



Response of soluble fertilizer on productivity and profitability of *Bt* cotton based cropping system in semiarid environment

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ABSTRACT : Farmers' participatory front line demonstrations on foliar spray of potassium nitrate (Three foliar sprays of potassium nitrate @ 1 % starting from flowering at 10 days interval) were conducted on *Bt* cotton (hybrid bioseed 6588) during *kharif*, 2013-2015 as preceding crop and wheat (variety HD 2967) as succeeding crop at 40 locations covering an area of 0.4 ha at each location under demonstration and same area was also devoted under local check selected from the cluster villages under CCS, HAU, Krishi Vigyan Kendra, Fatehabad, Haryana. The study reveals that pooled average seed cotton yield and wheat yield was to the tune of 24.58 and 50.65 q/ha in demonstration as compare to 22.73 and 45.92 q/ha in local check, which was 8.14 and 10.3 per cent higher that of local check of both the crops, respectively. The data on economic parameters reveals that a net return was to the tune of 39.3 and 154.1 per cent higher under demonstration over local check in both consecutive crops, respectively. Benefit: Cost ratio figured 1.51:1 and 1.19:1 under demonstrations as compared to 1.37:1 and 1.08:1 in local check in both consecutive crops, respectively. Further, increased in extension gap of 2.49 and 4.88 q/ha in cotton and wheat, respectively, suggesting the higher profitability and economic viability of the technology demonstrated.

Key words : B:C ratio, *Bt* cotton, economics, fertilizer, foliar spray, wheat, yield

Cotton wheat cropping is the second most important cotton based cropping system in the South Asia (4.5 M ha) and India (2.6 M ha) and contributes significantly to the food security in the region. Being a cash and grain cropping system, it is highly remunerative with assured returns (Anonymous, 2016). Production of *Bt* cotton has suffered severely due to abrupt weather conditions and erratic rainfall, sever incidence of sucking pest, occurrence of wilt, flower drop and not/late opening of bolls due to which cotton bolls in majority of cases did not open well in time which resulted yield loss as well as delayed sowing of succeeding wheat crop. Thus, there is need to increase its yields

through adoption of suitable crop production technique like foliar sprays of fertilizers along with other agronomic practices. Cotton plants require a specific amount of certain nutrients in specific format applied at an appropriate time for their growth and development. Now a days, soil application of nutrients (*i.e.* N, P, K and Zn) is found to be very expensive. In addition, the availability of these nutrients will be affected by several environmental factors, that is, antagonism, element deposition, leaching etc. In contrast, foliar feeding technique as a particular way to supply these nutrients could avoid these factors and results in a rapid absorption, which is more effective and less

costly. In the view of these facts, a colossal need was felt to conduct the present study on foliar spray of potassium nitrate on *Bt*. Cotton.

MATERIALS AND METHODS

Farmers' participatory front line demonstrations on foliar spray of potassium nitrate (Three foliar sprays of potassium nitrate @ 1 % starting from flowering at 10 days interval) were conducted on *Bt* cotton (hybrid bioseed 6588) during *khariif*, 2013-2015 as preceding crop and wheat (variety HD 2967) as succeeding crop at 40 locations covering an area of 0.4 ha at each location under demonstration and same area was also devoted under local check selected from the cluster villages under CCS, HAU, Krishi Vigyan Kendra, Fatehabad, Haryana. The soil of the experimental locations were sandy loam in texture, low in available N, medium in P and K with slightly alkaline in reaction (pH- 8.0 to 8.2). Recommended agronomic practices were followed in both the crops and data on yield of *Bt* cotton crop as well as succeeding wheat crop were recorded from time to time at farmers' field as well as feedback was taken from the farmers. To estimate the extension gap, demonstration plot yield was subtracted from local check yield.

The economics and benefit cost (B:C) ratio was worked out by simple tabular analysis.

RESULTS AND DISCUSSION

The perusal of pooled data (2013 - 2015) in Table 1 and 2 reveals that pooled average seed cotton yield and wheat yield was to the tune of 24.58 and 50.65 q/ha in demonstration as compare to 22.73 and 45.92 q/ha in local check, which was 8.14 and 10.3 per cent higher that of local check of both the crops, respectively. It was due to the fact that the foliar spray of potassium nitrate improved cotton yield by reducing flower and boll drop, less incidence of insect-pest and diseases, improves the seed quality of cotton as compare to local check and enhance maturity, which in terms improves the yield of succeeding wheat crop. The results are in conformity with the findings of Sriharsha *et al.*, (2016). The average extension gap of three year study was estimated to be 2.49 and 4.88 q/ha in cotton and wheat, respectively. More and less similar results were also reported by Patel *et al.*, (2013). A thorough understanding of the data shows that average gross return was found to be Rs.110435 under demonstration as compare to local check which was found Rs. 98994 in cotton, while it

Table 1. Effect of different treatments on yield and economics of *Bt* cotton (Pooled data *khariif*, 2013-2015)

Year	Yield (q/ha)		Increase over local check (%)	Ext-ension gap	Economics of demonstration				Economics of local check			
	Demon-stration	Local check			Gross cost	Gross return	Net return	B:C ratio	Gross cost	Gross return	Net return	B:C ratio
2013	25.11	21.98	14.24	3.13	72800	120528	48528	1.67	72000	105504	33504	1.46
2014	24.80	22.78	8.90	2.02	72834	111600	38766	1.53	72000	102510	30510	1.42
2015	22.54	20.22	11.47	2.32	74200	99176	24976	1.34	72400	88968	16568	1.23
Average	24.58	22.73	8.14	2.49	73278	110435	37423	1.51	72133	98994	26861	1.37

Table 2. Effect of different treatments on yield and economics of wheat (Pooled data rabi 2013-2014 to 2015-2016).

Year	Yield (q/ha)		Increase over local check (%)	Ext-ension gap	Economics of demonstration				Economics of local check			
	Demon-stration	Local check			Gross cost	Gross return	Net return	B:C ratio	Gross cost	Gross return	Net return	B:C ratio
2013	53.10	49.10	8.15	4.00	65500	74340	8840	1.15	65500	68740	3240	1.05
2014	50.91	44.06	15.62	6.85	65560	81023	15463	1.24	65560	69927	4367	1.07
2015	47.94	44.16	8.71	3.78	65925	78709	12784	1.19	65925	72853	6928	1.11
Average	50.65	45.92	10.30	4.88	65662	78024	12362	1.19	65662	70507	4845	1.08

was Rs. 78024 and 70507 in wheat under demonstration and local check, respectively. Net return was to the tune of 39.3 and 154.1 per cent higher under demonstration over local check in both consecutive crops, respectively. In the quick view of the data the average Benefit: Cost ratio figured 1.51:1 and 1.19:1 under demonstrations as compared to 1.37:1 and 1.08:1 in local check in both consecutive crops, respectively (Table 1 and 2). These results are in accordance with the findings of Vidyayathi *et al.*, (2012).

CONCLUSION

Foliar spray of potassium nitrate on *Bt*. Cotton has proven to be an important management tool for high-yielding *Bt* cotton hybrids under cotton based cropping system. Success with the K foliar fertilization suggest that other nutrient need may also be addressed by foliar fertilization.

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