



## Evaluation of Front Line Demonstrations on Fertigation in Cotton

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### ABSTRACT

The present study in the form of frontline demonstrations were conducted by DAATT Centre, warangal during 2011,2012 to 2013 crop seasons in six villages of Warangal district of Telangana state. The results of demonstrations showed that farmers could increase the seed cotton yield notably by switching over to drip fertigation and adoption of improved production technology. From the front line demonstrations, it was observed that the drip fertigation in cotton recorded the higher average yield of three years (56.03q/ha) compared to average yield of the farmers' practices (28.82 q/ha). The percentage in yield increase in the demonstration was 91.6, whereas extension gap, technology gap and technology index over farmer's practices were 27.87 kg/ha, 13.1 and 18.9 respectively.

Key words: Fertigation in cotton, FLDs, evaluation.

Cotton (*Gossypium spp.*) is one of the most important commercial crops playing a key role in economics and social affairs of the World. Cotton is the major commercial fibre crop which accounts for 75 per cent of the fibre used in the textile industry in India. Bt (*Bacillus thuringiensis*) cotton technology has been widely accepted by Indians across the country since its first commercialization in 2002. Release of Bt cotton for commercial cultivation in India has been a historical event in increasing the productivity of cotton. India is the largest cotton growing country in the world with an area of 119.27 lakh ha and produces 342.20 lakh bales with a productivity of 487 kg lint ha<sup>-1</sup>. While in Telangana the area and productivity of cotton are 18.13 lakh ha and 423 kg lint ha<sup>-1</sup>, respectively during 2012-2013 (DoES, 2015). The productivity of cotton in Telangana is lower compared to national average productivity. Almost 95 per cent of total area under cotton is converted to Bt cotton. Application of fertilizer along with irrigation water through drip fertigation improves seed cotton yield and fertilizer recovery and provides better timing to meet crop demand throughout the cotton growing season. So to aware the farmers about information on drip fertigation for cotton these front line demonstrations wear conducted in different villages.

### MATERIAL AND METHODS

The study was carried out in operational area of DAATT Centre, Warangal located in Telangana state. Six demonstrations were conducted in cotton crop in 6 villages during the period three years. The demo field was ploughed using tractor drawn disc plough followed by tiller. Levelled raised beds of 1.2 m width with furrows of 30 cm width and 15 cm depth were formed for drip fertigation treatments. In each raised bed two rows of cotton were planted at the spacing of 90 cm with plant to plant distance of 60 cm. Drip irrigation system was installed from sub main and its inline laterals were laid at a spacing 3 feet. The recommended dose of fertilizer (RDF) for test variety of cotton is 118:59: 59 kg of NPK ha<sup>-1</sup>. Phosphorus was applied as basal to soil. Nitrogen and potassium were applied as per the schedule through fertigation in the form of urea and muriate of potash, respectively, urea was given in 16 equal splits at 15 days interval and MOP 8 equal splits at 30 days interval commencing from 14 DAS up to 110 DAS. For the study, technology gap, extension gap and technology index were calculated as suggested by (Samui, *et al.* 2000).

$$\text{Percent increase yield} = \frac{\text{Demonstration yield} - \text{farmers yield}}{\text{Farmers yield}} \times 100$$

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration yield-Farmers yield

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstrated yield}}{\text{Potential yield}} \times 100$$

## RESULTS AND DISCUSSION

The average yield of seed cotton with fertigation is 56.03 q/ha was much higher than average yield of farmers practices 28.82 q/ha. The average percentage of increase in the yield over farmer's practices was 94. The results indicated that the front line demonstrations have given a good impact over the farming community of Warangal district as they were motivated by the new agricultural technologies applied in the FLD plots (Table 1). This finding is in corroboration with the findings of (Jayakumar *et al.* 2014). Adoption of drip fertigation with 100 per cent recommended NPK recorded higher boll weight (4.2 g boll<sup>-1</sup>) than the Farmer practice 3.3 g boll<sup>-1</sup> (Table 1). This might be due to application of fertilizers based on growth stage resulted in availability of nutrients during crop growth period and maintaining adequate soil moisture in the root zone depth throughout the crop growth period which facilitated in better uptake of water and nutrients having beneficial effect on growth and branches formation as a result of optimum moisture and nutrition to the crop through drip irrigation and fertigation there by increased photosynthates and translocation of more assimilates from source to sink which resulted in increased boll weight and more number bolls plant<sup>-1</sup> as reported by (Yadav *et al.*, 2014) and also due to fertigation more nutrient uptake, fertilizer utilization efficiency and percentage of nutrient derived from fertilizer as compared with soil application fertilizers (Mohammad, 2006). Similar findings were also recorded by (Grieesha 2003).

### Extension gap

The yield gap in cotton between fertigation and farmer practise is 27.87 q/ha which is due to extension gap. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reduce extension gap. Maintaining optimum plant

population in unit area, supplying nutrients continuously with drip irrigation, growing hybrids having high yield potential, drought tolerance and multiple resistance to pests and diseases 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 2). This finding is in corroboration with the findings of (Hiremath and Nagaraju 2010).

### Technology gap

The technology gap is the demonstration yield over potential yield was 13.1q/ha for cotton. The technological gap may be attributed to the indiscriminate use of plant nutrients and unfavourable weather conditions (Mukherjee 2003) (Table 2). Efficacy of drip with fertigation compared to flood irrigation with soil application of fertilizer has been documented previously (Grieesha 2003) where in the fertilizer and water use efficiency was more in drip fertigation which resulted in highest seed cotton yield. Similar reports were also made by (Pawar *et al.*, 2014).

### 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 average technology index was 18.9 percents for cotton (Table 2).

### Economics of frontline demonstrations

The input and output prices of commodities prevailed during the study were taken for calculating gross returns, cost of cultivation, net returns and benefit: cost ratio (Table 3). The cultivation of cotton under drip fertigation gave higher net returns of Rs. 1,17,634/- per hectare, as compared to farmer's practices. The benefit cost ratios of cotton under drip fertigation were 3.6 as compared to 1.2 under farmer's practices. This may be due to higher yields and lower cost to fertiliser obtained under drip fertigation compared to local check (farmers practice). This finding is in corroboration with the findings of (Narayana *et al.* 2008) and (Bharath Raj *et al.* 2015)

**Table 1. Yield and yield attributing character of cotton under FLDs.**

Year	Trial (No.)	Area (ha)	Average yield (q/ha)		Per cent increase in yield	Boll weight (g boll <sup>-1</sup> )	
			Trial	Farmers practice		Trial	Farmers practice
2010-11	6	0.5	59.28	32.11	84.6	4.1	3.6
2011-12	6	0.5	54.34	25.17	100	4.3	3.2
2012-13	6	0.5	54.47	27.19	100	4.2	3.2
Total/Average	6	0.5	56.03	28.82	94.8	4.2	3.3

**Table 2. Technology & Extension gap and Technological Index of cotton under FLDs.**

Year	Trial (No.)	Area (ha)	Technology gap (q/ha)	Extension gap (q/ha)	Technological index (%)
2010-11	6	0.5	9.80	27.17	14.1
2011-12	6	0.5	14.82	29.17	21.4
2012-13	6	0.5	14.69	27.28	21.2
Total/Average	6	0.5	13.10	27.87	18.9

**Table 3. Economic impact of cotton under FLDs.**

Year	Trial (No.)	Area (ha)	Gross Income (Rs./ha)		Net Return (Rs./ha)		B:C Ratio	
			Trial	Farmers practice	Trial	Farmers practice	Trial	Farmers practice
2010-11	6	0.5	2,34,156	1,26,834.5	1,69,936	32,974.5	3.6	1.3
2011-12	6	0.5	2,20,077	1,10,038.5	1,59,562	61,256.0	3.6	1.1
2012-13	6	0.5	2,23,327	1,11,479.0	1,59,724.5	9,675.5	3.5	1.0
Total/Average	6	0.5	2,25,853.3	1,16,117.3	1,63,074.1	34,635.2	3.5	1.1

*Price of seed cotton in 2011-Rs3950/- and 2012- Rs 4050/- 2013- Rs 4100/-*

#### **Specific constraints with marginal/sub marginal farmers:**

##### **Small holding:**

The adoption of well proven technology is constrained due to lack of awareness and small size of holdings and poor farm resources. Small and marginal farmers have less capability to take risk and do not dare to invest in the costly input. Only huge subsidy to the equipment irrespective of cast, creed and crop can push the technology. if possible subsidy should also be extended to water-soluble fertilisers.

#### **CONCLUSION:**

It can be concluded that drip with fertigation produces more seed cotton yield and net profit than the farmer practise. This practise will also reduce the cost of cultivation and labour shortage in villages and also minimise water and fertilizer losses and improve the fertilizer use efficiency and water use efficiency in the cotton fields.

## LITERATURE CITED

- Bharath Raj H R, Mukund Joshi and Vishaka G V 2015** Effect of surface fertigation on nutrient uptake, fertilizer use efficiency and economics of inter-specific hybrid *Bt* cotton. *Universal Journal of Agricultural Research*, 3 (2): 46-48.
- DoES. 2015 Season and Crop Report, Telangana.** Directorate of Economics and Statistics (DoES), Hyderabad. 92-93.
- Gireesha G 2003** Crop establishment studies to increase yield in irrigated cotton (cv. MCU 12). *M.Sc. (Ag) Thesis*. Tamil Nadu Agricultural University, Coimbatore.
- Hiremath S M and Nagaraju M V 2010** Evaluation of on-farm front line demonstrations on the yield of chilli. *Karnataka Journal of Agricultural Sciences*, 23 (2): 341-342.
- Jayakumar M, Surendran U and Manickasundaram P 2014** Drip fertigation effects on yield, nutrient uptake and soil fertility of *Bt* Cotton in semi arid tropics. *International Journal of Plant Production*, 8 (3).
- Jeengar K L, Panwar P and Pareek O P 2006** "Front line demonstration on maize in bhilwara District of Rajasthan," *Current Agriculture*, vol. 30(1/2), pp. 115-116.
- Mukherje N 2003** Participatory, learning and action Concept, Publishing Company, New Delhi, pp. 63-65.
- Muhammad Maqsood, Tariq Hussain, Tayyab M and Ibrahim, M 2006** Effect of different irrigation levels on the yield and radiation use efficiency of cotton (*Gossypium hirsutum L.*) under two sowing methods. *Pakistan Journal of Agricultural Sciences*, 43 (1, 2): 21-24.
- Narayana E, Hema K, Srinivasulu K, Prasad N V S D and Rao N H P 2008** Performance of *Bt* cotton hybrid (NCS- 145 *Bt.*) to varied spacing and fertilizer levels in vertisol under rainfed conditions. *Journal of Indian Society for Cotton Improvement*, 33: 33-36.
- Pawar D D, Dingre S K and Surve U S 2014** Split application of nutrients through fertigation in *Bt* cotton. *Journal of Cotton Research and Development*, 28 (2): 238-242.
- Samui S K, Mitra S, Roy D K, Mandal A K and Saha D 2000** Evaluation of front line demonstration on groundnut. *Journal of the Indian Society Coastal Agricultural Research*, 18 (2):180-183.
- Yadav B S, Chauhan R P S, Bhatia K N and Yadav N K 2014** Studies on drip fertigation on growth, yield and pest incidence of American cotton (*Gossypium hirsutum L.*) and *desi* cotton (*Gossypium arboretum L.*) on sandy loam soil. *Journal of Cotton Research and Development*, 28 (2): 234-237.

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