

Weed Control in the Fodder Crops of Teosinte & Maize

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Maize and teosinte are important fodder crops suitable for cultivation in large parts of India. These crops are generally grown in the rainy season when weeds become a serious problem because of favourable moisture and temperature conditions. It is generally difficult to keep the fields in weed-free conditions, as the soil may be too wet to permit mechanical weeding. It is most important in the fodder crops to prevent early weed competition because subsequently the thick stands of fodder crops could take care of the late emerging weeds.

No work on control of weeds in teosinte is reported. There is however, evidence to show that weeds in maize can be controlled by the use of simazine (Mazumdar, 1964; Sharma *et al.*, 1965; Mani *et al.*, 1966). The effect of 2, 4-D on broadleaf weeds is also reported (Nazamuddin & Rehman, 1960). Since both broadleaf and grassy weeds predominate in the rainy season, an experiment was conducted at the Indian Grassland and Fodder Research Institution, Jhansi to study the effect of pre-emergence application of simazine and post-emergence application of 2, 4-D & MCPA in controlling weeds in maize and teosinte.

MATERIALS AND METHODS

The experiment was conducted on sandy loam soil in 1967-68 and on clay loam soil in 1968-69. The following treatments were tried in a split plot design.

Main plots : Crops :—

Maize

Teosinte

Sub plots : Weed Control Methods :—

Control

Mechanical weeding

Intercropping with fodder cowpeas

Simazine @ 0.75 kg. a. i./ha (Pre-em.)

Simazine @ 1.50 kg. a. i./ha (Pre-em.)

Symbols

C

W

Cowpeas

S₁

S₂

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Simazine @ 0.75 kg. a. i./ha (Pre-em.) followed by 2, 4-D amine @ 0.75 kg. a.e./ha (Post-em.)	S ₁ D
Simazine @ 1.50 kg. a i /ha (pre-em.) followed by 2, 4-D amine @ 0.75 kg. a.e./ha (post-em.)	S ₂ D
Simazine @ 0.75 kg. a.i./ha (pre-em) followed by MCPA amine @ 0.75 kg. a.e./ha (post-em.)	S ₁ M
Simazine @ 1 50 kg. a.i./ha (pre-em,) followed by MCPA amine @ 0.75 kg. a e./ha (post-em.)	S ₂ M
Simazine @ 0 75 kg. a.i./ ha (pre-em.) followed by mechanical weeding	S ₁ W
Simazine @ 1.50 kg. a.i./ha (pre-em.) followed by mechanical weeding	S ₂ W

Gross and net sub plots were 4×4 m. and 3×3 m. respectively. Fodder crops were sown at 25 cm. spacing. A fertilizer mixture of 40 kg N, 50 kg P₂O₅ and 50 kg K₂O/ha was applied at sowing and later on the crops were topdressed with 20 kg N/ha at 3-week age. Fodder crops were harvested at pre-flowering stage. Potato was planted in the first year and berseem in the second year during the *rabi* season. The schedule of operations is given below :—

Operations	Dates	
	1967-68	1968-69
A, Maize & Teosinte :		
Sowing	8/7	23/6
Pre-emergence treatments	10/7	25/6
Post-emergence treatments	30/7	15/7
Harvestings	4/9	21/8 (Maize)
	12/9	21/8 (Teosinte)
B, Potato :		
Sowing	28/10	
C, Berseem :		
Sowing		3/10

RESULTS

Effect on weeds associated with maize and teosinte crops :

Broadleaf weeds, *Commelina benghalensis*, *Digera arvensis*, *Portulaca quadrifida* and *Amaranthus* spp. predominated during 1967-68. The other weeds associated with the crop were *Eleusine aegyptiaca*, *Dactyloctenium aegyptium*, *Echinochloa colonum* and *Cyperus rotundus*. During 1968-69 the infestation was mainly due to grassy weeds and *Cyperus iria*. Pre-emergence treatments of

Table 1. Effect of Weed Control treatments on associated weeds

Treatments	Weed population/M ²						Fresh weight of weeds gms/M ²		
	Broadleaf			Grasses					
	1967	1968	Av.	1967	1968	Av.	1967	1968	
C	420	108	264	163	251	212	54	210	2424
W	146	25	115	78	106	83	66	196	931
Cowpeas	436	80	259	127	145	136	54	230	923
S ₁	0	1	0	16	2	9	54	2	112
S ₂	0	0	0	11	2	7	46	2	104
S ₁ D	0	0	0	14	4	9	32	0	102
S ₂ D	0	0	0	11	3	7	30	1	109
S ₁ M	0	0	0	14	5	9	33	0	116
S ₂ M	0	0	0	11	4	7	28	0	114
S ₁ W	0	0	0	7	1	4	68	1	26
S ₂ W	0	0	0	7	1	4	58	2	23

Table 3.
Effects of treatments on the weeds and average dry matter yield of maize and teosinte.

Treatments	Av. dry matter yield (q/ha)		W e e d s					
	Maize	Teosinte	No. M ²				Fresh weight (gms/M ²)	
			Broadleaf		Grasses		Maize	Teosinte
			Maize	Teosinte	Maize	Teosinte		
C	52.5	57.8	258.9	274.9	171.9	154.6	2322	2526
W	73.4	73.2	113.0	127.4	78.6	77.3	916	947
Cowpeas	61.2	67.3	263.6	255.2	129.3	124.0	1942	1905
S ₁	90.8	92.8	0.3	0.1	17.0	15.8	123	100
S ₂	105.4	110.2	0.1	0.0	10.6	11.3	114	94
S ₁ D	97.6	101.4	0.0	0.0	14.9	13.8	109	95
S ₂ D	120.0	117.1	0.0	0.0	11.6	11.3	100	119
S ₁ M	90.4	106.4	0.0	0.0	14.1	14.5	131	104
S ₂ M	108.8	108.8	0.0	0.0	10.4	11.1	109	119
S ₁ W	118.7	128.5	0.0	0.0	7.7	7.3	25	26
S ₂ W	156.9	140.9	0.0	0.1	5.8	8.4	17	28

Effect on the following rabi crops :

Simazine applied to maize and teosinte fodders 110 days before the sowing of the potato crop reduced the fresh weight of weeds of *rabi* season (*Chenopodium album*, *Spergula arvensis* and *Portulaca* species). The treatment slightly improved the yield of potato tubers (Table 4).

Table 4
Residual effect of treatments on weed and the yield of potato tubers.

Treatments	Fresh wt. of weeds before earthing (q/ha)	Potato yield (q/ha)
C	64.4	388.4
W	48.1	399.5
Cowpeas	50.6	395.0
S ₁	28.9	425.6
S ₂	43.7	374.8
S ₁ D	40.6	414.2
S ₂ D	40.6	437.9
S ₁ M	45.6	404.4
S ₂ M	51.9	378.8
S ₁ W	44.4	420.4
S ₂ W	50.6	414.4
S. Em		+26.6

On the basis of the results emerged during 1968-69 the application of simazine at either rates in maize and teosinte fodders was found safe for growing berseem fodder during the *rabi* season when it was sown 100 days after the elapse of the herbicide treatment.

Economics of treatments :

Pre-emergence application of simazine @ 1.50 kg. a.i./ha followed by mechanical weeding at 3-week age of the crops was most remunerative as it gave maximum profit of Rs. 786/ha over control (Table 5).

DISCUSSION

During the rainy season, it is absolutely necessary to prevent early weed infestation in order to provide favourable conditions to the growth of maize and teosinte seedlings. This condition was obtained by the pre-emergence application of simazine herbicide. Treatment of simazine has controlled annual broadleaf and grassy weeds, and *Cyperus iria* in conformity with the findings of Majumdar 1969. However, this treatment alone could not control nutsedge but this weed was partially suppressed when applied in combination with post-

Table 5.
Economics of treatments.

Treatments	Cost of Weed Control Operation (Rs.)	Fodder value (Rs.)	Crop value minus treatment cost (Rs.)	Additional profit (+) or loss (-) over control (Rs.)
C	—	551.60	551.60	—
W	50.00	733.10	683.10	131.50
Cowpeas	—	645.00	645.00	93.40
S ₁	68.00	918.10	850.10	298.50
S ₂	131.00	1078.10	947.10	395.50
S ₁ D	95.12	995.10	899.98	348.38
S ₂ D	158.12	1185.30	1027.18	475.58
S ₁ M	93.61	984.00	890.39	338.79
S ₂ M	156.61	1086.80	930.19	378.59
S ₁ W	88.00	1236.30	1148.30	596.70
S ₂ W	151.00	1489.00	1338.00	786.40

Basis of calculation :

Labourers required/ha per weeding	20	
Labour wages	Rs. 2-50/day	Cost of simazine Rs. 42-00/Kg.
Cost of MCPA amine (400 gm/l)	11/l	(50% W.P.)
Cost of 2, 4-D amine (720 gm/l)	21-28/l	Price of dry matter Rs. 10/q

emergence spray of 2, 4-D or MCPA. Similar results have been reported by Sharma *et al.* (1965). The effect of 2, 4-D and MCPA were not distinct on nut-sedge because of their low rate (Singh *et al.*, 1968).

Simazine application @ 1.5 kg a.i./ha followed by mechanical weeding was found most effective in reducing the fresh weight of weeds. This treatment proved better than others in increasing the forage yield of maize and teosinte and consequently the financial return. The contribution of mechanical weeding in this treatment may be in loosening the soil besides controlling the already established weeds at the time of simazine application. Because of high weed infestation, the increase in yield was more pronounced in 1968-69 than that obtained in the previous year. The findings also indicate the suitability of the treatment in the rotation of maize/teosinte (fodders) with potato or berseem.

SUMMARY AND CONCLUSIONS

A field experiment on the control of weeds in teosinte and maize fodders was conducted at the Central Farm of the Indian Grassland & Fodder Research Institute, Jhansi during 1967-68 and 1968-69. The treatments included pre-emergence application of simazine (0.75 and 1.50 kg a.i./ha) alone and in combination with post-emergence application of amine salts of 2, 4-D and MCPA and mechanical weeding, in addition to mechanical weeding alone, intercropping with cowpeas and untreated control. The residual effect of treatments was studied on the *rabi* crops of potato and berseem. Treatment effects were observed on weeds and the fodder yields.

Application of simazine @ 1.50 kg a.i./ha in combination with mechanical weeding proved most effective in controlling weeds and increasing the yield of fodders. This treatment was also found suitable for the cultivation of potato or berseem crops during the *rabi* season.

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