INFLUENCE OF DEPTH OF TILLAGE AND LAND CONFIGURATION ON GROWTH, YIELD AND ECONOMICS OF COTTON (G. COT. HY.12)

PATEL, J. G., PATEL, D. D.* AND PATEL, D. K.

COLLEGE OF AGRICULTURE
NAVSARI AGRICULTURAL UNIVERSITY
MAKTAMPUR, BHARUCH – 392 012, GUJARAT, INDIA

Email:drpatel_76@yahoo.co.in

ABSTRACT

Field experiment was conducted on deep black soil of the Main Cotton Research Station, Surat during kharif season of 2005-06 and 2006-07 to study the influence of depth of tillage and land configuration on growth and yield of cotton var. G.Cot.Hy.12 under South Gujarat condition. Potential economic production of hybrid cotton can be secured by ploughing the soil upto 20 cm depth during summer and by adopting either ridge and furrow or broad bed and furrow technique as land configuration.

KEY WORDS: *Land configuration, quality parameters, seed cotton yield, tillage*

INTRODUCTION

Cotton is an important fibre crop of the world, which is cultivated over an area of 33.9 m ha with total production of 21.10 mt In India, total area under cotton was 91.32 lakh ha with production of 270 lakh bales having a productivity of 503 kg/ha during 2006-07. In Gujarat, cotton ranks second in area (29.90 lakh ha) and first in production (90 lakh bales) with an average productivity of 640 kg/ha among the cotton growing states of India (Anonymous, 2007). In Gujarat, farmers are growing irrigated as well as rainfed cotton. In rainfed area, due to poor soil and irregular monsoon, whereas in irrigated area, poor soil management, water logging condition and other faulty cultural practices created soil problem such as seizing of soil, decreased porosity and infiltration rate and moisture content of soil, decreased the productivity of soil. For augmenting these situations, deep tillage and land configuration plays a crucial role to improve the soil health by increasing porosity and decreasing bulk density of soil and thereby increase infiltration rate of soil, which increases the deep penetration of crop roots. It also increases the availability of nutrients which enhance the crop yield. Keeping in view the above points, the present study was conducted to study the effect of depth of tillage and land configuration on growth and yield of cotton Var. G. Cot. Hy. 12 under south Gujarat condition.

MATERIALS AND METHODS

Field experiment was conducted during *kharif* season of 2005-06 and 2006-07 on deep black soil of the Main Cotton Research Station, Navsari Agricultural University, Surat. There were Six treatment combinations comprised of three depths of tillage *viz.*, 10 cm (D_1), 20 cm (D_2) and 30 cm (D_3) as main plot treatment and two land configuration

techniques *viz.*, ridge and furrow (L_1) and broad bed and furrow (L_2) as sub plot treatments were tested in split plot design with six replications. The experimental soil was deep black having 231.53 kg /ha available N, 37.25 kg/ha available P_20_5 and 462.30 kg/ha available K_20 with 7.52 pH. The crop was fertilized with 10 t FYM / ha uniformly in the field. The chemical fertilizer applied @ 240:00:00 kg NPK / ha in the form of urea in four equal splits at 25 to 30 days interval starting from 20 days alter sowing. Other cultural practices and plant protection measures were taken as per recommendations. The data on plant height, number of sympodial branches / plant, dry matter accumulation / plant, number of bolls / plant and boll weight were recorded from randomly selected five plants in each net plot and seed cotton yield recorded from net plot and converted on hectare basis. The data were analyzed statistically by adopting the standard procedures described by Panse and Sukhatme (1967).

RESULT AND DISCUSSION

Effect of depth of tillage

A perusal of data in Tables 1 and 2 indicated that plant height, sympodial branches / plant, dry matter accumulation / plant and number of bolls / plant were increased significantly with increasing depth of tillage. The highest plant height, sympodial branches / plant, dry mater accumulation / plant and number of bolls / plant were recorded with treatment D_3 (30 cm depth of tillage), which remained at par with treatment D_2 (20 cm depth of tillage) during both the years of investigation as well as in pooled except dry matter accumulation / plant during 2005-06. Depth of tillage did not exert significant effects on bolls weight of seed cotton. The depth of tillage significantly increased the seed cotton yield during both the years as well as in pooled data. The highest seed cotton yield of 2551, 2466 and 2509 kg/ha was recorded in individual seasons and pooled over seasons under treatment D_3, which was significantly superior over D_1 and found at par with treatment D_2. The increased in seed cotton yield might be due to increased in growth and yield attributes of cotton. These results are in conformity with the finding of Bishnoi (2004) and Nehra *et al.* (2006). Data presented in Table 3 on economics of cotton crop as influenced by different depths of tillage treatments indicated that maximum net realization of Rs. 33888 /ha was obtained with treatment D_3 followed by treatment D_2 (Rs.32814 / ha) and D_1 (Rs.26655 /ha). Higher depth (D_3) gave more return of Rs. 7233 and 1074 /ha over D_1 and D_2, respectively. The highest BCR of 2.61 was registered with treatment D_2 (20 cm depth). It clearly brings out the fact that tilling the soil up to 20 cm depth was more paying than 10 cm and 30 cm depth of tillage.

Effect of land configuration

The data presented in Table 1 and 2 revealed that there was no significant difference among land configuration techniques with respect to growth and yield attributes and yield of seed cotton during both the years of investigation as well as in pooled analysis. The ridge and furrow as well as broad bed and furrow techniques found equally effective to produced higher number of bolls / plant, bolls weight and ultimately higher seed cotton yield. This might he due to improved uptake of moisture and nutrients resulting in better growth with production of higher dry matter / plant and its distribution in bolls. These results are supported by Patel *et al.* (1989) and Sagare *et al.* (2001). The higher net returns of Rs. 32310 /ha and BRC of 2.59 recorded with broad bed and furrow followed by ridge and furrow land configuration techniques (Table 3). Sagare *et al.* (2001)

reported ridge and furrow as well as broad bed and furrow were equally effective.

CONCLUSION

Based on the results from the experimentation for two consecutive years, it seemed quite logical to conclude that potential and economical production of hybrid cotton cultivated on *vertisols* of South Gujarat can be secured by ploughing the soil up to 20 cm depth during summer and by adopting either ridge and furrow or broad bed and furrow technique as land configuration.

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Table 1: Growth attributes of cotton as influenced by depth of tillage and land configuration treatments.

Treatments	Plant Height (cm)			Sympodial Branches / Plant			Dry Matter Accumulation (g/plant)		
	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled
Depth of Tillage (D)									
D_1	115.25	109.75	112.50	22.43	22.60	22.52	187.09	183.39	185.24
D_2	124.58	122.85	123.72	25.55	25.60	25.58	226.53	215.48	221.00
D_3	128.45	127.53	127.99	26.45	25.73	26.09	221.18	222.53	221.86
SEm±	3.33	3.76	2.42	0.66	0.72	0.47	7.23	6.27	4.66
CD(P=0.05)	10.49	11.85	7.11	2.07	2.28	1.38	22.77	19.77	13.66
C.V.%	9.39	10.85	10.13	9.17	10.17	9.68	11.83	10.49	11.20
Land Configuration (L)									
L_1	121.42	120.38	120.90	24.54	24.44	24.49	210.91	205.92	208.42
L_2	124.10	119.71	121.91	25.08	24.84	24.96	212.29	208.35	210.82
SEm±	2.09	2.52	1.62	0.40	0.42	0.28	4.04	4.32	2.91
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	7.23	8.90	8.09	6.82	7.21	7.02	8.10	8.85	8.48
Interaction (D x L)									
SEm±	3.62	4.36	2.84	0.69	0.72	0.49	6.99	7.49	5.08
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	7.23	8.90	8.09	6.82	7.21	7.02	8.10	8.85	8.48
General Mean	122.76	120.04	121.40	24.81	24.64	24.73	211.60	207.14	209.37

Table 2: Yield attributes and seed cotton yield (kg ha^{-1}) of cotton as influenced by depth of tillage and land configuration treatments.

Treatments	Number of Bolls / Plant			Boll Weight (g)			Seed Cotton Yield (kg / ha)		
	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled
Depth of Tillage (D)									
D_1	35.42	28.67	32.04	4.03	4.05	4.04	2135	2095	2115
D_2	40.33	31.82	36.08	4.10	4.14	4.12	2470	2365	2417
D_3	43.67	34.10	38.88	4.15	4.15	4.15	2551	2466	2509
SEm±	1.17	1.02	0.77	0.09	0.09	0.09	76	69	51
CD(P=0.05)	3.70	3.22	2.27	NS	NS	NS	241	217	152
C.V.%	10.22	11.24	10.70	7.72	7.20	7.47	11.11	10.34	10.74
Land Configuration (L)									
L_1	39.39	30.90	35.14	4.08	4.11	4.10	2340	2268	2304
L_2	40.22	32.16	36.19	4.11	4.12	4.11	2431	2349	2390
SEm±	0.72	0.58	0.46	0.06	0.04	0.04	45	42	31
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	7.73	7.83	7.82	6.12	4.52	5.37	8.00	7.71	7.86
Interaction (D x L)									
SEm±	1.26	1.01	0.81	0.10	0.08	0.06	78	73	53
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	7.73	7.83	7.82	6.12	4.52	5.37	8.00	7.71	7.86
General Mean	39.81	31.53	35.67	4.09	4.11	4.10	2385	2309	2347

Table 3: Economics of cotton as influenced by depth of tillage and land configuration treatments (Pooled data)

Sr. No.	Treatments	Seed cotton yield (kg ha^{-1})	Gross realization (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Net realization (Rs ha^{-1})	B:C ratio
Depth of tillage (D)						
1	D_1	2115	46530	19875	26655	2.34
2	D_2	2417	53174	20360	32814	2.61
3	D_3	2509	55198	21310	33888	2.59
Land configuration (L)						
1	L_1	2304	50688	20760	29928	2.44
2	L_2	2390	52580	20270	32310	2.59

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