

Studies on Simazine in Hybrid Maize (Var. Ganga-5) Under Graded Levels of Nitrogen

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ABSTRACT

Simazine as pre-emergence application at 1.00 and 1.75 kg a. i./ha was effective in controlling weeds in maize and superior to two hand weedings. The grain yield in herbicide-treated plots were on par with twice hand weeded plots. The sub-herbicide dose of simazine (0.25 kg a. i. / ha) increased the protein content of grain than the other treatments. Nitrogen levels did not influence the weed population but the weed weight increased with each increment of nitrogen. Grain yield was maximum under 120 kg N / ha but it was on par with 60 and 90 kg N/ha.

INTRODUCTION

The need for an effective weed control method for better utilisation of nutrients and moisture for higher yields in maize has been well realised. Eddowes (1961) reported that pre-emergence application of simazine at 1.0 kg/ha in corn gave excellent control of weeds. Simazine was reported to be effective in controlling weeds like *Chenopodium album*, *Paucum capillare*, *Echinochloa crusgali*, *Amaranthus, retroflexus* and *Digitaria sanguinalis* (Vengris, 1961). A few workers have reported that simazine at sub-herbicide doses increased the uptake of plant nutrients, yield and protein content of grain under different soil fertility levels. Lorenzoni (1965) and Freney (1965) reported that corn plants treated with

low levels of simazine took up more nitrogen and increased the dry matter yield. Tweedy and Ries (1966) noted low levels of simazine increased the dry weight and total nitrogen content of maize plants. Ries *et al.* (1970) recorded that sub-herbicide doses of simazine increased the seed yield by 13 per cent.

MATERIALS AND METHODS

Field trial was conducted at the Agricultural College Farm, Coimbatore in *kharif* season, 1971 under split plot design with three replications. The soil is of clayey type with medium in available nitrogen and phosphorus and high in potash content. The main plot treatments comprised of 0, 30, 60, 90 and 120 kg N/ha (denoted by symbols

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N_0 , N_1 , N_2 , N_3 and N_4 respectively) while the five sub plot treatments were unweeded check (C), hand weeding (W), Simazine 0.25 kg a.i./ha (S_1), Simazine 1.00 kg a.i./ha (S_2) and Simazine 1.75 kg a.i./ha (S_3). The gross and net plot sizes were 4.8×8.0 m and 2.4×7.2 m respectively. Hybrid maize Var. Ganga 5 was sown on 4-8-1971. A basal application of 68 kg of phosphorus, 45 kg of potash per hectare was made. Half the dose of nitrogen was applied at sowing time and the rest was applied 30 days after sowing of maize as per the treatments. Simazine (80 per cent) was sprayed as a pre-emergence spray on the third day after sowing. Five plants at random in each plot were selected and all the biometric observations were made from them.

RESULTS AND DISCUSSION

The observations on growth, yield and quality characters of the crop and weed studies are presented in Table 1 and 2.

I. Growth Characters

Plant height:

The plant height was maximum at the highest dose of nitrogen (120 kg N/ha) while it was the least under no nitrogen level. Unweeded control recorded the least plant height than the simazine and hand weeded plots. This was primarily due to the more dry weight of weeds in the latter treatments which checked the growth of the plants.

Leaf number at maturity:

The leaf number per plant was influenced by nitrogen upto 60 kg/ha only. Further increases in nitrogen dose gave a negative response. Weed control by both manual and chemical means were significantly superior to unweeded control (C) in increasing the leaf number per plant. Gadiz (1956) had also reported that weed control measures in maize increased the leaf number of the plant.

Leaf area of the plant:

The leaf area per plant was maximum at 120 kg N/ha and superior to all other treatments. Hussien (1968) observed positive response in leaf area of maize with the levels of N from 0 to 200 kg/ha. The different weed control methods were superior to unweeded control in enhancing the leaf area of the plant.

Plant dry matter production :

The plant dry matter production per unit area was not influenced either by nitrogen application or by herbicide treatments.

II. Yield characters

Cob size:

The cob length was increased due to application of nitrogen. Weed control either manually or by pre-emergence application of simazine increased the length of the cob. Neither the application of nitrogen nor the weed control treatments had any influence on the width of cob.

TABLE 1. Influence of levels of nitrogen and methods of weeding on growth characters of maize

Treatments	Mean plant height (cm)	Mean leaf No. per plant	Mean leaf area (sq. cm)	Plant dry matter (kg/ha)
a) Levels of Nitrogen				
N ₀	150.0	12.30	351.80	20239.90
N ₁	161.3	13.04	400.46	21128.75
N ₂	163.6	14.20	430.52	22400.84
N ₃	160.0	14.16	427.62	21494.72
N ₄	178.5	13.65	466.70	22785.27
S. E.	3.70	0.30	9.50	1475.4
C. D. (5%)	12.10	1.00	30.90	N. S.
b) Methods of weeding				
C	131.70	11.50	370.00	19005.84
W	161.96	13.84	427.80	22440.53
S ₁	176.60	14.26	428.90	22263.12
S ₂	180.70	13.94	435.56	22375.34
S ₃	167.70	13.70	415.00	21954.74
S. E.	5.30	0.20	12.90	987.32
C. D. (5%)	14.80	0.70	35.60	N. S.

Cob weight:

The cob weight was increased only upto 60 kg N/ha and further increases in nitrogen level did not influence the cob weight significantly. Appa Rao (1969) in his studies at

Coimbatore obtained response in cob weight upto 56 kg N/ha only. Weed control treatments were superior to unweeded control in increasing the cob weight. This may be due to better availability of plant nutrients in all the weed control treatments. Increased

TABLE 2. Influence of levels of Nitrogen and methods of weeding on yield and yield attributes of crop and weed attributes

Treatments	Crop							Weeds					
	Mean cob length [cm]	Mean cob width [cm]	Mean weight of cobs (kg/ha)	Mean weight of 1000 grains [g]	Mean grain yield (kg/ha)	Mean straw yield (kg/ha)	Protein content in per cent	No. of weeds sq. m. At 30 days (Trans)	At harvest (Trans.)	Dry weight of weeds/ha At 30 days (Trans)	At harvest (Trans.)	Cost of weed control/ha (Rupee)	Additional income over control/ha (Rs)
a) Levels of Nitrogen													
N ₀	11.40	4.22	4815	383.54	3499	12468	10.44	8.70	10.61	17.80	26.20	—	—
N ₁	11.41	4.16	5660	397.12	4121	13425	11.08	9.43	11.10	17.11	25.63	—	—
N ₂	12.80	4.20	6852	416.00	4956	14120	11.36	8.32	10.93	17.10	28.22	—	—
N ₃	12.50	4.32	6863	401.24	4910	13616	11.79	8.61	10.34	17.90	29.21	—	—
N ₄	11.74	4.30	7164	400.20	5165	14340	12.05	8.13	10.81	16.43	29.31	—	—
S. E.	0.40	0.10	0.37	3.61	0.24	0.73	—	0.434	0.462	0.788	2.283	—	—
C.D.5%	N.S.	N.S.	1.20	11.70	0.80	N.S.	—	N. S.	N. S.	N. S.	N. S.	—	—
b) Methods of weeding													
C	10.64	39.2	4850	342.21	3504	124.68	10.68	16.80	23.41	48.71	52.61	—	—
W	12.56	4.38	6575	412.28	4760	13997	11.61	10.13	9.50	18.80	23.81	190	545.80
S ₁	12.36	4.32	6794	418.23	4876	14606	12.18	8.62	8.32	10.11	25.20	30	805.80
S ₂	12.46	4.36	6759	412.12	4887	14155	11.75	5.12	6.51	5.12	21.31	90	715.80
S ₃	11.90	4.22	6377	412.51	4625	13541	11.57	2.74	5.90	3.63	16.61	150	482.80
S. E.	0.30	0.33	0.34	5.80	0.24	0.62	—	0.333	0.521	0.796	2.144	—	—
CD 5%	0.90	N.S.	0.94	16.10	0.68	1.74	0	0.95	1.49	2.28	6.18	—	—

nutrient availability had been reported earlier by Mani (1971) in corn in a similar study.

Weight of thousand grains:

Thousand-grain weight was increased only upto 60 kg N/ha and any further increase in nitrogen levels gave only negative response. Reddy (1968) obtained similar results in corn with the graded levels of nitrogen.

Weed control by simazine or manual weeding increased the grain weight in maize than unweeded control. This may be due to increased availability of plant nutrients from the soil in the weeded plots. Singh and Shekhawat (1968) reported that pre-emergence application of simazine and hand weeding in maize increased the nutrient availability which appeared to be responsible for higher test grain weight.

Grain yield:

The highest grain yield was obtained under 120 kg N/ha which was on par with 60 and 90 kg N/ha. The yield components like cob weight and grain weight were influenced by nitrogen levels. Tewary *et al.* (1970) obtained highest grain yield in hybrid maize at 150 kg N/ha. The marked increase in grain yields were under hand weeded and chemical treated plots as compared to unweeded check. This might be due to increase in cob length, cob weight and test grain weight. The yield components were influenced mainly due to different weed control measures over unweeded control.

Straw yield:

The differences mainly due to nitrogen levels were not significant. However, all the weed control treatments were significantly superior to the unweeded control. Increased plant height in all the weed control treatments may be responsible for increased straw yield. Dungan *et al.* (1958) observed increased straw yield with increases in plant height.

Protein content of grain:

Increased protein content of grain with successive increases in nitrogen levels was observed. The results are in conformity with the findings made by Puntamaker *et al.* (1965). As compared to different weed control treatments the protein content in unweeded check was low and the highest was under sub-herbicide dose of simazine. The sub-herbicide dose of simazine increased the uptake of nitrogen in plants. Freney (1965) found that corn plants treated with low levels of simazine took up more nitrogen and increased dry matter yield. The present observations corroborate with these observations.

Weed Study

Trialema p. rtulacastrum L. (purslane), an annual dicot was the most dominant weed. It formed nearly 90 per cent of the total weed population. The other weeds recorded were *Lagascia mollis* Cav., *Portulaca oleracea* L. and *Cyperus rotundus* L.

Weed count:

The number of weeds per square metre at different levels of nitrogen did not vary significantly at all stages of crop growth. The weed number in a field being a population factor mostly depended upon viable weed seeds present in a soil, the fertility status of the soil did not influence the weed count per unit area. The weed number recorded during the crop growth was the highest under unweeded control while the lowest number was under simazine 1.75 kg/ha. The efficiency of weed control increased with the increases in the dose of simazine from 0.25 to 1.75 kg/ha. The weed control measures with simazine at 1.0 and 1.75 kg/ha were even superior to two hand weedings. The efficiency of simazine at 1.12 kg/ha in controlling the weed population had been reported by Gupta and Gangwar (1965).

Dry Weight of Weeds:

The differences in the dry weight of weeds at various levels of nitrogen were not significant at early stages of crop growth but at the harvest stage there was positive response with each increment in nitrogen level. Bandeen and Buchholtz (1964) have reported in maize that higher doses of nitrogen increased the weed growth. Pre-emergence application of simazine checked the weed growth at all stages. Sivaji and Rao (1965) reported that efficiency of simazine was positively correlated with dosage levels when the chemical was applied from 2 to 6 kg/ha.

Economics of weed control

The cost of weeding was higher in twice hand - weeded treatment compared to simazine application. Among the different treatments with simazine, the weeding charge was the lowest at 0.25 kg a.i./ha. Chemical weed control gave as much grain and straw yield as obtained from two hand weedings at a low cost.

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