INFLUENCE OF DEPTH OF TILLAGE AND LAND CONFIGURATION ON YIELD AND NUTRIENT UPTAKE BY COTTON *CV.* G.COT.HY.12 UNDER SOUTH GUJARAT CONDITION

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ABSTRACT

Field experiment was conducted on deep black soil of Main Cotton Research Station, Navsari Agricultural University, Surat (Gujarat) to evaluate the effect of depth of tillage and land configuration techniques on seed cotton yield and uptake of nutrients by cotton (cv. G.Cot.Hy-12) under south Gujarat condition. The seed cotton yield differed significantly with different depths of tillage. The treatment D_3 (30 cm depth of tillage) registered the highest seed cotton yield as well as nutrient uptake, which was at par with treatment D_2 (20 cm depth of tillage). With respect to land configuration, ridge & furrow and broad bed and furrow techniques were equally effective to increased seed cotton yield and nutrient uptake.

KEY WORDS: *Land configuration, nutrient uptake, seed cotton yield, tillage*

INTRODUCTION

Cotton is an important commercial crop of India. Its yield is affected by many factors such as soil type, irrigation, weeds, pests, diseases and nutritional imbalance etc. Poor inherent fertility status of the soil is one of the major reasons for the low productivity under irrigated as well as rainfed eco-system. South Gujarat characterized by heavy rainfall zone and most of the farmers of these region adopted in both mechanical cultivation and continues use of canal water for irrigation and use of high doses of chemical fertilizers without or very low application of organic manures in their field, thereby, the soil of the south Gujarat zone was compacted with deterioration of the soil structure. Due to compaction of soil, nutrient availability is very low, so that cotton crop suffering from nutrient supply. To overcome this problem, it is planned to improve the physical and chemical properties of soil. Among the various agronomic practices to increase cotton productivity, depth of tillage and land configuration techniques were found to be appropriate, which improved/increased the physical and chemical properties of soil, which help to increased availability of soil native nutrients. In focus of these views, this experiment was carried out during 2005-06 and 2006-07 to find out the effect of depth of tillage and land configuration techniques on seed cotton yield and uptake of nutrients by cotton *(cv.* G. Cot. Hy. 12) under south Gujarat condition.

MATERIAL AND METHODS

Field experiment was conducted on deep black soil of the Main Cotton Research Station, Navsari Agricultural University, Surat during *kharif* seasons of 2005-06 and 2006-07. 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 treatments 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 available N 231.53 kg/ha, P_20_5 37.25 kg/ha and K_20 462.30 kg/ha with pH 7.52. 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 after sowing. Other cultural practices and plant protection measures were taken as per recommendations. Biochemicals studies pertain to nutrient uptake by whole plant of cotton were determined. A composite sample was prepared for each treatment and oven dried at a temperature of 65°C till constant weight was obtained. Then it was ground in a willey mill. These samples were analyzed for nutrient content.

RESULT AND DISCUSSION

Effect of depth of tillage

The depth of tillage significantly influenced the seed cotton yield (Table 1). The higher depth of tillage (D_3) registered higher seed cotton yield of 2551, 2466 and 2509 kg/ha, it was on par with that of 20 cm depth of tillage (D_2) with recording 2470, 2365 and 2417 kg/ha seed cotton yield, but significantly superior over 10 cm depth of tillage (D_1) during 2005-06, 2006-07 and in pooled, respectively. It might be due to either increased in soil fertility, improved soil physical properties, improved weed control or reduced incidence of disease, nematodes and insect pests. Similar finding are reported by Weslay *et al.* (2001) and Nehra *et al.* (2006).

The higher uptake of nitrogen (114.70 and 109.29 kg/ha) and phosphorus (34.12 and 34.54 kg/ha) with treatment D_3 was observed during 2006-07 and in pooled, respectively, and it was at par with treatment D_2, however, reverse trend was observed during 2005-06 (Table 1). Potash uptake was significantly higher under treatment D_2 during 2005- 06 and in pooled, whereas reverse trends was observed during 2006-07. Treatment D_2 and D_3 were statistically at par with each other. Significantly the lowest N, P and K uptake was recorded with the treatment D_1. The increase in nutrient uptake with increasing depths of tillage might be due to increased density of rooting and greater lateral growth and more moisture improved the rate of nitrification and mineralization of nitrogen, all together increased the availability and uptake of nutrients. More moisture made P and K soluble which were efficiently absorbed by plant along with moisture and increased the concentration of both the nutrients. Since the total uptake is a function of total biological yield and the nutrient concentration in the tissue, the data showed profound increase in seed cotton and stalk yield ultimately increased the uptake of N, P and K by cotton plant

Effect of land configuration

The seed cotton yield did not differ significantly due to land configuration techniques (Table 1). This might be due to improved uptake of moisture and nutrient resulting in better growth with production of higher dry matter per plant and its distribution in bolls.

The uptake of nitrogen, phosphorus and potash (Table 1) was also not influenced significantly due to land configuration treatments. The uptake of N was numerically higher with broad bed and furrow system, whereas P and K were higher under ridge and furrow technique. These results are in accordance with Muralidaran and Solaimalai (2005), who reported that broad bed and furrow system recorded the highest nitrogen uptake, however, phosphorus and potassium uptake by cotton crop were not affected significantly. However, Patil and Sheelavantar (2000) and Tomar (2005) concluded that broad bed and furrow and ridge and furrow systems

significantly increased N, P, K and S uptake than flat bed system.

CONCLUSION

From the results obtained, it can be concluded that the treatment of 30 cm depth of tillage obtained the highest seed cotton yield as well as nutrient uptake, which was found at par with 20 cm depth of tillage. However, ridge & furrow and broad bed and furrow technique equally effective to increased the seed cotton yield and nutrient uptake.

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Table 1: Seed cotton yield (kg/ha) and nutrient uptake (kg/ha) by cotton plant as influenced by depth of tillage and land configuration.

Treatments	Seed Cotton Yield (kg/ha)			Nitrogen Uptake (kg/ha)			Phosphorus Uptake (kg/ha)			Potassium Uptake (kg/ha)		
	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled
Depth of Tillage (D)												
D_1	2135	2095	2115	86.17	88.49	87.33	27.44	27.51	27.58	103.18	105.84	104.51
D_2	2470	2365	2417	106.44	107.74	107.09	35.59	32.86	34.23	131.43	124.92	128.18
D_3	2551	2466	2509	103.89	114.70	109.29	34.96	34.12	34.54	124.88	131.22	128.10
SEm±	76	69	51	2.27	2.85	1.91	0.59	0.81	0.52	2.88	3.47	2.37
CD(P=0.05)	241	217	152	7.15	8.97	5.59	1.85	2.54	1.51	9.08	10.94	6.96
C.V.%	11.11	10.34	10.74	7.96	9.52	8.81	6.21	8.85	7.60	8.33	9.97	9.19
Land Configuration (L)												
L_1	2340	2268	2304	98.31	103.23	100.77	32.82	31.56	32.19	119.82	121.38	120.60
L_2	2431	2349	2390	99.36	104.05	101.70	32.44	31.44	32.04	119.84	120.01	119.92
SEm±	45	42	31	1.12	1.44	0.98	0.52	0.57	0.38	1.43	2.22	1.31
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	8.00	7.71	7.86	4.82	6.71	5.89	6.75	7.72	7.23	5.08	7.82	6.60
Interaction (D x L)												
SEm±	75	73	53	1.95	2.84	1.67	0.90	0.99	0.65	2.48	3.85	2.22
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	8.00	7.71	7.86	4.82	6.71	5.89	6.75	7.72	7.23	5.08	7.82	6.60
General Mean	2385	2309	2347	98.83	103.64	101.24	32.73	31.50	32.11	119.83	120.69	120.26

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