

Chemical Control of Predominant Weeds of Maize and Wheat in Plain and Plateau Tracts of Bihar

by
T. D. SINHA*

Weed control assumes an added importance particularly in the context of the present day food crisis. Within the past three decades, weed control has been developed into a science of increasing complexity. Employment of chemicals in weed control is one of the most interesting chapters in the science of farming. Introduction of 2,4-D and similar chemicals has revolutionised the whole concept of weed control. Many workers of the various countries have reported reduction in crop yields due to weed infestation. Notable among them are Ghosh and Dungan (1956), Moolani *et al.* (1964) and Sinha and Thakur (1966).

In any programme of developing improved production practices for maize and wheat under Indian conditions, developing suitable weed control measures assumes primary importance. The present series of experiments therefore, were planned to find out most effective weedicides to control predominant weeds of maize and wheat of different tracts of Bihar, *i. e.*, plain and plateau. In plain tracts of Bihar, experiments were carried out at Bihar Agricultural College, Sabour during *rabi* season of 1963-64 and *kharif* season of 1964-65. In plateau tracts of Bihar, experiments were carried out at Ranchi Agricultural College, Kanke during *rabi* season of 1965-66 and *kharif* season of 1966-67.

Materials and Methods: I. *Rabi* season (1963-64): Design of experiment - Randomised blocks with seven treatments replicated four times. The treatments are: (1) Fernoxone at 1.1 kg/ha on 30th day of sowing. (2) Fernoxone at 1.1 kg/ha on 60th day of sowing. (3) Taficide 80 at 1.6 kg on 30th day of sowing. (4) Taficide 80 at 1.6 kg on 60th day of sowing. (5) Planotox at 1.1 litre on 30th day of sowing. (6) Planotox at 1.1 litre on 60th day of sowing. (7) Control (*i. e.*, no weedicide).

N.P. 799 variety of wheat was sown on 27-11-1963. Weedicides were sprayed on 26-12-1963 and 25-1-1964. Four quadrates of 60 cm square each were selected randomly in each plot for counting weeds.

II. *Kharif* season (1964-65): Design of the experiment - Randomised block with ten treatments replicated thrice. The treatments are: (i) Tafazine 50 W at 2.8 kg/ha full as pre-emergence. (ii) Tafazine 50 W at 2.8 kg/ha full

*Tirhut College of Agriculture, Dholi (Muzaffarpur), Bihar.

as post-emergence. (iii) Tafazine 50 W at 2.8 kg/ha half as pre and half as post-emergence. (iv) Taficide 80 at 1.68 kh/ha full as pre-emergence. (v) Taficide 80 at 1.68 kh/ha full as post-emergence. (vi) Taficide 80 at 1.68 kh/ha half as pre and half as post emergence. (vii) Planotox at 1.09 litres/ha full as pre-emergence. (viii) Planotox at 1.09 litres/ha full as post-emergence, (ix) Planotox at 1.09 litres/ha half as pre and half as post-emergence, (x) Control (*i.e.*, no weedicide).

Jaunpur variety of maize was sown on 29-6-1964. Pre-and post-spraying were done on 1-7-1964 and 23-7-1964. For counting weed population, two quadrates of 60 cm square each were selected randomly.

III. *Rabi* season (1965-66): Design of the experiment - Randomised block with six treatments replicated four times. The treatments are: (i) Taficide 80 at 1.12 kg / ha. (ii) Taficide 80 at 2.24 kg / ha. (iii) Bladex G at 0.84 kg / ha. (iv) Bladex G at 1.68 kg / ha. (v) Hand-weeding. (vi) Control.

N.P. 799 variety of wheat was sown on 2-12-1965. Spraying of weedicides and hand weeding were done on 12-1-1966. For counting weed population, two quadrates of 60 cm square each were selected randomly.

IV. *Kharif* season (1966-67): Design of the experiment - Randomised block with six treatments replicated four times. The treatments are: (i) Atrazine 1.0 kg/ha. (ii) Atrazine 2.0 kg/ha. (iii) Simazine 1.0 kg/ha. (iv) Simazine 2.0 kg/ha. (v) Hand-weeding. (vi) Control.

Jaunpur variety of maize was sown on 25-6-1966. Spraying of weedicides was done on 27-6-1966. Hand-weeding was done on 17-7-1966. For weed counting, two 60 cm square quadrate were selected randomly in each plot.

Results: *Sinebieria pinnatifida* and *Cyperus rotundus* (nutgrass) were the two weeds predominantly associated with wheat crop at Sabour. *Sinebieria pinnatifida* was a new weed for Sabour. Data obtained on the mean population of these two weeds under different treatments on five observational dates have been presented in Table 1. It is evident that all the three weedicides, *i.e.* Fernoxone at 1.1 kg/ha, Taficide 80 at 1.6 kg/ha, and Planotox at 1.1 litre/ha were very effective in completely controlling *S. pinnatifida* weed within a week of spraying, whether sprayed on 30th or 60th day of sowing. The three weedicides were almost equally effective in controlling *C. rotundus*. However, they were less effective in controlling this weed.

TABLE 1. Mean population of *S. pinnatifida* and *C. rotundus* during rabi season (1963-64)

Treatments	<i>Sinebieria pinnatifida</i>					<i>Cyperus rotundus</i>				
	17 ¹² ₁₁	2 ¹ ₁₁	17 ¹ ₁₁	1 ¹ ₁₁	16 ¹ ₁₁	17 ¹ ₁₁	2 ¹ ₁₁	17 ¹ ₁₁	1 ¹ ₁₁	16 ¹ ₁₁
W ₁ T ₁	21	nil	2	1	nil	27	22	16	9	6
W ₁ T ₂	17	24	26	nil	nil	30	30	35	26	16
W ₂ T ₁	15	nil	nil	nil	nil	26	21	20	16	14
W ₂ T ₂	16	21	32	4	2	23	28	25	23	13
W ₃ T ₁	13	nil	nil	1	nil	18	14	16	6	4
W ₃ T ₂	19	26	34	nil	nil	22	16	22	20	12
W ₀	18	28	40	27	17	24	28	23	19	20

C. rotundus and *Dactyloctenium aegyptiacum* are the two most predominant weeds associated with maize at Sabour. Data obtained on the mean population of these two weeds under different treatments on five observational dates after pre-emergence application of three weedicides, viz., Tafazine 50W, Taficide 80, and Planotox have been presented in Table 2. The results indicate that even at the first population count of *C. rotundus*, i.e., 13 days after application of weedicides, there was appreciable control of this weed in all the plots treated with weedicides as compared to untreated control plots. The effect of the weedicides in controlling this weed was slightly more evident in plots receiving full dose than those receiving half dose of weedicides. There was no remarkable difference among these three weedicides. The second population study shows that there was increase in population, more in plots receiving half dose as pre-emergence. The third population study taken 15 days after full-dose post-emergence registered decrease in population of this weed. A perusal of the data recorded on final count one day before harvest of maize reveals that as compared to control plots, there was appreciably less number of this weed in almost all the plots. However, at no stage there was any marked difference between these three weedicides.

TABLE 2. Mean population of *C. rotundus* and *D. aegyptiacum* during kharif season (1964-65).

Treatments	<i>Cyperus rotundus</i>					<i>Dactyloctenium aegyptiacum</i>				
	14 ¹ ₁₁	23 ¹ ₁₁	8 ¹ ₁₁	24 ¹ ₁₁	20 ¹ ₁₁	14 ¹ ₁₁	23 ¹ ₁₁	8 ¹ ₁₁	24 ¹ ₁₁	20 ¹ ₁₁
W ₁ T ₁	6	6	6	7	2	nil	nil	4	3	1
W ₁ T ₂	16	18	16	11	4	4	15	11	10	8
W ₁ T ₃	6	8	10	9	1	nil	5	5	4	2
W ₂ T ₁	4	4	6	6	2	nil	1	2	1	1
W ₂ T ₂	10	18	10	8	2	8	20	21	18	11
W ₂ T ₃	5	7	7	8	1	nil	7	6	8	5
W ₃ T ₁	4	6	7	5	1	nil	4	4	4	2
W ₃ T ₂	12	24	12	8	1	16	27	21	17	13
W ₃ T ₃	7	8	9	7	1	4	5	8	8	4
W ₀	20	26	31	29	10	15	27	36	30	25

A perusal of the data obtained for *D. aegyptiacum* (Table 2) reveals that on the first count very few plants of this species appeared in the treated plots except the plots treated with half dose of Planotox. On second count, Tafazine 50W seemed to be more effective in controlling this weed. From final count, it is evident that although weedicides did not differ significantly among themselves in controlling this weed, a trend for more effective control with Tafazine 50W (W_1) was more pronounced.

Among the time of application the best control was achieved when full dose of weedicides was applied as pre-emergence.

Anagallis arvensis, *Fumaria parviflora* and *Chenopodium album* are the most common weeds associated with wheat at Kanke (Ranchi). Data obtained on the mean population of these three weeds under different treatments on different dates have been presented in Table 3.

TABLE 3. Mean population of *A. arvensis*, *F. parviflora* and *C. album* during rabi season (1965-66)

Treat- ments	<i>Anagallis arvensis</i>					<i>Fumaria parviflora</i>					<i>Chenopodium album</i>				
	27.12 65	11.1 66	26.1 66	10.2 65	25.2 66	27.12 65	11.1 66	26.1 66	10.2 66	25.2 66	27.12 65	11.1 66	26.1 66	10.2 66	25.2 66
W_1	140	240	128	68	28	24	40	8	4	nil	36	60	20	8	4
W_2	196	384	144	52	12	52	80	8	4	nil	48	104	24	4	nil
W_3	144	240	104	48	32	44	56	4	4	nil	32	76	28	8	4
W_4	160	304	60	28	16	60	68	nil	nil	nil	36	72	20	8	3
H	136	276	nil	62	134	48	48	12	10	8	40	56	nil	nil	nil
C	160	324	432	360	308	56	72	84	120	48	36	68	106	124	121

From the combined study of the data of all the five observational dates recorded in Table 3, it is evident that in case of *A. arvensis* and *F. parviflora*, weedicides, viz., Taficide 80 and Bladex G proved to be more fatal than hand-weeding. In *A. arvensis*, Bladex G (amine salt of 2, 4-D) has proved to be more fatal than Taficide 80 (sodium salt of 2, 4-D) at both the levels, i.e., at 0.84 and 1.68 kg/ha. But in case of *F. parviflora*, Bladex G proved to be more effective at higher dose (W_4) in killing all the weeds. Taficide 80 proved to be equally effective at both the levels. In case of *C. album*, hand-weeding showed its superiority over both the weedicides in controlling this weed completely. Both the weedicides have shown the similar effect in controlling this weed. Higher dose of both the weedicides had caused high mortality.

Xanthium strumarium, *Richardia brasiliensis*, and *C. rotundus* are the predominant weeds associated with maize at Kanke (Ranche). *R. brasiliensis*,

locally known as *Hadapoda* is a special weed of the College Farm. Data obtained on the mean population of these three weeds under different treatments on the five observational dates (Table 4) indicated that the pre-emergence application of weedicides, viz., atrazine and simazine almost completely controlled the emergence of weeds for a fortnight. Both the weedicides were very effective in controlling weeds throughout the growing period of maize. Higher concentrations were more effective than the lower concentrations. Hand-weeding was inferior to both the weedicides. From the combined study of the data for all the three weeds, it seems that among the three species, *X. strumarium* was the first to emerge in all the plots, but there was only slight increase in its population. *C. rotundus* appeared in the unsprayed plots only after 15 days of sowing. With the passing of time, its population increased slowly. Among the weeds, the behaviour of *R. brasiliensis* was note-worthy. This species which only emerged out after one month of sowing multiplied very rapidly.

TABLE 4. Mean population of *Xanthium strumarium*, *Richardia brasiliensis* and *Cyperus rotundus* during kharif season (1966-67)

Treat- ments	<i>Xanthium strumarium</i>					<i>Richardia brasiliensis</i>					<i>Cyperus rotundus</i>				
	10.7 66	25.7 66	9.8 66	24.8 66	8.9 66	10.7 66	25.7 66	9.8 66	24.8 66	8.9 66	10.7 66	25.7 66	9.8 66	24.8 66	8.9 66
A ₁	nil	9	6	9	9	nil	nil	9	57	147	nil	nil	nil	9	18
A ₂	nil	3	3	2	3	nil	nil	nil	60	129	nil	nil	nil	21	30
S ₁	nil	9	6	6	6	nil	nil	6	57	171	nil	nil	nil	3	9
S ₂	nil	3	3	6	5	nil	nil	3	66	126	nil	nil	nil	18	30
H	11	15	21	21	21	nil	nil	8	212	315	nil	3	6	39	51
C	20	18	24	27	27	nil	nil	28	243	361	nil	20	18	21	42

Summary: The experiments were carried out to find out most effective weedicides for controlling most predominant weeds associated with maize and wheat crops in two different tracts of Bihar, viz., plain and plateau. In plain tract, experiments were carried out at Bihar Agricultural College, Sabour (Bhagalpur) during 1963-64 and 1964-65. In plateau region, experiments were carried out at Ranchi Agricultural College, Ranke (Ranchi) during 1965-66 and 1966-67.

For controlling weeds especially *Sinebieria pinnatifida* and *Cyperus rotundus* in wheat field of the plain tract, Fernoxone at 1.1 kg/ha, Taticide 80 at 1.6 kg/ha and Planotox at 1.1 litre/ha were sprayed on 30th and 60th day of sowing. The three weedicides were very effective in completely controlling *S. pinnatifida* weed within a week of spraying whether

sprayed on 30th or 60th day of sowing of wheat. For controlling *C. rotundus*, three weedicides were almost equally effective. Application on 30th day was more effective than application on 60th day.

In plateau tract, *Anagallis arvensis*, *Fumaria parviflora* and *Chenopodium album* are the predominant weed in wheat field. For controlling these weeds, Taticide 80 at 1.1 kg and 2.2 kg/ha and Bladex G at 0.84 and 1.68 kg/ha were used. For controlling *A. arvensis*, Bladex G proved to be more fatal at both the levels than Taticide 80. For *F. parviflora* higher concentration of Bladex G proved to be more fatal than Taticide 80. Both the weedicides were equally effective in controlling *C. album* but they were inferior to hand-weeding.

C. rotundus and *Dactyloctenium aegyptiacum* are the most predominant weeds associated with maize at Sabour. For controlling these, Tafazine 50W at 2.8 kg/ha, Taticide 80 at 1.6 kg/ha and Planotox at 1.09 litre/ha were sprayed as pre, post and pre and post-emergence application. All the three weedicides were almost equally effective in controlling *C. rotundus*. Pre-emergence application of these weedicides was more effective than post-emergence. Although weedicides did not differ among themselves in controlling *D. aegyptiacum*, but a trend for more effective control with Tafazine 50W was more pronounced.

Among the time of application, the best control was achieved when full dose of weedicides was applied as pre-emergence.

Xanthium strumarium, *Richardia brasiliensis*, and *C. rotundus* are the pre-dominant weed associated with maize at Kanke. For controlling these weeds, Atrazine at 1.0 and 2.0 kg/ha and Simazine at 1.0 and 2.0 kg/ha were used as pre-emergence application. Both the weedicides were very effective in controlling these weeds throughout the growing season of maize. Higher concentration was more effective than lower concentration.

REFERENCES

- Ghosh, A. K. and G. H. Dungan. 1956. The problem of weed control. *Allahabad Fmg.*, 30: 22-5.
- Moolani, M. K., E. L. Knake and F. W. Slife. 1964. Competition of smooth pig weed with corn and soyabean. *Weeds.*, 12: 126-8.
- Sinha, T. D. and C. Thakur. 1966. Chemical control of nutgrass during *Kharif* season. *Bhag. Uni.*, 1: 11.