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RESIDUAL EFFECT OF STOMP 330E (PENDIMETHALIN) ON THE SUCCEEDING CROPS

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The field investigations were carried out for three consecutive years from 1984-85 to 1986-87 at the Agronomic Research Area, Central Cotton Research Institute, Multan to see the residual effect of Stomp 330 (Pendimethalin) [N-(1-ethylpropyl)-3, 4-dimethyl-2, 6-dinitrobenzenamine] at 1.2 Kg/ha on different crops following its treated and untreated plots in cotton. From three years average it was concluded that there were no significant differences between Stomp 330E treated and untreated plots of the succeeding crops. However, Stomp 330E treated plots gave higher number of seedlings/m², plant height and grain yields Kg/ha than untreated plots. Thus the use of Stomp 330E for weed control in cotton was safe and had no residual effects on the succeeding crops viz. wheat, maize, sunflower, soybean and mung.

Key words: Stomp 330E carryover, Succeeding crops, Grain yields, Seedlings, Plant height.

Introduction

Dinitroanilines form a group of herbicides used for selective weed control in cotton, legumes and vegetables etc. Herbicides of this group are volatile and photodecomposable. They are active through the soil and applied as pre-plant soil incorporation (PPI) treatment against weed germination. Persistence of this group of chemicals in the soil may only be for a few weeks at low doses but at higher doses activity was detected even after 12 months. Stomp 330E (Pendimethalin), one of the Dinitroanilines group of herbicides is comparatively cheap and was found to provide good broad-leaved weed control especially "itsit" (*Trianthema portulacastrum* L.) [16].

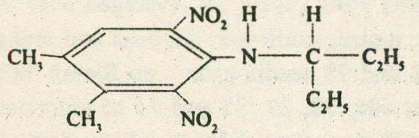
The residual effect of a number of herbicides had been studied in detail. Most of these do not exhibit any adverse effect on succeeding crops, though a few retard the germination of some crops (1-3,5-15,17-19). Certain herbicides exerts a selective action in being antagonistic to a few crops while harmless to others [4,16].

The present project is undertaken to find out the effect of Stomp 330E (Pendimethalin) carryover, if any, on the succeeding crops.

Materials and Methods

The field investigations were undertaken for three consecutive years from 1984-87 at the Agronomic Research Area, Central Cotton Research Institute, Multan to find out the residual effect of Stomp 330E (Pendimethalin) N-(1-ethylpropyl)-3, 4-dimethyl-2, 6-dinitrobenzenamine on succeeding crops. There were two plots as untreated and treated with Stomp 330E in cotton. Stomp 330E (1.2 Kg/ha) was mixed thoroughly in water (500 lit/ha) and sprayed on the soil till the water reached upto 5cm depth. Knapsack sprayer, fitted with jet type nozzles, was used for spraying purpose.

After cotton harvesting, each year crops were randomized in the same main plots and herbicides in the same sub plots of cotton. The sub plot size was 13.7 x 7.6m. The experimental design was factorial. The treatments were as under:



Wheat, Maize, Sunflower, Soybean and Mung each in previously Stomp 330E treated (H_1) and untreated (H_0) plots with 3 replications. Other cultural operations like weeding, hoeing, irrigation and plant protection measures were kept uniform in all the treatments for all three years. The recommended doses of P_2O_5 and N of each crop were added as and when required. The details of varieties, sowing dates, seed rates and spacings were as under Table 1.

TABLE 1.

Crop	Year	Varieties	Sowin g dates	Seed-rate Kg/ha	Spacing (cm)
Wheat	1984-85	Blue Silver	27.12.1984	120	22.5x0.0
	1985-86	Blue Silver	18.12.1985	120	" "
	1986-87	Pak-81	22.12.1986	120	" "
Maize	1984-85	Neelam	18.2.1985	30	75.0x22.5
	1985-86	Neelam	12.2.1986	30	" "
	1986-87	Neelam	12.2.1987	30	" "
Sunflower	1984-85	Cargil	31.1.1985	10	75.0x22.5
	1985-86	Cargil	3.2.1986	10	" "
	1986-87	NK-212	3.2.1987	10	" "
Soybean	1984-85	William-82	21.2.1985	100	30.0x7.5
	1985-86	William-82	11.2.1986	100	" "
	1986-87	William-82	3.2.1987	100	" "
Mung	1984-85	M-28	27.2.1985	20	30.0x7.5
	1985-86	M-6601	20.2.1986	20	" "
	1986-87	NM-121-25	23.2.1987	20	" "

The data for the following characters were recorded 1. seedlings (/m²); 2. grain yields (Kg/ha) and 3. plant height (cm). The analysis of variance was done and significant differences among the treatments were determined by protected LSD test at 5% probability level as described by Steel and Torrie, [20].

Results and Discussion

Grain yields. Averaged over three years all the crops i.e. wheat, maize, sunflower, soybean and mung from Stomp 330E treated plots gave higher grain yields (4057, 3366, 1369, 1238 and 406 Kg/ha respectively) than untreated plots (4004, 3338, 1326, 1142 and 379 Kg/ha respectively) (Table 2). However, treatmental difference was non-significant, statistically. Even, crop herbicide interaction was also insignificant. It may be concluded that Stomp 330E is safe to use in cotton because of the absence of residual effect on grain yields of succeeding crops. These findings confirm with many of the earlier findings.

Seedling emergence. Crops planted on Stomp 330E treated plots resulted in a higher seedling emergence than untreated plots (Table 3). Averaged over three years data, wheat, maize, sunflower, soybean and mung gave 408, 39, 31, 88 and 73 seedlings/m² on Stomp 330E treated plots against 406, 38, 29, 85 and 71 of untreated plots, respectively. There was no difference between treatments, statistically. Crop treatment interaction was also non-significant. From these results it was concluded that application of Stomp 330E in cotton was useful and its carryover in the soil did not affect the seedling emergence of the succeeding crops. These results are in agreement with the findings of Warfa and Noor [4]; Karpenko *et al.* [11]; Aleev [13]; Catizone *et al.* [14]; Subramanian and Ali [17] and Berayon [19]

TABLE 2. RESIDUAL EFFECT OF STOMP 330E ON THE YIELD OF DIFFERENT CROPS.

Year/Treatment		Crops				
		Wheat	Maize	Sunflower	Soybean	Mung
		(Grain yield Kg/ha)				
1984-85	H_0	3637	3121	1346	1139	435
	H_1	3663	3150	1364	1286	475
1985-86	H_0	4642	2945	1352	900	385
	H_1	4692	2952	1417	967	415
1986-87	H_0	3733	3947	1280	1387	316
	H_1	3817	3997	1328	1460	327
Average	1984-85	3650	3136	1355	1213	455
	1985-86	4667	2948	1384	933	400
	1986-87	3775	3972	1304	1423	321
Mean effects for						
treatments	H_0	4004	3338	1326	1142	379
	H_1	4057	3366	1369	1238	406
Critical differences						
Year		93*	98*	N.S.	152*	75*
Treatments		N.S.	N.S.	N.S.	N.S.	N.S.
Interaction		N.S.	N.S.	N.S.	N.S.	N.S.

Figures with the same letter do differ ($P \leq .05$).N.S = Non significant, * = Significant at $P \leq .05$, H_0 = No Stomp 330E application, H_1 = Stomp 330E @ 3.7 lit/ha application at seedbed preparation.

TABLE 3. RESIDUAL EFFECT OF STOMP 330E ON THE SEEDLINGS OF DIFFERENT CROPS.

Year/Treatment		Crops				
		Wheat	Maize	Sunflower	Soybean	Mung
		(No. of seedling/m²)				
1984-85	H_0	375	43	32	95	59
	H_1	370	41	33	96	61
1985-86	H_0	421	33	21	84	98
	H_1	424	35	22	85	99
1986-87	H_0	424	38	32	76	55
	H_1	430	41	37	83	58
Average	1984-85	372	42	32	96	60
	1985-86	422	34	22	85	98
	1986-87	427	40	35	80	57
Mean effects for						
treatments	H_0	406	38	29	85	71
	H_1	408	39	31	88	73
Critical differences						
Year		18*	5*	3*	8*	18*
Treatments		N.S.	N.S.	N.S.	N.S.	N.S.
Interaction		N.S.	N.S.	N.S.	N.S.	N.S.

Figures with the same letter do differ ($P \leq .05$). N.S. = Non significant, * = Significant at $P \leq .05$, H_0 = No Stomp 330E application, H_1 = Stomp 330E @ 3.7 lit/ha application at seedbed preparation.

TABLE 4.RESIDUAL EFFECT OF STOMP 330E ON THE PLANT HEIGHT OF DIFFERENT CROPS.

Year/Treatment		Crops				
		Wheat	Maize	Sunflower	Soybean	Mung
		(Plant height cm)				
1984-85	H0	72	224	103	21	26
	H1	75	224	106	21	29
1985-86	H0	60	219	115	22	20
	H1	64	232	121	24	21
1986-87	H0	86	226	161	28	23
	H1	87	228	165	30	20
Average	1984-85	74	224	105	21	28
	1985-86	62	226	118	23	20
	1986-87	86	227	163	29	22
Mean effects for						
treatments	H0	73	223	126	24	23
	H1	75	228	131	25	23
Critical differences						
Year		7*	N.S.	7*	4*	3*
Treatments		N.S.	N.S.	N.S.	N.S.	N.S.
Interaction		N.S.	N.S.	N.S.	N.S.	N.S.

Figures with the same letter do differ ($P \leq .05$), N.S. = Non significant, * = Significant at $P \leq .05$, H_0 = No Stomp 330E application, H_1 = Stomp 330E @ 3.7 lit/ha application at seedbed preparation.

Plant height: Crop plants on Stomp 330E treated plots were taller than untreated plots (Table 4). On the average basis of three years data wheat, maize, sunflower, soybean and mung plants attained 75, 228, 131, 25 and 23 cm. Plant height on Stomp 330E treated plots as compared with untreated plots having 73, 223, 126, 24 and 23 cm plant height, respectively. However, the treatmental difference and crop treatment interaction were non-significant. From these findings it can be concluded that Stomp 330E carryovers in the soil and did not affect the plant development and show any phytotoxic effect on the following crops throughout the growing season. Similar results were reported by Warfa and Noor [4]; Karpenko [11]; Aleev [13]; Catizone *et al.* [14]; Subramanian and Ali [17] and Berayon [19].

Conclusion

It was observed that crops planted on Stomp 330E treated plots in cotton behaved very similar to those of untreated plots in grain yield, seedling emergence and plant height. Therefore, it was concluded that Stomp 330E exert no residual effect on the succeeding crops and therefore can be recommended as a safe herbicide.

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