ISSN: 2319-5967
ISO 9001:2008 Certified
International Journal of Engineering Science and Innovative Technology (IJESIT)
Volume 4, Issue 2, March 2015

Impact of Front Line Demonstrations (FLD) on the Yield of Cotton

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Abstract: ***The study was carried out during kharif season in two villages viz., Goragummi (Gangavaram mandal) and Lotupalem (Devipatnam mandal) in agency area of Rampachodavaram division of East Godavari District during the year 2014. Total 30 demonstrations on cotton crop were carried out in an area of 30 acres by the active participation of farmers with the objective to demonstrate the improved technologies of cotton production potential. The improved technologies consisting use of balanced fertilizer application, integrated pest management and use of high yielding Bt cotton variety (Tulasi). Front Line Demonstrations recorded higher yield (9 quintals) as compared to farmer's local practice (6 quintals). The improved technology gave higher gross (Rs.32,690/-) and net returns (Rs. 27,000/-) with higher benefit cost ratio of 5.74 thanthe farmer's practice.***

Index Terms: **Cotton Hybrids, Production, IPM, Yield.**

I. INTRODUCTION

Cotton (*Gossypium sp*) white gold, the most important commercial crop of India, is subjected to the ravages of a number of insect pests. The use of Bt-Cotton in India has grown exponentially since its introduction. Recently India has become the number one global exporter of cotton and the second largest cotton producer in the world. India has also bred Bt-cotton varieties [2] such as *Bikaneri Nerma* and hybrids such as (NHH-44), setting up India to benefit now and well into the future.

Socio-economic surveys confirm that Bt-Cotton continues to deliver significant and multiple agronomic, economic, environmental and welfare benefits to Indian farmers and society including halved insecticide requirements and a doubling of yields [7]. The five leading exporters of cotton in 2011 are the United States, India, Brazil, Australia and Uzbekistan [12]. The largest nonproducing importers are Korea, Taiwan, Russia and Japan. In India, the states of Maharashtra (26.63%), Gujarat (17.96%) and Andhra Pradesh (13.75%) and also Madhya Pradesh are the leading cotton producing states. These states have a predominantly tropical wet and dry climate. Although it is the world's largest cotton producer, India is importing 7 million tons (MT) of cotton every year to meet its domestic demand. However, during the last decade, growth in cotton production has increased significantly.

Sucking pests have become quite serious from seedling stage and heavy infestation in later stages reduces the crop yield to a great extent. The estimated loss due to sucking pests is up to 21.20% [3]. Among the sap feeders, aphids (*Aphis gossypii* (Glover)), leafhoppers (*Amrasca biguttula biguttula* (Ishida)), thrips *(Thrips* tabaci (Linn)) and whitefly (*Bemisia tabaci)* are deadly pests. Cotton growers in India depend heavily on synthetic pesticides to combat sucking pests. At least 2-3 sprays are directed against sucking pests. Chemical controls which involve use of synthetic pesticides only are required and often only at specific times in a pest life cycle [1]. Due to continuous and indiscriminate use of synthetic insecticides, there is resistance and hence the efficacy has become less reliable. To overcome this problem discovery of novel substances with different biochemical targets are needed. Novel molecules are effective at low doses and have less exposure in the environment.

The area of Rampachodavaram division of East Godavari comes under tribal belt where lack of awareness in rural youth, practicing farmers and tribal women is a common problem. Therefore, this investigation was carried out for popularizing cotton production with the objective of reducing cost of plant protection and increased cotton yield per capita.

II. MATERIALS AND METHODS

The present study was carried out by the Krishi Vigyan Kendra, Pandirimamidi, in *kharif* season in the farmer's fields of two villages namely, Lothupalem and Goragommi, agency area of East Godavari District during 2014.

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30 Front Line Demonstrations were carried out in an area of 30 acres were conducted in these villages. Materials for the present study with respect to FLD was as following

(i) Improved variety (**Tulasi -** Bt cotton hybrid)
(ii) Raising of trap crops and inter crops
(iii) Fertilizers (N:P: S: Zn) 20:40 :20 : 20 kg/ha
(iv) Adoption of IPM (Imidacloprid-500ml; Acetamiprid-250g; Neem oil-1lt/acre/farmer)

The improved technology included modern variety and maintenance of optimum plant population. The sowing was done during first fortnight of July and the spacing adopted was (90x60 cm) in cotton. The seed rate of cotton was 6 kg/ac. The fertilizers were given as per improved practices as basal dose. One hand weeding on 45 DAS kept the field weed free up to 60 DAS. The crop was harvested at perfect maturity stage with suitable method. Integrated pest management practises followed by deep ploughing, yellow sticky traps, raising of trap crops and inter crops and chemical practises.

In general, soils of the area under study were red medium to low fertility status. In demonstration plots, critical inputs in the form of quality seed and treatment, farm manure, balanced fertilizers and agro-chemicals were provided by KVK. For the study, technology gap, extension gap and technology index were calculated as suggested by [14].

Technology gap = Potential yield- Demonstration yield
Extension gap = Demonstration yield-Farmers yield
Technology index (%) = Technology gap / Potential yield x 100

III. RESULTS AND DISCUSSION

Yield

The average yield of cotton 9qt/acre was much higher as compared to average yield of farmer's practices (cotton (6-7qt/acre). The average percentage increased in the yield over farmer's practices was 60 per cent cotton. The results indicated that the front line demonstrations have given a good impact over the farming community of East Godavari district as they were motivated by the new agricultural technologies applied in the FLD plots (Table 1).

Technology gap

The technology gap in the demonstration yield over potential yield was 1qt/ac for cotton. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions [11] (Table 1). Efficacy of thiomethoxam against sucking pest has been documented previously [13] where in the chemical was effective against thrips and leaf hoppers and obtained highest seed cotton yield. Similar reports were also made by [14] and [3]. Newer technologies that directly incorporate genes into crop genomes, commonly referred to as genetic modification or genetic engineering, are integrating new traits into crop germplasm. The most-widely distributed are the different insecticidal proteins derived from *Bacillus thuringiensis*. Upon these two layers, growers can further reduce pest pressure by considering both biological and chemical inputs [9].

Extension gap

The extension gap of 3qt/ac has been recorded through FLD's. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology (Table 1). This finding is in corroboration with the findings of [6].

Technology Index

The technology index shows the feasibility of the evolved technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology (Jeengar, et al., 2006). The technology index was 10.0 percents for cotton (Table 1). Conventional tillage in dry land cotton increased water stress, causing plants to shed squares and bolls, and allocated more resources into vegetative growth. The conservation tillage cotton responded by fruiting at a higher rate. Increased plant height and number of leaves in conventional tillage provided significantly more light interception and shading of the soil surface between rows. Temperatures in

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conservation tillage rows were higher than in conventional tillage fields by about 15ºC and resulted in increased mortality of insects in fallen fruit (Greenberg et al., 2004, 2010)

Economic return

The input and output prices of commodities prevailed during the study of were taken for calculating gross returns, cost of cultivation, net returns and benefit: cost ratio (Table 2). The cultivation of cotton under improved technologies gave higher net returns of Rs. 32,690/- per acre, as compared to farmer's practices. The benefit cost ratios of cotton under improved technologies were 5.74 as compared to 3.57 under farmer's practices. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of [10].

Reasons of low yield of cotton at farmer's field

Optimum sowing time is not followed due to non availability of quality seed. Lack of popularization of seed cum fertilizer drill for sowing and use of inadequate and imbalance dose of fertilizers especially the nitrogenous and phosphate fertilizers by farmers does not make possible to fetch potential yield. Mechanical weed control is costly and chemical control is quite uncommon in this region (Tribal agency area).

Specific constraints with marginal/sub marginal farmers

Small Holding: The adoption of well proven technology is constrained due to small size of holding and poor farm resources. Small and marginal farmers have less capability to take risk and do not dare to invest in the costly input due to high risk and the poor purchase capacity of small farmer.

Farm Implements and Tools: Traditional implements and tools are still in practice due to small holding which have poor working efficiency. The lack of simple modern tools for small holding also hinders the adoption of improved technology.

Thus, the cultivation of cotton with improved technologies has been found more productive and seed yield might be increased up to 60 per cent. Technological and extension gap extended which can be bridges by popularity package of practices with emphasis of improved variety, use of proper seed rate, balance nutrient application and proper use of plant protection measures. Replacement of local variety with the released variety of cotton would be increase in the production and net income to the tribal farmers.

IV. ACKNOWLEDGEMENT

The authors are highly thankful to the Agricultural Technology and Management Agency (ATMA-East Godavari, A.P) for providing financial assistance towards organizing front line demonstrations. Hence, by conducting front line demonstrations of proven technologies, yield potential of cotton crop can be increased to great extent. This will subsequently increase the income as well as the livelihood of the farming community.

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Volume 4, Issue 2, March 2015

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ISSN: 2319-5967
ISO 9001:2008 Certified
International Journal of Engineering Science and Innovative Technology (IJESIT)
Volume 4, Issue 2, March 2015

as research Associate, I have implemented on farm testing's, front line demonstrations and organized trainings and extension activities. Published 3 research articles and 5 popular articles.

APPENDIX

Table 1 productivity, technology gap, extension gap and technology Index of pulses under FLDs

Name of crop and variety	Bt cotton hybrid &Tulasi
Area (ac)	30 acres
No. of farmers	30
Potential yield (qt/ac)	10qt/acre
Improved technologies	9qt/qc
Local farmers practices	6qt/qc
% increase over local check	60%
Technology gap (qt/ac)	1qt/ac
Extension gap (qt/ac)	3qt/ac
Technology index (%)	10%

Table 2 Gross return (Rs./ha), Cost of cultivation (Rs./ha), net return (Rs./ha) and B:C ratio as affected by improved and local Technologies

Year	**2014**
Improved technologies (Gross returns)	32690
Local farmers practices (Gross returns)	25000
Improved technologies (cost of cultivation)	5690
Local farmers practices (cost of cultivation)	7000
Improved technologies (net returns)	27000
Local farmers practices (net returns)	18000
Improved technologies (B:C ratio)	5.74
Local farmers practices (B:C ratio)	3.57