EFFECT OF DEPTH OF TILLAGE AND LAND CONFIGURATION ON WEED INFESTATION AND YIELD OF COTTON UNDER SOUTH GUJARAT CONDITION

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ABSTRACT

Field experiment was conducted on deep black soil of the Main Cotton Research Station, Navsari Agricultural University, Surat during kharif season of 2005-06 and 2006-07 to study the effect of depth of tillage and land configuration on weed infestation and seed yield of cotton under south Gujarat conditions. The lowest number of weed, dry weight of weeds as well as higher seed cotton yield were registered with 30 cm depth of tillage followed by 20 cm depth of tillage (D_2). However, the land configuration techniques did not show any significant effect on weed population, dry weight of weeds and seed cotton yield.

KEY WORDS: *Land configuration, seed cotton yield, tillage, weed*

INTRODUCTION

Cotton crop is very sensitive to weed infestation. It is a greatest hazard in successful cotton cultivation. Reduction in seed cotton yield due to weeds may vary from 10 to 90 per cent under irrigated condition. The cotton growing farmers generally control the weeds by repeated inter cultivation and hand weeding. Farmers are always worried about perennial weeds of cotton. Deep tillage is one of the alternatives of herbicides to control the weeds. Deep tillage, inversion of soil and there by exposed the underground stolen or rhizomes to hot Sun and buried them and destroyed them effectively. It reduces the weed problem in the forth coming season because the hot sun braking of rhizomes and tubers of the perennial weeds. The seeds of other weeds also drives and loss their germination capability, ultimately reduce the use of herbicides to control weeds and chances of pollution hazards reduces and also gave the money of poor farmers on herbicides and gain from high crop yields (Sharma *et al.* 2007). Therefore, the present investigation was conducted to obtain the information on weed infestation and seed cotton yield.

MATERIALS AND METHODS

A field experiment was conducted at Main Cotton Research Station, Navsari Agricultural University, Surat during *kharif* season of 2005-06 and 2006-07. The soil of the experimental field was vertisol having low available nitrogen, medium available phosphorus and high available potash and pH was normal. The experiment was laid out in split plot design with six treatment combinations of three depths of tillage *i.e.* D_1-10 cm, D_2-20 cm and D_3-30 cm in main plot and two land configuration techniques *i.e.* L_1-ridge & furrow and L_2-broad bed and furrow in sub plots with six replications. The crop was fertilized with 10 t FYM/ha uniformly in the field. The chemical fertilizer applied @ 240 Kg N/ha in the form of urea in four equal splits. The data on weed population (m^{-2}) and

dry weight (gm^{-2}) were taken with iron quadrate (1m x 1m). The iron quadrate was randomly placed in each plot of all six replications and the total numbers of weeds was counted. The same were uprooted and collected. The weeds were then dried at a temperature of 65^0 C in oven till their weight become constant. The seed cotton yield from net plot was recorded and expressed prevailing market prices.

RESULTS AND DISCUSSION

Effect of depth of tillage

Weed population at 60 and 90 DAS (Table 1) revealed that it was drastically reduced under higher tillage depth (30 cm). The data on weed population at 60 and 90 DAS clearly indicated that increased depth of tillage significantly reduced the weed population. Treatment D_2 and D_3 being at par with each other recorded comparatively less number of weeds than treatment D_1, except during 2006-07 at 60 DAS at 90 DAS during 2006-07 and in pooled. The weed population was comparatively higher in 10 cm depth of tillage at 60 and 90 DAS. Dry weight of weeds (Table 1) recorded at 60 and 90 DAS were found significantly the highest with 10 cm tillage depth (D_1). A marked reduction in dry weight of weeds was noticed in treatment D_3 (30 cm depth of tillage), which remained at par with treatment D_2 during 2005-06 and 2006-07 only at 60 DAS. The dry weight of weeds were recorded in the order D1 > D2 > D3 during both the years of investigation as well as in pooled data. Different depths of tillage reduced the weed population and growth considerably which might have reflected in reduced dry weight of weeds under these treatments. The reduction in number of weeds and their dry weight under higher depth of tillage might be due to deep tillage during summer exposed the underground stolens or rhizomes to hot sun and buried them and thus destroyed them effectively. Similar results were also reported by Richey *et al.* (1977), Yoo *et al.* (1987), Patel and Mehta (1989) and Nehra *et al.* (2006), who reported that deep tillage killed emerging seedlings, buried weed seeds and delayed growth of perennial weeds, leaving a rough surface to hinder weed seed germination, providing enough loose soil at the surface to permit effective cultivation, leaving a clean uniform surface for efficient action of herbicides and incorporating herbicides when necessary.

Effect of land configuration

Weed population m^{-2} and weed dry weight (Table 1) did not differ significantly due to either ridge and furrow or broad bed and furrow land configuration technique. Ridge and furrow and broad bed and furrow techniques were found equally effective to reduce weed population. It might be due to expose of seeds to sun and buried and weeds were inverted during preparation of ridge and furrow and broad bed and furrow. Chauhan (1998) and Hobbs (2001) also reported that raised bed systems significantly reduced the weed population.

CONCLUSION

From the two years experimentation, it can be concluded that the lowest number of weeds, dry weight of weeds as well as higher seed cotton yield were registered with 30 cm depth of tillage followed by 20 cm depth of tillage (D_2). However, the land configuration techniques did not show any significant effect on weed population, dry weight of weeds and seed cotton yield.

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Table 1: Weed population (m^{-2}) and dry weight of weeds (g m^{-2}) in cotton at 60 and 90 DAS and seed cotton yield (kg/ha) as influenced by depth of tillage and land configuration treatments.

Treatments	Weed Population (m^{-2})						Dry Weight of Weeds (g m^{-2})						Seed cotton yield (kg/ha)		
	60 DAS			90 DAS			60 DAS			90 DAS					
	2005-06	2006-07	Pooled	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	10.05* (102.83)	10.08 (102.42)	10.07 (102.63)	6.75 (44.92)	6.71 (44.58)	6.73 (44.75)	43.45	49.85	46.65	23.92	24.28	24.10	2135	2095	2115
D_2	8.02 (64.75)	9.56 (91.92)	8.79 (78.33)	5.78 (32.92)	6.53 (42.00)	6.15 (37.46)	34.34	40.56	37.45	17.30	21.51	19.40	2470	2635	2417
D_3	7.46 (56.17)	8.63 (75.17)	8.05 (65.67)	5.34 (27.75)	5.74 (32.50)	5.54 (30.13)	33.97	36.26	33.11	14.73	15.85	15.29	2551	2466	2509
SEm±	0.35	0.28	0.24	0.23	0.22	0.16	1.98	1.49	1.23	0.78	1.02	0.69	76	69	51
CD(P=0.05)	1.09	0.89	0.71	0.73	0.69	0.48	6.25	4.70	3.62	2.45	3.23	2.01	241	217	152
C.V.%	14.05	10.36	12.17	13.45	11.97	12.69	18.44	12.23	15.29	14.43	17.27	16.07	11.11	10.34	10.74
Land Configuration (L)															
L_1	43.45	49.85	46.65	23.92	24.28	24.10	39.94	43.98	39.46	19.08	21.18	20.13	2340	2268	2304
L_2	34.34	40.56	37.45	17.30	21.51	19.40	39.56	40.46	40.01	18.21	19.91	19.06	2431	2349	2390
SEm±	33.97	36.26	33.11	14.73	15.85	15.29	1.56	1.17	2.88	0.51	0.61	0.39	45	42	31
CD(P=0.05)	1.98	1.49	1.23	0.78	1.02	0.69	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	6.25	4.70	3.62	2.45	3.23	2.01	17.77	11.78	14.73	11.67	12.59	12.20	8.00	7.71	7.86
Interaction (D x L)															
SEm±	0.31	0.31	0.28	0.21	0.21	0.22	0.15	2.70	2.03	1.65	0.89	1.06	0.68	78	73
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	8.96	7.39	8.14	8.53	8.37	8.45	17.77	11.78	14.73	11.67	12.59	12.20	8.00	7.71	7.86
General mean	8.51 (74.58)	9.42 (89.83)	8.97 (82.21)	5.95 (35.19)	6.33 (39.69)	6.14 (37.44)	37.25	42.22	39.74	18.65	20.54	19.60	2385	2309	2347

Data in parenthesis indicate actual value and those outside are** $\sqrt{X+1}$ **transformed value

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