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Research Article

Boosting Bt cotton productivity through frontline demonstrations

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Abstract : The present study was conducted across 30 villages in Muktsar district of Punjab. Fifty front line demonstrations were conducted by KVK Muktsar from the year 2008 to 2010 during the *Kharif* seasons. The results of the study revealed that the average yield of Bt cotton under FLDs on integrated nutrient management (INM) varied between 22.40 q/ha to 24.20 q/ha, whereas, under the farmers' practice, it varied between 19.43 q/ha to 21.95 q/ha. The FLD plots recorded a per cent increase in yield to the tune of 6.88 to 15.28. The yield of Bt cotton was much better under FLD plots on integrated nutrient management (INM) as compared to under farmers' practice due to foliar application of potassium nitrate (13:0:45) @ 2 per cent at flowering initiation stage. The study further revealed that the increment in yield of cotton crop under front line demonstrations was due to dissemination of improved and latest technology *viz.,* fertilization and plant protection measures. The data depicted that ridge sowing accounted for approximately 30 per cent water saving without adversely affecting the yield of cotton under FLD plots.

Key Words : Froutline demonstration, Productivity, Integrated nutrient management, Technological interventions.

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INTRODUCTION

Cotton plays a key role in the national economy in terms of direct and indirect employment and income generation in the agricultural and industrial sectors. It is cultivated in tropical and sub tropical regions of more than 80 countries. Presently, the total area under cotton cultivation in India is 121.91 lakh hectares with production of 356 lakh bales of 170 kg (Cotton Advisory Board 2011-12).

The ICAR has always underlined the importance of scientist-farmer linkage for the effective transfer of latest agricultural technologies. To achieve the desired objectives, the Government of India had established a "Technology Mission on cotton" under mini mission II in the year 2000. The main objectives of the mission were to enhance the production, per unit area through (a) technology transfer, (b) supply of quality seeds, (c) elevating IPM activities/ and (d) providing adequate and timely supply of critical inputs to the farmers. These demonstrations are conducted under the close supervision of scientists of Krishi Vigyan Kendras, SAUs and their Regional Research Stations. The FLD is an important tool for transfer of latest package of practices in totality to farmers and the main objective of this programme is to demonstrate newly released crop production and protection technologies and management practices at the farmers' field under real farming situation. Through this practice, the newly improved innovative technology having higher production potential under the specific cropping system can be popularized and simultaneously feedbacks from the farmers may be generated on the demonstrated technology.

The present study has been undertaken to study the

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difference between demonstrated package of practices *vis-a-vis* practices followed by the local farmers in cotton crop. Under the demonstration package, two components evaluated were integrated nutrient management (INM) and water saving techniques in cotton. Under integrated nutrient management (INM), Krishi Vigyan Kendra Muktsar conducted 25 front line demonstrations across 21 villages to study the effect of foliar application of potassium nitrate (13:0:45) in cotton, whereas, under water saving techniques, 25 front line demonstrations on ridge sowing in Bt cotton were conducted across 9 villages.

EXPERIMENTAL METHODS

The study was carried out in operational area of Krishi Vigyan Kendra, Muktsar located in south western Punjab. 25 front line demonstrations were conducted on integrated nutrient management (INM) in Bt cotton across 21 villages over the period of three years. Further, under water saving techniques, 25 front line demonstrations on ridge sowing in cotton were conducted across 9 villages during the period of three years. The primary data were collected from the selected farmers with the help of interview schedule and interpreted and quantitative data expressed in terms of per cent increased yield. Thus, a total sample size comprised of 50 respondents from 30 villages across Muktsar district wherein, FLDs were conducted by KVK Muktsar.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been discussed in detail under following heads :

Major differences between demonstration package and farmers' practices being followed in Bt cotton:

The differences in adoption of production technologies in Bt cotton under demonstrations and local farmers' practices were measured. The major differences were observed regarding recommended varieties, seed rate, time and method of sowing, fertilizer dose, method of fertilizer application and method of irrigation. Table 1 shows that under the demonstrated plot only recommended varieties, potassium nitrate (13:0:45) and recommended insecticides were given to farmers by the KVK and all the other package and practices were timely performed by the farmer itself under the supervision of KVK scientists.

Table 1 : Differences between technological interventions and farmers' practices for Bt cotton

Sr. No.	Particular practice	Demonstration package	Farmers' practice
1.	Hybrid	RCH 134, MRC 7017	Non recommended Bt hybrids
2.	Seed rate	RCH 134:1500 g/ha MRC 7017: 1875 g/ha	Higher seed rate
3.	Time of sowing	Ist fortnight of April- Ist fortnight of May	2nd fortnight of May
4.	Fertilizer dose	DAP : 67.5 kg/ha Urea: 300kg/ha and + Foliar application of potassium nitrate (13:0:45) @ 2 % at floral initiation stage, 4 sprays at weekly intervals	Irrational use of nitrogenous and phosphatic fertilizers + Foliar application of N:P:K (19:19:19) @ 1-2 % at floral initiation stage, 2-3 sprays at weekly intervals
5.	Method of irrigation	Furrow irrigation	Flooding
6.	Plant protection measures	Recommended plant protection measures	In judicious use of insecticides

Table 2 : Effect of potassium nitrate (13-0-45) @ 2% on performance of Bt cotton hybrid under demonstration *vis-à-vis* farmers' practice

Year	Variety	Under FLD programme		Avg. yield (q/ha)		% Increase in the yield over farmers practice
		No. of demonstrations	Total area (ha)	Demonstration	Farmers practice	
2008	RCH 134	10	4.0	23.28	21.78	6.88
2009	RCH 134	10	4.0	22.40	19.43	15.28
2010	MRC 7017	5	2.0	24.20	21.95	10.25

Table 3: Effect of ridge sowing on performance of Bt cotton hybrid under demonstration *vis-à-vis* farmers' practice

Years	Variety	Under FLD programme		Avg. yield (q/ha)		% Increase in the yield over farmers practice
		No. of demonstrations	Total area (ha)	Demonstration	Farmers practice	
2008	RCH 134	10	4.0	18.64	18.45	1.03
2009	RCH 134	10	4.0	19.70	19.65	0.25
2010	MRC 7017	5	2.0	24.10	23.50	2.55

Under farmers' practice, they generally sowed seeds of non recommended Bt hybrids at higher seed rate. It was also observed that under farmer situation, normally sowing of cotton was late, leading to reduction in yield. Similar findings were reported by Dhaliwal *et al*. (2004). The farmers resorted to irrational use of nitrogenous and phosphatic fertilizers. Similar trend was highlighted by Dhaliwal *et al*. (2004) as they also observed that phosphatic fertilizers were over utilized in cotton. Besides, foliar application of N: P: K (19:19:19) @ 1-2 per cent at floral initiation stage, 2-3 sprays at weekly intervals is common prevalent practice. Under demonstration, farmers opted for foliar application of potassium nitrate (13:0:45), 4 sprays at weekly interval starting from floral initiation stage. Similar findings have also been observed by Khan and Chauhan (2005), Kirar *et al.* (2006), Yadav *et al.* (2007) and Asiwal and Hussain (2008) and Singh *et al.* (2011).

The effect of potassium nitrate (13:0:45) @ 2 per cent on production performance of Bt cotton under FLD programme:

The results obtained during period under study are presented in Table 2. The results revealed that the average yield of cotton under FLD plots varied between 22.40 to 24.20 q/ha, whereas, under the farmers' practice, it varied between 19.43 to 21.95 q/ha. The FLD plots recorded per cent increase in yield over the farmer practice to the tune of 6.88 to 15.28. This may be attributed to the fact that Bt cotton has higher demand for potassium at boll development stage which cannot be fulfilled through soil application of potash and N: P: K (19:19:19). The higher potassic content of 45 per cent in potassium nitrate (13:0:45) accounted for higher yield than 19 per cent potash availability in N: P: K (19:19:19). The beneficial effects of foliar application may also be attributed to role of potassium in osmoregulation during hot summer months coinciding with boll development stage.

The effect of ridge sowing on production performance of cotton under FLD programme:

The data presented in Table 3 showed that the yield under FLD plots on ridge sowing was at par with farmer practice, the difference lied with additional benefit of water saving under ridge sowing. It is stated that the underground water in Muktsar district is brackish in nature. The cotton cultivation is mainly dependent on canal irrigation. Ridge sowing proved to be a very good resource conservation technology as it accounted for utilization of good quality canal water on additional 30 per cent area.

Conclusions:

It is concluded that the FLD programme is an effective tool for increasing the production and productivity of cotton crop and changing the knowledge, attitude and skill of farmers. Foliar application of potassium nitrate (13:0:45) @ 2 per cent at floral initiation stage, 4 sprays at weekly intervals accounted for 6.88 to 15.28 per cent increase in yield of Bt cotton under demonstration plots. Further, ridge sowing accounted for approximately 30 per cent water saving without adversely affecting the yield of Bt cotton under FLD plots. These demonstrations also built the relationship and confidence between farmers and scientists.

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