https://doi.org/10.56572/gjoee.2022.si.0004 Guj. J. Ext. Edu. Special Issue

FARMER FIRST PROGRAMME: AN EFFECTIVE EXTENSION APPROACH FOR DISSEMINATION OF SUSTAINABLE COTTON PRODUCTION TECHNOLOGIES

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ABSTRACT

Field experiments were conducted during 2019-20 on 160 farmer's field of the villages Mav Jinjava, Hadala, Deri Pipaliya and Nava Vaghaniya of Bagasara Taluka of Amreli District of Gujarat on intensification and pink bollworm management in cotton under the Farmers First Project. The technological intervention of the study comprised of improved Bt. cotton hybrid GTHH-49, closer planting technology (90 cm x30 cm), de topping of cotton plant at 75 DAS, pink bollworm management with 16 pheromone traps/acre, spraying of Spinosad 45 EC @ 2ml/10 liter water and four spray of bio pesticide Beauveria bassiana. The technological intervention was compared with the farmer's practice. The results revealed that the technological intervention registered 18.82 % significantly higher seed cotton yield than farmer's practice, additional net return of ₹ 10417/ha with ICBR of 2.37 over the farmer's practice. The pink boll worm damage was significantly decreased under technological intervention and recorded 16.76% over the farmer's practice. The pink bollworm incidence under technological intervention was decreased up to 60.94 % over the farmer's practice.

Keywords : *bt. cotton, de-topping, close planting, pink bollworm*

INTRODUCTION

Cotton, a major economical crop of India, is considered as backbone of the national economy. Itcontributes about 1.4% to GDP and 6.9% of total value addition in agriculture. Export of cottonand textileproducts have a share of 57% in the overall exports of the country. Cotton scientific name (*Gossypium hirustum*) belongs to family *Malvaceae*. Cotton is unanimously designated as "King of fibers".

Cotton is one of the most important cash crops grown in major rainfed areas of central India (Madhu *et al.,* 2022). In India, cotton occupied on 111.42 lakh hectare with production of 325 lakh bales and productivity is 496 kg lint/ha. Among states, Maharashtra ranks first in acreage with 39 lakh ha and second in production yielding 82 lakh bales followed by to Gujarat with productivity of 355 kg lint/ha. Uncertain and poor distribution of rainfall that leads less moisture availability at boll formation stage caused low productivity of cotton in this region(Shukla *et al.*, 2013).Closer spacing leading to more rapidcanopy closer and decreased soil water evaporation isbecoming popular to address. Pink bollworm (*Pectinophora gossypiella* Saunders) is the key pest of cotton and requires regular control measures to produce a profitable crop. Rosseted flowers, intercellular burrowing, double seed formation discolored lint and burrowed seedscotton shows the infestation of pink bollworm causing above ETL level crossed *i.e.* 1-2 larvae/ cotton ball.

As such the information on suitable new cotton hybrid, crop geometry and integrated management of pink bollworm is lacking at present and will be very useful for exploiting its full potentiality to boost up the yield level of cotton under rainfed condition. In light of the above facts, experiments were conducted during *Kharif* season of 2019-20 on farmer's fields of four villages of Amreli district of Gujarat under the Farmers First Project.

OBJECTIVES

(1) Participatory development of crops, Integrated farming system, enterprise, livestock and NRM technologies for livelihood security and economic empowerment of resource poor farmers

(2) Capacity building of beneficiary farmers regarding different agricultural (crops, livestock, IFS and NRM) technologies

(3) Impact evaluation of different agricultural interventions on socio-economic, demographic and psychological traits of beneficiary farmers.

METHODOLOGY

To assess the economic feasibility of technology transfer for crop management and better productivity of cotton, the experiments were conducted on 160 farmers

field of 4 adopted villages of Amreli district of Gujarat during *Kharif* season of 2019-20 in rainfed condition. Each experiment was conducted on an area of 1.0 acre and the same area adjacent to the experimental plot was kept as farmer's practices. The package of improved production technologies including high yielding improved Bt. cotton hybrid GTHH-49, close planting technology (90X30 cm) and de-topping of cotton plant at 75 DAS. For pink bollworm management, installation of 16 pheromone traps/acre, spraying of Spinosad @ 2 ml/10 liter water and four sprays of bio-pesticide *Beuvaria basiana* @ 1.0 kg/acre. In the second plot, different Bt. cotton varieties with wider spacing and indiscriminate use of costlier chemical pesticides for plant protection and maintained as farmer's practice.

The data on seed cotton yield, reduction in pink bollworm incidence (%), pink boll worm damage, gross and net return were collected from the experimental plots. In addition to this, data on farmer practices were also collected and the ICBR was also calculated.

RESULTS AND DISCUSSION:

Table 1: Details of need based critical inputs given under FFP project on Cotton

Variety of Cotton	Villages	Area (Acre)	No. of farmers benefited	Technologies	Need based critical inputs
GTHH-49	Deri Pipaliya Mav Jinjava Hadala& NavaVaghaniya	80 acre	160	1. Adoption of high yielding improved Bt. hybrid GTHH-49. 2. Adoption of recommended crop production technologies: a. Advice to adopt close planting technology (90X30 cm): planting of cotton keeping 90 cm between rows and 30 cm between plants and de topping of cotton plant at 75 DAS 3. Adoption of crop protection technology: Pink Ball worm Management: • Installation of 16 pheromone traps/acre • For the control of pink ball worm, spray of Spinosad 45 EC @ 2 ml/10 litre water • Spray of bio-pesticide *Beauveria bassiana*	• Seed GTHH-49 • Pheromone traps (PBW) • Spinosad 45 EC • Bio-pesticide *Beauveria bassiana*

Under the intervention, improved Bt. cotton hybrid (GTHH-49), pheromone traps, insecticides and bio-pesticide for pink bollworm management were given to the farmers and farmers were also advised to follow closer spacing of 90X30 cm (Table 1) while other recommended package of practices were followed by the farmers under the supervision of JAU scientist in the intervention plots. Farmer's practice generally includes different Bt. cotton varieties with wider spacing and indiscriminate use of costlier chemical pesticides for plant protection. Pink bollworm is the key pest in reduction of the yield if not managed timely and properly and farmers generally don't follow integrated management practices well in advance to control the pink bollworm.

Table 2: Effect of intervention on seed cotton yield, economics and pink bollworm infestation during the year 2019-20 (n=160)

Sr. No.	Parameters	Experiment (Variety + Closer Spacing + Pink bollworm Mgt.)	Farmer's Practice	Z Test
1	**Seed cotton yield (kg/ha)**	2071**	1743	18.20**
2	**Yield increase (kg/ha)**	328	--	--
3	**Yield increase (%)**	18.82	--	--
4	**Gross return (₹/ha)**	113924	95881	--
5	**Additional return (₹/ha)**	18042	--	--
6	**Additional cost (₹/ha)**	7625	--	--
7	**Additional net return (₹/ha)**	10417	--	--
8	**ICBR**	2.37	--	--
9	**Pink boll worm damage (%)**	16.76**	42.90	35.35**
10	**Incidence decrease (%)**	60.94	--	--

** indicates z-test significant at 1% level of significance

Scientists field visit and monitoring of cotton crop at farmer's field

The data of the experimentation on farmer's fields presented in Table 2 clearly indicated that there was a significant difference between intervention and farmer's practice. The intervention of improved Bt cotton hybrids, closer spacing and integrated management of pink bollworm recorded significantly higher seed cotton yield of 2071 kg/ha. Farmer's practices registered seed cotton yield of 1743 kg/. The magnitude of increase in yield of the intervention over the farmers' practice was 18.82%.The technology intervention registered additional return of ₹ 18042 and over the farmer's practice having additional cost of ₹ 7625/ha over the farmer's practice, hence resulted in additional net return of ₹ 104174/ ha with B:C of 2.37. The technological intervention recorded significantly lower pink bollworm damage 16.76% while the farmer's practice registered 42.90%. The reduction in pink bollworm incidence under technological intervention was 60.94%. The improvement in yield and reduction in pink bollworm damage and incidence might be due to improved Bt. cotton hybrid GTHH-49, the improved production technologies and integrated management technologies for pink bollworm. Higher plant density in closer spacing utilized all natural resources like solar radiation, moisture, nutrients and space and wider spacing, it could not compensate for the loss in number of plants ha^{-1} and number of bolls m^{-2}. Similar results were reported by Paslawar *et al.* (2015), Madavi *et al.* (2017) and Leena *et al.* (2017).The incidence of pink bollworm was reduced over 50.0% under technological intervention of integrated management of pink bollworm and this result is in close conformity with the findings of Suman Devi & Roshan Lal (2017) and Venugopal *et al.* (2017).

CONCLUSION

From the field experiments conducted on 160 farmers' fields at four villages of Bagasara taluka of Amreli district during 2019-20 under the Farmers FIRST Programme, it can be concluded that higher production and profit can be obtained by adopting improved Bt. cotton hybrid GTHH-49 with closer spacing (90 X 30 cm.) de topping of cotton plant at 75 DAS and and integrated management of pink bollworm with pheromone traps, bio-pesticide (*Beuveria basiana*) and chemical pesticide (Spinosad) under North Saurashtra Agro-climatic Zone of Gujarat.

RECOMMENDATION

The farmers of North Saurashtra agroclimatic zone are recommended to adopt improved Bt. cotton hybrid GTHH-49 with closer spacing (90 cm X 30 cm.) de topping of cotton plant at 75 DAS and integrated management of pink bollworm with pheromone traps, bio-pesticide (*Beuveria basiana*) and chemical pesticide (Spinosad) for getting higher yield and profitability from cotton crop.

ACKNOWLEDGEMENT

I wish to express my sincere thanks and gratitude to Hon'ble Vice Chancellor, JAU, Junagadh for providing opportunities to work in this auspicious project. I acknowledge my thanks to Director of Extension Education, JAU, Junagadh for his continuous support and encouragement. I am also thankful to PI of this project for facilitating all the required facilities in executing this project.

CONFLICT OF INTEREST

No conflict of interest among the researchers

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Received : March 2022 : Accepted : May 2022