

Relative efficiency of Weedicides with and without Hand Weeding in Maize

S. C. CHAURASIA AND N. N. SHARMA*

Reduction in yield and quality of farm produce due to uncontrolled weed-crop competition is a well established fact. As with other crops, losses caused by weeds to maize crop vary with intensity and nature of weeds, soil fertility and stage of the crop growth when weeds compete with it. Based upon these factors, reductions in corn yield from 33 to 72 per cent or even more have been reported and it has been shown that weed crop competition in early stages of corn growth is particularly harmful (Altona and Mentz, 1953; Hackbarth, 1957; Verma and Raheja, 1958; Moolani *et al.*, 1964 and Eddowes and Harpur, 1965). Nizamuddin and Rahman (1961) estimated that in Bihar alone weed in maize fields cause an annual loss of Rs. 0.92 crores.

With the difficulties experienced in using cultural and cropping methods of weed control, chemical methods are receiving increased attention and have become of wide use in agriculturally advanced countries. This discovery of hormone type weedicides has revolutionised the whole concept of weed control.

As a result of encouraging findings on the use of weedicides, Indian markets are being flooded by a large number of weedicides under different trade names. Since the action of the weedicides is influenced, besides several agro-climatic factors, on the crop with which the weeds are associated and the rate and time of application of the weedicides, it is desired, therefore, that the farmers must know the specific weedicide with its rate and time of application to be used against specific weeds in a particular crop for a particular locality. The present investigation was, therefore, planned and carried out at the Bihar Agricultural College Farm, Sabour, during the *Kharif* season of 1965-66, to study the relative efficiency of different weedicides in comparison to the prevalent method of hand weeding on the growth and yield of maize, one of the most important cereal crop of our country.

MATERIALS AND METHODS

A factorial experiment was conducted in a randomised block design with 3 replications. The treatment details are given below :

*Division of Agronomy, Bihar Agricultural College, Sabour (Bhagalpur).

Weedicides and their rates of application :

W₁—Tafazine 50 W (Simazine) @ 2.80 kg per hectare in 1121 litres of water.

W₂—Tafacide 80 (Sodium salt of 2, 4-D) @ 1.68 kg. per hectare in 673 litres of water.

W₃—Planotox (Ester of 2, 4-D) @ 1.093 litres per hectare in 673 litres of water.

Time of application :

t₁—Pre-emergence application of full dose (2 days after sowing).

t₂—Post-emergence application of full dose (20 days after sowing).

t₃—Split application—Half as pre-emergence (2 days after sowing) and half as post-emergence (20 days after sowing).

t₄—Pre-emergence application of full dose (2 days after sowing) and one hand-weeding (40 days after sowing).

t₅—Post-emergence application of full dose (20 days after sowing) and one hand weeding (40 days after sowing).

Combination of weedicides and their time of application gave 15 treatments. The following additional treatments were also included to give 18 treatments.

h₁—One hand weeding (20 days after sowing).

h₂—Two hand weedings (First 20 days and second 40 days after sowing).

C—Control.

The gross and net plot sizes were 8.54 m × 4.27 m (0.0035 ha) and 7.32 m × 3.66 m (0.0027 ha), respectively.

The soil of the plot was sandy loam with medium fertility and the maize variety was 'Jaunpur' which is the most popular open pollinated variety of the locality.

RESULTS AND DISCUSSION

In this paper the effect of different treatments on the yield attributes like length and girth of maize cob, number of grains per cob and 1000-grain weight, and the yield of grain and stover have been presented and discussed. The data on the length, girth, number of grains and 1000-grain weight have been presented, in Table 1 and that on the yield of grain and stover in Table 2 and 2 A.

Table 1

Effect of different weedicidal and hand weeding treatments on yield attributes of Maize.

Treatments	Yield attributes			
	Length of cob in cm.	Girth of cob in cm.	Number of grains/cob	1000-grain weight in gm.
W ₁	13.80	11.34	423.9	212.39
W ₂	12.00	10.71	392.0	202.03
W ₃	11.26	10.40	356.9	195.75
C. D. at 5%	0.43	0.29	1.07	2.06
t ₁	15.93	12.04	478.3	
t ₂	10.34	10.09	322.6	189.59
t ₃	10.79	10.48	340.9	198.66
t ₄	12.59	10.91	418.7	205.61
t ₅	12.07	10.56	394.1	203.09
C. D. at 5%	0.56	0.37	1.55	2.66
h ₁	10.25	10.25	325.3	195.77
h ₂	13.09	11.38	470.7	200.80
Control	9.65	7.15	364.1	165.41
C. D. at 5%	0.96	0.64	2.38	4.60
Weedicides	12.35	10.81	390.9	203.39
Control	9.65	7.15	364.1	165.41
C. D. at 5%	0.70	1.47	1.74	3.36
Weedicides	12.35	10.81	390.9	203.39
H. W.	10.67	10.82	398.0	198.29
C. D. at 5%	0.51	N.S.	1.27	2.44

Table 2

Effect of different weedicidal and hand weeding treatments on grain and stover yield of Maize.

Treatment	Grain Yield		Stover Yield	
	(q/ha)	C. D. at 5%	(q/ha)	C. D. at 5%
W ₁	24.77		50.08	
W ₂	20.22	1.08	41.08	2.23
W ₃	17.23		35.25	
t ₁	27.87		37.31	
t ₂	16.64		34.07	
t ₃	17.42	1.38	35.15	2.87
t ₄	22.05		45.00	
t ₅	19.77		40.37	
h ₁	16.15		34.07	
h ₂	22.87	2.05	46.15	4.96
Control	10.02		21.00	
Weedicide	20.74		42.09	
Control	10.02	1.75	21.00	3.62
Weedicide	20.74		42.09	
H. W.	19.51	N. S.	40.11	N. S.

Table 2-A w × t interaction

Treatment	t ₁	t ₂	t ₃	t ₄	t ₅	
Grain yield (q/ha)	W ₁	34.18	17.72	19.88	28.21	23.88
	W ₂	27.35	16.41	15.43	22.98	19.25
	W ₃	22.33	15.78	16.79	14.92	16.15
Stover yield (q/ha)	W ₁	69.25	35.44	39.96	57.05	48.69
	W ₂	53.77	33.32	30.89	47.61	39.58
	W ₃	44.07	33.43	34.51	30.26	32.83

Remarkable increase in the length and girth of the cobs with a consequent increase in the number of grains per cob as well as an increase in the test weight under all the weedicidal treatments over control was an interesting outcome of this investigation. All the three weedicides differed significantly from each other in influencing all these yield attributes. Most favourable influence was under Simazine (Tafazine 50 W) followed by 2, 4-D Sodium salt (Tafacide 80) and 2, 4-D Ester (Planotox) respectively. All these yield attributes are expressions of better plant vigour and conducive growth conditions provided to the crop. Weeds produce detrimental effect on the growth and development of the crop by sharing its good space, air and water which finds expression in the reduction in the yield attributes. Simazine was able to control the weeds more effectively than the other two weedicides. Control of weeds seems to have diverted more of the nutrients to the cob which was reflected in better yield attributes. This favourable effect of simazine finds its support in the work of Chaudhary (1964) and Singh and Shekhawat (1966).

Pre-emergence application of weedicides eliminated the weeds in the early and most vital stage of maize growth when the plants were least resistant to adverse condition and this might be the cause of increase in yield attributes under this treatment. Since the pre-emergence application have already exerted the desired influence, addition of hand weeding in these plots could not help (t_4). Impropriety of supplementing full dose pre-emergence application with hand weeding has, thus, been clearly proved in this investigation. Maize is known to be very sensitive to any competition at the early stage and control methods either weedicides or hand weeding which can control the weeds more effectively at this stage seems to be more congenial for better plant growth as well as increase in the yield attributes. This corroborates the present findings and finds support in the work of Sharma *et al.* (1965).

It is well known that the favourable effects of the treatments on the growth, developmental and yield contributing characters are well reflected in the final yield of grain and stover. Among the weedicides tried Simazine (Tafazine 80W) gave significantly higher yield of both grain and stover than both the 2, 4-D formulations, Sodium salt (Tafacide 80 W) prove to be more effective than its ester derivative (Planotox). Better yield of maize with Simazine has also been reported by Gupta and Gangwar (1966). Higher yield with pre-emergence application was again the reflection of the superior response of this treatment on all the yield attributes studied. Higher yield with pre-emergence application of 2, 4-D has been reported by Nizamuddin and Rahmam (1961). On the other hand Lee (1957) and Vassilova (1961) have reported increase in the yield of maize by the pre-emergence application of Simazine.

The significance of the interaction between the weedicides and time of application brought out clearly the inter-dependence of the two factors. The steep fall in the grain yield in t_2 and t_3 as compared to the other times of application, more particularly in case of Tafazine 50 W (W_1), explained the significance of this interaction. Tafazine 50W (W_1) applied full at pre-emergence (t_1) gave the maximum yield of maize grain which was significantly better than other treatment combinations.

Among the two hand weeding treatments, twice hand weeded plots had a significantly favourable influence on the yield attributes as well as the yield of grain and stover than those having one hand weeding.

SUMMARY

Important findings from the investigation are summarised below :—

Yield attributes such as length and girth of cob, number of grains per cob and 1000-grain weight were significantly influenced by pre-emergence application of the full dose, irrespective of the weedicides. However, among the weedicides, Tafazine 50 W (Simazine) proved to be the best

Maximum grain and stover yields were obtained with full dose pre-emergence application of Tafazine 50 W (Simazine).

In almost all the characters two hand weeding was superior to one hand weeding.

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