light traps for the control of pink bollworm at agro service centre proper time. (98.33%), unavailability of bioagents such as *Trichogramma*, chrysopa eggs etc. at proper time. (96.67%), unavailability of quality biopesticides like neem ark, *Beauveria, Verticillium* (95.83%), lack of demonstration and training on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM. (92.50%) was ranked IV; lack of proper multidisciplinary linkage among SAUs, ICAR, Agri. Dept. Producers and users (90.00%) as the major constraints.
In case of suggestions the IPM cotton growers expressed their suggestions to overcome constraints in Integrated Pest Management technology were quality pheromone traps and scientific light traps should be provided by government (95.00 per cent) , Timely supply of trichocards, chrysopa eggs by biocontrol laboratories of state Agri. department and SAU's (93.33%), Good quality biopesticides like neem ark, *Beauveria, Verticillium* should made available at cheaper rate (91.67%) , lack of demonstration and training on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM should be organized by State dept.of Agriculture ,SAUs. (89.17%), Trainings should be organized on scientific installation of pheromone traps, light traps by state dept of Agri., SAU's and KVK (87.50%).

Keywords: Constraints, suggestions, integrated pest management technology

Introduction
Cotton, the important cash crop, globally known as “King of Fibre” offers an important natural fabric material to the world has been a point of fascination. It is an important fiber crop of global importance which belongs to the genus *Gossypium* in the family *Malvaceae*. Cotton in a way is a gift of the Indian subcontinent to human civilization. India accounts for about 26 per cent of the world cotton production. It has the distinction of having the largest area under cotton cultivation in the world ranging between 10.9 mha to 12.8 mha constituting about 38 to 41% of the world area under cultivation. The yield per hectare (i.e. 504 kg to 566 kg per hectare) is however still lower against the world average of about 701 kg to 766 kg per hectare. Country is expected to make more strides in cotton production in the years to come. (Anonymous 2017) [3].
Cotton fibre is an important raw material to the textile industries and plays a key role in national economy in terms of employment generation and foreign exchange. The development of *Bt* cotton in India from the conditional release of three Mahyco-Monsanto transgenic *Bt* hybrids viz., MECH-12, MECH- 162, MECH-184 for commercial cultivation on 26th march 2002 by govt. of India has brought new in cotton cultivation. Since then *Bt* cotton in India has jumped to about 1.34 m. ha in the current crop year from about 405.00 ha year earlier.
During recent year, *Bt* cotton acreage has gone up and reached up to 99 per cent of the total cotton acreage. The introduction of *Bt* cotton hybrids has helped in production increase from 156 lakh bales (170 kg lint per bale) in 2001 to an estimated 356 lakh bales in 2011. *Bt* cotton was introduced in 2002 and the area increased from 0.29 lakh hectares in 2002 to 116.14 lakh hectare in 2013-14. The productivity was 309 kg per hectare in 2001 before the introduction of *Bt* cotton which increased to 495 Kg/ha in 2010.

Cotton as is evident from the fact that more than 90% of the area in all the cotton growing states in India is now under *Bt* cotton. Maximum gains in yield increase have been obtained in Gujarat, Andhra Pradesh, Maharashtra, Haryana, Punjab and Tamil Nadu (Anonymous 2012) [1].

Cotton is one of the principal commercial crop contributing nearly 75% of total raw material needs of textile industry in our country. India was recognized as the cradle of cotton industry for over 3000 years (1500 BC to 1700 AD). India produces finest and beautiful cotton fabrics since time immemorial. India, being the earliest country in the world for domesticated cotton producers and manufacture of cotton fabrics, has led to today's first rank in cotton cultivated area (122.38 lakh ha) and production (361 bales of 170 kg) among all cotton producing countries in the world (2018-19). Cotton is one of the principal crops of India and plays a vital role in the country's economic growth by providing substantial employment and making significant contributions to export earnings. The cotton cultivation sector not only engages around six million farmers, but also involves another about 40 to 50 million people relating to cotton cultivation, cotton trade and its processing (Anonymous 2019) [4].

The cotton is important cash crop in Marathwada region. The cotton crop is heavily infested by insect-pest and the cotton growers do not use proper plant protection measures for insect-pests which causes lower yield. Also from last 2-3 years pink bollworm became a major problem in cotton as it get developed resistance against *Bt* toxin. Pink bollworm is internal feeder so it is difficult to control by insecticides. In the 2016-17 *kharif* season the entire 42 lakh hectares of cotton crop in Maharashtra get infested by pink bollworm. Maharashtra government provided compensation of crores of rupees towards crop damage of cotton growers whose crop is damaged by the attack of pink bollworm. State Agriculture Department, SAU's, KVK,s conducted massive campaign for the Integrated Management of pink bollworm as Integrated Pest Management (IPM) is one of the important tool in pest management. It was therefore, felt necessary to find out what constraints faced and what suggestions given by cotton growers for effective implication of Integrated Pest Management technology.

Objectives of the study

To identify the constraints and obtain suggestions of the cotton growers for effective implication of Integrated Pest Management technology

Methodology

The present study was conducted purposively in Aurangabad and Nanded district was selected purposively on the basis of maximum cotton area of the Marathwada region of Maharashtra state during the year 2018-19, from these two districts four tahsils were selected purposively on the basis of maximum cotton area. With irrespective of list of villages of IPM growers was collected from ICAR-KVK, Aurangabad and CRS Nanded. 240 Cotton growers was selected in to two categories viz. IPM and non IPM cotton growers from selected twelve villages of 4 tahsils of Aurangabad and Nanded districts. Ex-post facto research design was adopted in this study. The data were collected with the help of pretested interview schedule. Constraints were measured on an inventory prepared for the purpose and response for various constraints were obtained in a category of yes and no with assigned score of 1 and 0 respectively and appropriate statistical tools were applied to analyze the data .Frequency and percentage were calculated and ranks are assigned.

Results and discussions

The data collected for the study were classified, tabulated and analyzed in the light of the objectives of the study and the results are presented under the following heads.

Table 1: Constraints faced by the cotton growers during effective implication of IPM technology implication of IPM technology

Sr. No.	Constraints	IPM cotton growers (n=120)		Rank
		Frequency	Percentage	
1.	Unavailability of quality pheromone traps and scientific light traps for the control of pink bollworm at agro-service centers at proper time	118	98.33	I
2.	Unavailability of bioagents such as *Trichogramma*, chrysopa eggs etc. at proper time	116	96.67	II
3.	Unavailability of quality biopesticides like *Beauveria, Verticillium*, neem ark etc. at agro-service centers	115	95.83	III
4.	Lack of demonstration and training on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM	111	92.50	IV
5.	Lack of proper multidisciplinary linkage among SAUs, ICAR, Agri. Dept. Producers and users	108	90.00	V
6.	Lack of dealers network for bio-pesticides	107	89.17	VI
7.	Unavailability of simple illustrated booklet on IPM	105	87.50	VII
8.	Short shelf-life of trichocards and storage problem	104	86.67	VIII
9.	Lack of proper training on IPM practices to be followed at particular stage of crop growth	102	85.00	IX
10.	Mis-guidance from agro-service centers	101	84.17	X
11.	Mechanical practices like detopping, hand picking of rosette flowers, clipping of terminal shoots and collection of affected fruiting bodies was time consuming, laborious and expensive	98	81.67	XI
12.	Difficult to identify the harmful and beneficial insects to conserve the natural enemies	95	79.17	XII
13.	Non availability of sheep or goats immediately after last picking of cotton	92	76.67	XIII
14.	Timely sowing of cotton in rainfed condition is impossible because of delayed monsoon	87	72.50	XIV
15.	Growing of maize in the field increases the problem of wild animals	74	61.66	XV

In the constraints, majority of the cotton growers reported that, unavailability of quality pheromone traps and scientific light traps for the control of pink bollworm at agro service centre proper time. (98.33%) was ranked I, unavailability of bioagents such as *Trichogramma*, chrysopa eggs etc. at proper time. (96.67%) was ranked II , unavailability of quality biopesticides like neem ark, *Beauveria, Verticillium* (95.83%) was ranked III, lack of demonstration and training on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM. (92.50%) was ranked IV, lack of proper multidisciplinary linkage among SAUs,

ICAR, Agri. Dept. Producers and users (90.00%) was ranked V as the major constrains.

Whereas, lack of dealers network for bio-pesticides (89.17%) was ranked VI, unavailability of simple illustrated booklet on IPM (87.50%) was ranked VII, short shelf-life of trichocards and storage problem (86.67%) was ranked VIII, lack of proper training on IPM practices to be followed at particular stage of crop growth (85.00%) was ranked IX. Some other than these constraints, mis-guidance from agro-service centers, mechanical practices like detopping, hand picking of rosette flowers, clipping of terminal shoots and collection of affected fruiting bodies was time consuming, laborious and expensive, difficult to identify the harmful and beneficial insects to conserve the natural enemies, non availability of sheep or goats immediately after last picking of cotton, timely sowing of cotton in rainfed condition is impossible because of delayed monsoon, growing of maize in the field increases the problem of wild animals were ranked as X, XI, XII, XIII, XIV and XV respectively.

Table 2: Suggestion of cotton growers to overcome the constraints during effective implication of IPM technology

Sr. No.	Suggestions	IPM cotton growers (n=120)		Rank
		Frequency	Percentage	
1.	Quality pheromone traps and scientific light traps should be provided by government at cheaper rate	114	95.00	I
2.	Timely supply of trichocards, chrysopa eggs by biocontrol laboratories of State Agriculture Department and SAU's	112	93.33	II
3.	Good quality biopesticides like neem ark, *Beauveria, Verticillium* should made available at cheaper rate	110	91.67	III
4.	Demonstration on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM should be organized by State dept. of Agriculture , SAUs	107	89.17	IV
5.	Trainings should be organized on scientific installation of pheromone traps, light traps by state dept of Agri., SAU's and KVK	105	87.50	V
6.	Various IPM components like pheromones traps, light traps, sticky traps, neem powder, biopesticides etc. should made available at every agro-service centers in villages and talukas	104	86.67	VI
7.	The latest literature of IPM practices in simple and understandable language should be provided through various publications	103	85.83	VII
8.	Adequate support and encouragement for IPM technology should be given by Government	102	85.00	VIII
9.	Importance should be given to develop dealers network for bio-pesticides	100	83.33	IX
10.	Research should be undertaken on evolving new more effective bio-agents, biopesticides and their mass production technology	95	79.17	X
11.	Most of the bio-agents are live material and perishable, their immediate disposal is impossible, therefore provision of storage facility should be made in rural areas	92	76.67	XI

In order to overcome the said constraints some suggestions were given by the cotton growers said quality pheromone traps and scientific light traps should be provided by government (95.00 per cent) was ranked I, Timely supply of trichocards, chrysopa eggs by biocontrol laboratories of state Agri. department and SAU's (93.33%) was ranked II. Good quality biopesticides like neem ark, *Beauveria, Verticillium* should made available at cheaper rate (91.67%) was ranked III, Demonstration on installation of pheromone traps, light trap, yellow and blue sticky traps, use of bioagents for IPM should be organized by State dept.of Agriculture ,SAUs. (89.17%) was ranked IV. Trainings should be organized on scientific installation of pheromone traps, light traps by state dept of Agri., SAU's and KVK. (87.50%) was ranked V.

Various IPM components like pheromones traps, light traps, sticky traps, neem powder, biopesticides etc. should made available at every agro-service centre in village and taluka (86.67%) was ranked VI. The latest literature of IPM practices in simple and understandable language should be provided through various publications (85.83%) was ranked VII. Adequate support and encouragement for IPM technology should be given by Government. (85.00%) was ranked VIII, Importance should be given to develop dealers network for bio-pesticides (83.33%) was ranked IX. Research should be undertaken on evolving new more effective bio-agents and their mass production technology (79.17%) was ranked X, most of the bio-agents are live material and perishable, their immediate disposal is impossible, therefore provision of storage facility should be made in rural areas (76.67%) was ranked XI.

Conclusion

It is concluded that, majority of the cotton growers reported that, unavailability of quality pheromone traps and scientific light traps for the control of pink bollworm at agro service centers at proper time, unavailability of bio-agents such as *Trichogramma*, chrysopa eggs etc. at proper time, unavailability of quality biopesticides like neem ark, *Beauveria, Verticillium* etc., improper demonstration and trainings on installation of pheromone traps, light trap, yellow and blue sticky traps. lack of multidisciplinary linkage among SAUs, ICAR, Agri. Dept. Producers and users as the major constrains.

It also concluded that in order to overcome the said constraints some suggestions were given by the cotton growers said quality pheromone traps and scientific light traps should be provided by government at cheaper rate, timely supply of trichocards, chrysopa eggs by bio-control laboratories of state Agri. department and SAU's, various IPM components like pheromones traps, light traps, sticky traps, neem powder, bio-agents, good quality biopesticides like neem ark, *Beauveria, Verticillium* etc. should made available at every agro-service centre in village and taluka, demonstration and trainings on scientific installation of pheromone traps, light traps, yellow and blue sticky traps, use of bioagents, biopesticides etc. should be organized by State dept. of Agriculture, SAUs., and ICAR- KVK's.

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