

Chemical Control of Weeds in Linseed

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In the present decade the practice of weed control in different crops through the use of herbicides has gained considerable popularity, but little work has been reported for the control of weeds in oilseed crops specially from our country. A field assessment on weed control in linseed was, therefore, carried out using different formulations of 2, 4-D and MCPA.

Initial studies conducted by the authors in microplots during 1965-66, showed that response of 2, 4-D and MCPA applications in different recommended varieties of linseed *viz.*, Hira Nilam and Mukta is almost same. Blackman and Holly (1948) and Tandon (1949) also did not report any adverse effects of MCPA and 2, 4-D when used at the rates of 0.2 per cent and 4 oz/acre respectively in tolerant varieties of flax. According to Segarceanu *et al.* (1966) and Mashtakov *et al.* (1967), application of MCPA @ 0.76-1.0 kg/ha, when the plants were 4-5 cm high, produced highest yields of seed and gave 80% weed control. Similar observations have been obtained by Varlet (1962), Aukema (1962), Mani and Bhardwaj (1965) and Domanska (1966).

MATERIALS AND METHODS

The experiment was conducted on linseed variety Mukta at Govt. Research Farm, Kanpur for two years 1966-67 and 1967-68 on light loam soil of moderate fertility. The design adopted was randomized block with 6 treatments and 4 replications. The crop was fertilized with 40 kg N and 20 kg P₂O₅ per hectare. The treatments were as follows :—

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| 1. Unweeded Control. | |
| 2. Hand weeding | 6 weeks after sowing. |
| 3. 2, 4-D (Sodium) 0.500 kg a. e. / ha | 6 weeks after sowing. |
| 4. 2, 4-D (amine) 0.376 kg a. e. / ha | „ „ |
| 5. 2, 4-D (ester) 0.250 kg a. e. / ha | „ „ |
| 6. MCPA (amine) 0.500 kg a. e. / ha | „ „ |

The weedicides sprayings were done with the help of Knapsack sprayer, dissolved in 570 litres of water to cover one hectare. Weed data were recorded before and after spraying of weedicides by using one metre quadrat.

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RESULTS AND DISCUSSION

(I) *Weed Study* :

(a) *Extent of infestation* : During 1966-67 weed population counts recorded before spraying of weedicides indicated that field was highly infested with *Chenopodium album*; other weeds found were *Cyperus rotundus*, *Melilotus spp.*, *Anagallis arvensis* and *Asphodelus tenuifolius*, their percentage infestations were 83.8, 9.3, 2.8, 2.6 and 1.5 per cent respectively. In the second year weed population was not so heterogenous as in the previous season and during this year percentage infestations were *Cyperus rotundus* (24.8%), *Spergula arvensis* (23.6%), *Anagallis arvensis* (23.3%), *Chenopodium album* (14.30%) and *Melilotus spp.* (13.9%).

(b) *Percentage reduction* : The data presented in Table 1 provide information on the relative effects of herbicides on different weed species. In both the years all the weeds were significantly controlled by the weedicides used. It was observed that in hand-weeded plots, weeds regerminated after irrigation, but in the weedicide treated plots it was not so. Overall percentage kill of weeds was better in the first year than during the following season, possibly due to the fact that in the first year *Chenopodium album* was the dominant weed which was effectively controlled by all the weedicides tried, while in the second season, the dominant weed was *Cyperus rotundus* which is not checked either by the weedicides or by hand weeding. The average results of two years, however, indicate that maximum over all percentage control was achieved by ester 2, 4-D, (63.0%) followed by MCPA (56.0%), 2, 4-D amine (54.5%), hand-weeding (43.0%) and 2, 4-D sodium (39.5%).

(II) *Crop Tolerance* :— In the first year light to moderate scorch or spotting on the leaves was observed in almost all the treatments after spraying the weedicides. During the second year, however, the damage was not so severe as in the previous year but in 2, 4-D sprayed plots there was fusion of leaves and bending of stem. Hagsard (1954) also noted this type of deformity when 5 cm tall linseed plants were sprayed with phenoxy compounds but these abnormalities did not depress the yield and the plants recovered by themselves.

(III) *Effect on Yield* :— The grain and straw yields of crop were significantly influenced by weedicidal applications. In the first year, maximum grain yield was obtained with hand-weeding while, during the second season, the maximum grain yield was obtained from the plots sprayed with 2, 4- (amine) followed by MCPA (Table 2). The two years average results indicate that, amongst the treatments, 2, 4-D (amine) gave maximum increase in grain yield over control (55.8 %) followed by hand-weeding, MCPA, 2, 4-D (ester) and 2, 4-D (sodium), the percentage increases being 50.6, 44.4, 30.1 and 28.9 respectively. Increase in yield of grain due to spraying of herbicides has also been reported by Holly

Table I. :— Effect of weedicides on mortality of weeds

Characters	Year	T r e a t m e n t s					C. D. at 5%		
		Control	Hand weeding	Sodium 2, 4-D	Amine 2, 4-D	ester 2, 4-D		MCPA	
Weed intensity per sq. metre before spraying	1966-67	440	424	508	472	432	384		
	1967-68	168	179	176	202	214	172		
	Mean	304.0	301.5	342.0	337.0	323.0	278.0		
Percent control of individual weeds $0 = \sin^{-1} \sqrt{P}$									
<i>Chenopodium album</i>	1966-67	23.5	52.6	51.5	56.9	62.8	63.8	24.17	
	1967-68	0.0	45.8	48.0	54.2	60.5	54.8	6.36	
	Mean	11.7	49.2	49.7	55.5	61.6	59.3		
<i>Anagallis arvensis</i>	1966-67	12.0	35.5	40.1	75.9	80.8	63.8	24.75	
	1967-68	0.0	46.6	44.5	46.1	51.0	60.8	8.92	
	Mean	6.0	41.0	42.3	61.0	65.9	62.3		
<i>Melilotus sp.</i>	1966-67	0.0	52.6	36.2	50.8	83.5	67.5	28.09	
	1967-68	0.0	43.4	46.9	58.9	64.2	49.2	10.40	
	Mean	0.0	48.0	41.5	54.8	73.8	58.3		
<i>Asphodelus tenuifolius</i>	1966-67	0.0	41.8	26.6	44.3	35.5	42.1	20.54	
	1967-68		Not Present in the field						
	Mean	0.0	41.8	26.6	44.3	35.5	42.1		
<i>Cyperus rotundus</i>	1966-67	0.0	27.2	0.0	19.2	27.2	33.9	15.25	
	1967-68	0.0	18.6	0.0	9.0	26.9	38.5	13.95	
	Mean	0.0	22.2	0.0	14.1	27.0	36.2		
<i>Spergula arvensis</i>	1966-67		Not present in the field						
	1967-68	0.0	30.9	41.8	42.0	48.7	55.9	10.27	
	Mean	0.0	30.9	41.8	42.0	48.7	55.9		
Over all percent control	1966-67	10.5	56.0	48.0	59.0	74.0	66.0		
	1967-68	0.0	40.0	31.0	50.0	52.0	46.0		
	Mean	5.1	48.0	39.5	54.5	63.0	56.0		

Table 2 :— Effect of treatments on yield and comparative economics

Treatments	Grain yield q/ha		Mean	Percent increase over control	straw yield q/ha		Mean	Present increase over control	Income over control		Mean Rs.
	1966-67	1967-68			1966-67	1966-67			1966-67 Rs.	1967-68 Rs.	
Control	6.32	8.67	7.49	—	15.58	18.07	16.83				
Hand weeding	11.15	11.42	11.28	50.6	32.59	26.38	29.98	78.1	780.60	288.71	534.65
Sodium 2, 4-D	8.67	10.65	9.66	28.9	23.40	24.61	24.00	42.6	392.27	240.05	316.16
amine 2, 4-D	9.55	13.79	11.67	55.8	26.58	30.15	28.36	68.5	538.44	634.05	586.24
ester 2, 4-D	8.54	10.96	9.75	30.1	24.51	22.76	23.63	40.4	366.55	273.25	319.90
MCPA	8.83	12.81	10.82	44.4	26.89	28.23	27.56	63.1	412.85	506.74	469.49
C. D. at 5%	2.70	0.533			8.71	3.83					

and Blackman (1954). Straw yields were also improved by the application of weedicides.

(IV) *Economics of the treatments* :— The average results of two years showed that highest income of Rs. 586.26 was obtained by the plots treated with 2, 4-D amine (Table 2), followed by hand-weeding (Rs. 534.65), MCPA (Rs. 459.49) 2, 4-D ester (319.90) and 2, 4-D sodium (Rs. 316.16).

SUMMARY

Lower doses of the weedicides gave good control of *Chenopodium album*, *Anagallis arvensis*, *Melilotus spp.* and *Asphodelus tenuifolius* but were less effective against *Cyperus rotundus*.

MCPA treated plots did not show any abnormality of crop while 2, 4-D formulations produced certain leaf and stem deformities. Highest yields was obtained by amine salt of 2, 4-D.

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