Tillage and Sowing Method for Bt Cotton

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ABSTRACT

A field experiment was conducted during 2010 and 2011 at Junagadh to study the response of Bt cotton (NHH-44) to three tillage practices (conventional tillage i.e. cross cultivation + blade harrowing + planking, ploughing + blade harrowing + planking, and tillage through rotavator) and four sowing patterns (flat bed sowing, furrow sowing, ridge sowing, and paired row sowing). The results revealed that ploughing + blade harrowing + planking significantly improved growth and yield attributes viz., plant height, number of bolls/plant, single boll weight and seed cotton weight/plant and thereby increased seed cotton yield (2363 kg/ha), stalk yield (6115 kg/ha), lint yield (783 kg/ha) and ginning (33.0%) over conventional tillage. Similarly, ridge sowing enhanced growth and yield parameters viz. plant height, number of bolls/plant, single boll weight and seed cotton weight/plant and ultimately increased seed cotton yield (2370 kg/ha), stalk yield (6102 kg/ha), lint yield (781 kg/ha) and ginning (32.9%) over flat bed sowing.

Keywords: Tillage, Bt cotton, sowing pattern, paired row

1. INTRODUCTION

Cotton is the most remunerative and important fibre crop of Gujarat in general and Saurashtra in particular. After the development of high yielding, pest and diseases resistance Bt hybrids and availability of irrigation water due to development of different water harvesting techniques, area under irrigated cotton in the Saurashtra region is increasing day by day.

Various agronomic practices affect the yield of cotton. Among them high yielding, pest and diseases resistance hybrids, preparatory tillage practices, water management, weed management and sowing method are important one. Traditionally cotton is grown by using conventional tillage methods consisting of one ploughing followed by harrowing, and planking operation. But under limited irrigation water, for efficient utilization of irrigation water, reducing the soil loss, compaction and enhancing microbial population and activity as well as organic matter status, different tillage practices found suitable without compromising the economical yield (Sharma *et al.*, 2005).

Hand dibbling in flat bed is the common method for sowing hybrids under irrigated condition. However, cotton is usually suffers from moisture stress at different crop growth stages. To

overcome these problems, suitable sowing methods is to be evaluated which conserve more moisture, provide sufficient sunlight and aeration and protect the crop against lodging. Therefore, the present experiment is conducted to evaluate different preparatory tillage practice and sowing pattern in Bt cotton for higher production.

2. MATERIALS AND METHODS

A field experiment was conducted at Mechanized Commercial Farm, Department of Agronomy, Junagadh Agricultural University, Junagadh during 2010 and 2011. The soil of the experimental plot was clayey in texture and slightly alkaline in reaction (pH 7.9 and EC 0.32 dS/m) as well as low in available nitrogen (226 kg /ha), available phosphorus (24.5 kg/ha) and medium in available potash (233 kg/ha). The experiment comprising of three tillage practices (T_1- Conventional tillage *i.e.* cross cultivation + blade harrowing + planking, T_2- Ploughing + blade harrowing + planking, and T_3- Tillage through rotavator) and four sowing patterns (S_1- Flat bed sowing, S_2- Furrow sowing, S_3- Ridge sowing, and S_4- Paired row sowing *i.e.* 60-120-60 cm) were laid out in split plot design with three replications. The Bt cotton hybrid 'NHH-44' was sown at 120 cm x 60 cm except the paired row. FYM @ 15 t/ha was incorporated in soil at the time of preparatory tillage. The crop was fertilized with 160-0-120 kg N-P_2O_5-K_2O/ha, of which 120 kg K_2O/ha as muriate of potash and 40 kg N/ha as ammonium sulphate were applied as basal, while 40 kg N/ha as urea was top-dressed each at 30, 60 and 90 DAS. The crop was raised as per the recommended package of practices.

3. RESULTS AND DISCUSSION

Tillage practices

Data presented in Table-1 showed that various tillage practices significantly influenced the growth and yield attributes of cotton *viz*., plant height, number of bolls/plant, single boll weight and seed cotton weight/plant during both the years as well as in pooled results. Significantly the highest values of these parameters were recorded under ploughing + blade harrowing + planking (T_2) in both the years as well as in pooled results; however it remained at par with tillage through rotavator (T_3) in case of plant height in 2010, 2011 and pooled results, number of bolls/plant in 2011 and seed cotton weight/plant in 2010. On the other hand, the conventional tillage (T_1) resulted in significantly the lowest values of the growth and yield parameters during both the individual years and pooled results.

Different tillage treatments imparted their significant influence on yield of cotton and ginning outturn during both the years as well as in pooled results (Table-2). Ploughing + blade harrowing + planking (T_2) recorded significantly the highest seed cotton yield, stalk yield, lint yield and ginning in both the years as well as in pooled results; however it remained at par with tillage through

rotavator (T_3) in respect of seed cotton yield, stalk yield and lint yield in 2011 and ginning in 2010, 2011 and pooled results. The conventional tillage (T_1) gave significantly the lowest seed cotton yield, stalk yield, lint yield and ginning in both the years as well as in pooled results. On an average over two years, ploughing + blade harrowing + planking (T_2) increased seed cotton yield, stalk yield and lint yield to the tune of 21.2, 21.7 and 29.6%, respectively over conventional tillage (T_1). Brar and Kaur (2007) and Sekhon *et al.* (2011) also reported similar results.

Sowing pattern

Various sowing patterns significantly influenced growth and yield attributes of cotton (Table-1). Sowing of the crop on ridges (S_3) registered significantly the highest values of plant height, number of bolls/plant, single boll weight and seed cotton weight/plant during both the years as well as in pooled results, however it was statistically at par with flat bed sowing in 2010 and 2011 and with paired row sowing in 2011 in respect of number of bolls/plant. Significantly the lowest values of these growth and yield contributing characters were observed in the furrow sowing (S_2) during both the years and pooled results.

Cotton yields were significantly influenced by different sowing patterns during the individual years and pooled results (Table-2). The ridge sowing (S_3) produced significantly the highest seed cotton yield, stalk yield and lint yield during both the years and in pooled results, however it was found to be at par with the flat bed sowing (S_1) during individual years in case of seed cotton yield, stalk yield and lint yield, and with paired row sowing (S_4) in 2011 in case of stalk yield and lint yield. Significantly the lowest seed cotton yield, stalk yield and lint yield were observed under furrow sowing (S_2) during both the years and in pooled results. Though ginning outturn was not influenced by sowing patterns in individual years, the ridge sowing (S_3) being at par with the flat bed sowing (S_1) gave significantly the highest ginning percentage in pooled results. Averaged over two years, the ridge sowing (S_3) increases seed cotton yield, stalk yield and lint yield by 7.2, 7.9 and 8.9% over flat bed sowing (S_1). The results corroborate the findings of Sharma *et al.* (2005), Buttar *et al.* (2005) and Patel *et al.* (2009).

4. CONCLUSION

On the basis of results of two-year field experimentation, it is concluded that Bt cotton can be raised with preparing the field by ploughing followed by blade harrowing & planking and sow the crop on ridge for achieving higher yield and net realization.

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Table 1. Effect of tillage and sowing pattern on growth and yield attributes of cotton

Treatment	Plant height (cm)			No. of bolls/plant			Single boll weight (g)			Seed cotton weight/plant (g)		
	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled
Tillage practices												
T_1	103.7	101.2	102.4	24.4	26.0	25.2	4.53	4.23	4.38	96.9	95.7	96.3
T_2	118.7	114.2	116.4	31.9	32.2	32.0	5.44	5.24	5.34	113.8	110.4	112.1
T_3	112.4	111.5	112.0	28.3	29.9	29.1	4.94	4.78	4.86	108.9	100.3	104.6
LSD (P=0.05)	7.7	9.2	5.0	2.9	3.4	1.9	0.41	0.37	0.23	9.3	8.0	5.1
Sowing pattern												
S_1	111.2	109.1	110.2	29.4	29.6	29.5	5.01	4.79	4.90	106.3	102.6	104.5
S_2	107.8	103.7	105.7	24.6	26.9	25.8	4.67	4.42	4.54	101.2	96.9	99.1
S_3	118.2	114.7	116.5	31.8	31.4	31.6	5.33	5.12	5.23	114.3	109.5	111.9
S_4	109.1	108.3	108.7	26.8	29.5	28.2	4.87	4.67	4.77	104.3	99.6	102.0
LSD (P=0.05)	6.1	4.6	3.7	2.5	2.8	1.8	0.26	0.32	0.20	6.2	5.6	4.1
T x S	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2. Effect of tillage and sowing pattern on yield of cotton

Treatment	Seed cotton yield (kg/ha)			Stalk yield (kg/ha)			Lint yield (kg/ha)			Ginning (%)		
	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled
Tillage practices												
T_1	2240	1661	1950	5849	4202	5026	704	504	604	31.3	30.3	30.8
T_2	2757	1968	2363	7178	5052	6115	928	638	783	33.6	32.4	33.0
T_3	2386	1824	2105	6238	4526	5382	787	573	680	33.0	31.4	32.2
LSD (P=0.05)	262	215	141	872	633	448	106	84	56	1.6	1.3	0.9
Sowing pattern												
S_1	2517	1902	2210	6488	4825	5657	836	598	717	33.0	31.4	32.2
S_2	2118	1617	1868	5750	3971	4860	671	497	584	31.6	30.7	31.1
S_3	2783	1957	2370	7263	4940	6102	931	632	781	33.5	32.3	32.9
S_4	2426	1793	2110	6186	4637	5411	788	560	674	32.4	31.1	31.8
LSD (P=0.05)	296	139	158	878	418	470	99	51	54	NS	NS	0.9
T x S	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS