

Weed Control in Maize Under Graded Nitrogen Levels*

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A study on weed control in maize at Madurai indicated the usefulness of simazine as a pre-emergence herbicide. Manual weeding twice and simazine at 1 kg a. i./ha coupled with a hand weeding on 30th day after seeding gave similar weed control. Applied N had linear influence on grain yield and the 180 kg N/ha gave the highest yield of 5.54 kg/ha.

Adequate supply of moisture and nutrient fertilizers and optimum plant density are the factors to exploit the full yield potential of hybrid maize. These factors normally lead to luxuriant weed growth, which, unless controlled, results in low production. Thus, weed control is also an important factor to increase the yield. Kulshrestha *et al.* (1975) reported effective weed control in maize by pre-emergence application of simazine at 1.0 kg a.i./ha.

MATERIAL AND METHODS

A field experiment was conducted at the Agricultural College and Research Institute, Madurai in *kharif* season 1977 with the objective of finding the efficacy of chemical and mechanical method of weed control in maize and the effect of weed control methods and nitrogen levels on growth, yield and yield components of maize. The soil was of sandy loam type with a pH of 6.8. The fertility status of the soil was classified as low in available N and medium in available P and K.

Twenty one treatment combinations consisting of three levels of N viz., N₁—60; N₂—120 and N₃—180 kg/ha and seven weed control treatments viz., T₁—Unweeded check; T₂—Hand weeding twice on 15th and 30th day after sowing, T₃—Simazine at 1.0 kg a. i./ha as pre-emergence spray T₄—Simazine at 1.0 kg a. i. / ha as pre-emergence spray plus one hand weeding on 30th day after sowing, T₅—2,4-D at 1.5 kg a. i. / ha as post-emergence spray, T₆—2,4-D at 1.5 kg a. i./ha as post emergence spray plus one hand weeding on 30th day after sowing and T₇—Simazine at 1.0 kg a. i./ha as pre-emergence spray plus 2,4-D at 1.5kg a.i./ha as post-emergence spray, were accommodated in a factorial randomised block design, replicated thrice. The gross and net plot size was 7.0 x 5.4m and 5.2 x 4.8 m, respectively. Hybrid maize, Ganga 5, was sown on 15.6.1977 and harvested on 21.9.1977.

N was applied in the form of urea in three equal splits, on the day of sowing, 30th day and 50th day after

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sowing. A basal application of 60 kg P_2O_5 and 50 kg K_2O/ha was made. Simazine was applied as pre-emergence spray and 2, 4-D as post-emergence spray. Five plants were randomly selected from each plot for recording biometric observations.

RESULTS AND DISCUSSION

Plant height increased linearly with increasing level of N fertilization (Table I). All the weed control treatments were superior to unweeded check in enhancing the plant height. Bandeën and Buchholtz (1964) reported that weed infestation in maize reduced the plant height significantly. The plant dry matter increased linearly, the maximum dry matter being recorded at 180 kg N/ha. The dry matter production was the least in the unweeded plot.

The length of cob, grain weight per cob and 1000 grain weight increased with increasing level of N. Effective weed control improved the yield attributes such as length of cob, grain weight per cob and 1000 grain weight.

Grain yield was positively and significantly influenced by the levels of N applied. Increasing levels of applied N enhanced the grain yield. The linear response of maize upto 180 kg N/ha was reported by Shah *et al.* (1971). Weed control, either chemically, mechanically or in combination, had positive significant influence on grain yield. Among the treatmental combina-

tions, pre-emergence application of simazine at 1.0 kg a. i./ha coupled with hand weeding once on 30th day and hand weeding twice were superior to other treatments but were similar among themselves. Stover yield was maximum at 180 kg N/ha level. All the weed control treatments were significantly superior to the unweeded control in recording higher stover yield.

Trianthema portulacastrum L., was the most dominant weed. It formed nearly 50 per cent of the total weed population. The other weed species recorded were, *Cyperus rotundus*, *Trianthema decondra* L., *Portulaca oleraceae* L., *Amaranthus viridis* L., and *Eclipta alba*.

Significant differences in the dry weight of weeds were observed due to applied N (Table II). Increase in dry weight of weeds at each additional level of applied N was reported by Bandeën and Buchholtz (1964). Pre-emergence application of simazine followed by one hand weeding or hand weeding twice were effective in suppressing the weed growth and recorded the least dry weight of weeds.

Hand weeding twice involved higher expenditure followed by simazine plus one hand weeding. Although the cost of weeding in these two treatments was high, the net return was also higher in these two treatments because of effective weed control, resulting in higher grain production. When the normal method of manual

weed control viz., hand weeding twice was compared to other weed control methods, application of simazine plus one late hand weeding gave Rs. 174/ha additional income.

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REFERENCES

BANDEEN, J. D. and K. P. BUCHHOLTZ 1964.
Competitive effects of quackgrass upon corn

as modified by fertilization. *weeds* 15 : 220—24.

KULSHRESHTHA G., V. S. MANI and R. S. DEWAN. 1975. Effect of Simazine and Atrazine on maize and their residual effects on succeeding rabi crop. *Indian J. Agron.*, 20 : 201—202.

SHAH V. H., O. P. GAUTAM and AMARJIT SINGH 1971. Comparative response of an open pollinated variety and a double cross maize hybrid to N P and K. *Indian J. agric Sci.* 41 : 932—37.

TABLE I Influence of N and methods of weed control on growth and yield of maize.

Treatments	Mean Plant height (cm)	Plant dry matter (kg/ha)	Length of cob (cm)	Grain weight per cob (g)	1000 grain weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)
Nitrogen levels :							
N ₁	190.10	12852	11.98	82.25	240.76	3570	9282
N ₂	202.12	16134	12.60	94.67	262.76	4610	11524
N ₃	217.49	17184	13.27	114.38	293.09	5054	12130
SED	1.70	398.26	0.21	2.03	3.09	65	255
CD (0.05)	3.44	804.89	0.42	4.10	6.25	132	515
Weed Control Methods :							
T ₁	192.59	11454	11.36	80.55	243.44	3286	8167
T ₂	208.38	17373	13.36	106.24	274.00	4978	12394
T ₃	202.38	15356	12.70	97.19	268.33	4401	10955
T ₄	211.28	17566	13.10	108.02	275.33	5033	12533
T ₅	198.05	14114	12.33	91.68	260.88	4046	10067
T ₆	204.21	15531	12.53	95.80	260.00	4451	11080
T ₇	205.75	16336	12.93	100.22	270.77	4681	11655
SED	2.60	608.00	0.31	3.10	4.73	100	389
CD (0.05)	5.26	1229.00	0.64	6.26	9.55	202	787

TABLE II Influence of N and weed control methods on dry weight of weeds and economics of weed control.

Treatments	Dry weight of weeds at harvest (kg/ha) (Transformed)	Total income (Rs/ha)	Cost of cultivation (including weed control) (Rs/ha)	Profit per ha (Rs/ha)	Economics of weed control treatment compared to normal hand weeding twice (Rs/ha)
Nitrogen levels:					
N ₁	31.68	—	—	—	—
N ₂	32.57	—	—	—	—
N ₃	32.80	—	—	—	—
SED	0.21	—	—	—	—
CD (0.05)	0.42	—	—	—	—
Weed Control Methods:					
T ₁	53.21	3408	1487	1920	-1355
T ₂	24.72	5163	1887	3275	—
T ₃	29.40	4565	1571	2993	-282
T ₄	24.86	5220	1771	3449	174
T ₅	34.60	4197	1548	2648	-627
T ₆	31.50	4617	1748	2868	-407
T ₇	28.16	4855	1632	3222	-531
SED	0.32	—	—	—	—
CD (0.05)	0.65	—	—	—	—