

Effect of Weedicides on Motha (*Cyperus rotundus*) and Bathua (*Chenopodium album*) in Wheat Crop

by

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Efficient weed control forms an integrated part of the increased crop production. The introduction of selective herbicides of synthetic hormone group has opened a new chapter for the efficient weed control in the advanced countries than the old traditional methods of cultural and mechanical weeding practices which are time as well as labour consuming methods. The enormous research progress in these field of works have been recently reviewed by Ennis (1955). Considerable interest has been developed in India recently and the recent progress on chemical weed control has been reviewed by Verma and others (1958).

Wheat is an important cereal crop of the alluvial tract of Bihar which suffers from various types of weeds. *Motha* (*Cyperus rotundus*) and *Bathua* (*Chenopodium album*) are the most common weeds of wheat crop in Bihar. Wheat crop in Bihar is either sown behind the plough or broad cast which restricts its weeding by means of implements due to close growing of wheat plants. Hand weeding has been found out to be uneconomic and hence the cultivators do not generally weed out the wheat crop. Hoeing may also bring out some deeply buried weed seeds on the surface which may thrive with the favourable weather condition. Apart from this, hand weeding may as well damage the roots of wheat crop being grown very close to each other.

Hence the experiments were conducted at Sabour to find out suitable and cheap method of weed control by means of available selective weedicides which may be effective and may as well increase the wheat yields.

Methods and Materials: The experiments have been conducted at Sabour during the year 1957—'58, 1958—'59 infested with the above two weeds. The weedicides used were Fernoxone, Chloroxone, Spontox, and Tropotox in two doses $\frac{3}{4}$ lb. and $1\frac{1}{2}$ lb. of the acid equivalent of the chief active ingredient per acre. Two standard checks of control (no weeding) and one hand weeding were kept to

measure effect of weedicides on the control of weeds as well as on the yield of wheat. Wheat was sown in furrows behind the plough at the normal seed rate of 40 seers per acre. The fertilizers were applied at the time of sowing in furrows at the rate of 40 lbs. N and 40 lbs. P_2O_5 per acre in the form of Ammonium Sulphate and Single Super Phosphate respectively.

The spraying in each year was done three weeks after sowing in 100 gallons of water per acre. The number of weeds in three fixed quadrat of 2' x 2' distributed at random in each plot of the experiments were counted in both the years before spraying and after one month of spraying.

The experimental design followed was Randomised Block with four replications. Analysis of variance and covariance have been used to assess the effects of treatments on the different attributes recorded.

Experimental Findings: A. *Weeds and the effects of Weedicides:* In addition to the two dominant weeds, Motha (*Cyperus rotundus*) and Bathua (*Chenopodium album*) a few plants of *Vicia Sp.* and Banpiyajji (*Asphodelus tenuifolius*) were also observed.

Motha: The average number of *Motha* per quadrat of 2' x 2' at the time of spraying and one month after spraying are presented in the following table:—

TABLE I
Average Number of Motha in fixed quadrat of 2' x 2'.

Treatments	1957—'58			1958—'59		
	Before spraying (x)	After spraying (y)	P. C. reduction or increase	Before spraying (x)	After spraying (y)	P. C. reduction or increase
1. Fernoxone $\frac{3}{4}$ lb.	56.75	33.75	— 40.2	13.75	13.75	0.00
2. Fernoxone 1 $\frac{1}{2}$ lb.	99.50	29.50	— 69.1	19.50	20.25	+ 3.8
3. Chloroxone $\frac{3}{4}$ lb.	80.75	33.25	— 58.8	10.50	22.75	+ 116.6
4. Chloroxone 1 $\frac{1}{2}$ lb.	90.00	34.50	— 62.5	9.75	13.50	+ 33.3
5. Spontox $\frac{3}{4}$ lb.	42.75	30.50	— 28.6	12.25	17.25	+ 40.8
6. Spontox 1 $\frac{1}{2}$ lb.	57.00	23.75	— 58.2	13.75	14.75	+ 15.7
7. Tropotox $\frac{3}{4}$ lb.	80.00	51.25	— 37.5	12.25	17.50	+ 42.9
8. Tropotox 1 $\frac{1}{2}$ lb.	77.08	80.00	— 22.8	20.00	24.25	+ 21.3
9. Control	72.00	70.00	— 2.8	13.00	32.00	+ 140.2
SEm		± 7.72			± 3.98	
C. D.		22.45			...	

There is a wide variation in the occurrence of *Motha* in the various treatments both at the time of spraying and after one month of spraying. The weed population after one month of spraying has been considerably reduced in the first year as compared to control. In the second year, the population of *Motha* after one month of spraying has increased, but the percentage increase is less in all the weedicides treatments than that of control. In the first year, the higher dose of 1½ lb. has shown greater percentage reduction in all the weedicides. In the second year when the population count shows an increase in the number, the higher doses show a lesser increase than the lower doses of the weedicides.

As there is great variation in the weed population both at the time of spraying and after spraying data were analysed by analysis of variance and covariance. The test of significance of the adjusted treatments, means of the population count after one month of spraying are presented below :—

TABLE II
Test of Significance of adjusted treatments

Source	1957-'58				1958-'59		
	D. F.	S. S.	M. S.	Ratio	S. S.	M. S.	Ratio
Treatment + Error	31	12459.1	2124.3
Error	23	4763.5	207.1	4.64	1022.4	44.5	3.10
Treatment	8	7696.6	962.1	...	1102.0	137.8	...

The test shows to be significant for both the years. The adjusted population count are given below :—

TABLE III
Adjusted number of Motha after one month of spraying.

Treatments	1957-'58	1958-'59
1. Fernoxone ¾ lb.	36.25	13.36
2. „ 1½ lb.	25.93	16.20
3. Chloroxone ¾ lb.	31.99	24.92
4. „ 1½ lb.	31.80	16.19
5. Spontox ¾ lb.	35.19	18.21
6. „ 1½ lb.	26.21	15.36
7. Tropotox ¾ lb.	49.80	18.46
8. „ 1½ lb.	59.21	19.86
9. Control	70.11	32.44
S. Em.	± 7.30	± 3.42
C. D. @ 5%	21.35	10.01

The adjusted values of the population of Motha indicates that all the weedicides except Tropotox have significantly controlled them in the year 1957-'58 and in 1958-'59 all the weedicides have controlled them significantly.

Bathua: The population count of Bathua at the time of spraying and after one month spraying are given below (Table IV) along the percentage of increase or decrease from the time of spraying to population count after one month of spraying.

TABLE IV
Average number of Bathua in fixed quadrat of 2' x 2'

Treatments		Before spraying (x)	After spraying (y)	P. C. reduction or increase	Before spraying (x)	After spraying (y)	P. C. reduction or increase
1. Fernoxone	$\frac{3}{4}$ lb.	10.75	7.75	- 27.9	6.50	11.75	+ 80.0
2. "	$1\frac{1}{2}$ lb.	17.25	6.50	- 62.3	7.25	10.75	+ 48.3
3. Chloroxone	$\frac{3}{4}$ lb.	24.25	18.00	- 25.7	9.00	11.25	+ 25.0
4. "	$1\frac{1}{2}$ lb.	45.50	9.75	- 78.5	10.25	15.25	+ 47.8
5. Spontox	$\frac{3}{4}$ lb.	22.25	8.00	- 64.4	9.75	9.25	- 5.12
6. "	$\frac{1}{2}$ lb.	5.75	3.50	- 39.1	10.15	13.00	+ 20.9
7. Tropotox	$\frac{3}{4}$ lb.	21.25	15.50	- 27.1	6.50	15.50	+ 138.5
8. "	$1\frac{1}{2}$ lb.	24.75	11.25	- 54.5	6.50	16.50	+ 138.5
9. Control		14.0	9.50	- 30.1	10.50	38.50	+ 266.6
S. Em.		± 3.27			± 4.13		
C. D.		9.52			12.03		

The population count of *Bathua* has also decreased after one month of spraying in the first year and in the second year it has also increased like that of Motha. But the percentage increase in the weedicides treatments are lesser than the control.

The population of Bathua after one month of spraying has been adjusted as in *Motha*. The test of significance of adjusted values are given below :—

TABLE V
Test of significance of treatments means.

Source	D. F.	1957-'58			1958-'59		
		S. S.	M. S.	Ratio	S. S.	M. S.	Ratio
Treatment + error	31	1216.6			3691.96		
Error	23	766.5	33.33		1366.1	59.40	
Treatment	8	450.1	56.24	1.68	2325.81	290.73	4.89

Test shows that the differences are highly significant in the year 1958-59.

The adjusted population are presented in Table VI.

TABLE VI
Adjusted number of Bathua after one month of spraying

Treatments	1957-'58	1958-'59
1. Fernoxone $\frac{3}{4}$ lb.	9.40	13.23
2. " $1\frac{1}{2}$ lb.	6.84	11.69
3. Chloroxone $\frac{3}{4}$ lb.	17.44	10.93
4. " $1\frac{1}{2}$ lb.	13.20	14.04
5. Spontox $\frac{3}{4}$ lb.	7.76	8.40
6. " $1\frac{1}{2}$ lb.	5.97	11.43
7. Tropotox $\frac{3}{4}$ lb.	15.43	17.98
8. " $1\frac{1}{2}$ lb.	10.60	11.43
9. Control	10.62	37.11
S. Em.	12.37	± 3.91
C. D.	N. S.	11.44

No significant difference is observed in the first year and in second year all the weedicides treatments have reduced the number from control, but the different weedicides treatments do not differ significantly.

B. Effect on the yield of wheat grain: The yield of wheat grain obtained in the two years are presented below. Significant difference has been observed in the year 1957-'58 whereas the results for the 1958-'59 are not significant.

TABLE VII
Yield of grain in mds. per acre

Treatment	1957-'58		1958-'59		
	Yield	Mean yield	Yield	Mean yield	Mean yield for two years
1. Fernoxone $\frac{1}{2}$ lb.	12.80	12.69	14.18	14.95	13.42
2. " $1\frac{1}{2}$ lb.	12.59		15.72		
3. Chloroxone $\frac{3}{4}$ lb.	14.03	13.77	18.59	17.16	14.68
4. " $1\frac{1}{2}$ lb.	13.51		15.72		
5. Spontox $\frac{3}{4}$ lb.	13.73	14.81	14.34	14.61	14.75
6. " $1\frac{1}{2}$ lb.	16.05		14.87		
7. Tropotox $\frac{3}{4}$ lb.	12.59	13.10	17.36	16.69	14.85
8. " $1\frac{1}{2}$ lb.	13.62		16.01		
Average of 1-8 (weedicides)		13.61		15.85	14.73
9. Hand weeding		12.38		17.90	14.64
Average effect of weedicides and hand weeding		13.48		16.79	14.78
10. Control		11.46		13.90	12.68
C. D.		1.89		n. s.	

The only significant difference has been observed between control and the average effect of rest weeding treatments in the year 1957-'58. The other comparisons are not significant.

Discussion : The weedicides tried are of different active ingredients which react differently with different weeds. Fernoxone and Chloroxone contains sodium salt of 2, 4-D whereas spontox contains a mixture of 2, 4-D and 2, 4, 5-T and Tropotox contains M. C. P. B. *Motha* has been controlled significantly in both the years by all the weedicides excepting, Tropotox in the year 1957-'58 (Table III). Similarly all the weedicides have controlled *Bathua* significantly in the year 1953-'59, whereas no significant difference has been observed in the year 1957-'58 (Table V).

The differences in wheat due to various weedicides differ appreciably in both the years, but the differences are not significant in one out of two years. In the year 1957-'58 the average effect due to weedicides and one weeding has significantly given higher yield than the control. In the year 1958-'59, none of the comparisons is significant. Pande (1954) has also found increased yield of grain by the application of 2, 4-D as salt at the tillering phase of the crop. Verma (1958) has also reported the increased yield over unweeded control by the application 2, 4-D. Similarly increased yield over control has also been observed in both the years in the present experiment.

Summary : Experiments on weed control conducted in 1957-'58 and 1958-'59 by common weedicides have been reported. The common weedicides used were Fernoxone, Chloroxone, Spontox and Tropotox at two doses, $\frac{3}{4}$ lb. and $\frac{1}{2}$ lb. of acid equivalent per acre. Two checks of one weeding by hand and an unweeded control were kept.

Increased yield of wheat grain has been observed in all the treatments over unweeded control. Average effect of weedicides and one hand weeding has given statistically significant higher yield over control in one year. The rest of the comparisons are non-significant.

All the weedicides have controlled *Motha* significantly in both the years except Tropotox in 1957-'58. *Bathua* has also been controlled significantly in the year 1958-'59.

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Combination of Results of Groups of Similar Experiments

by

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Introduction: The repetition of agricultural experiments in a number of places and/or over a number of seasons has become a common feature now. The varietal response to manuring experiment in paddy, the model agronomic experiments sponsored by the Indian Agricultural Research Institute on a number of crops and simple fertiliser experiments on cultivators' fields are instances. The object of such repetitions is to study the average response to treatments over a number of places or over a number of seasons and to make firm recommendations that hold good for a fairly wide tract or to a variety of seasonal conditions. It may also be desired to test the consistency of the responses from place to place or from season to season. A knowledge of the method of combining the results of the several repeated experiments, therefore becomes necessary. This article is intended to draw attention to a few of the salient statistical considerations involved in the procedure and to briefly indicate the steps to be adopted for a preliminary and overall appraisal of the results.