Pak. J. Agri. Sci.
24(4)288, 1987

EFFECT OF POST-EMERGENCE HERBICIDES ON WEEDS IN WHEAT

S. Ahmad, Z.A. Cheema, R.M. Iqbal and M.A. Sher
Department of Agronomy, University of Agriculture, Faisalabad.

ABSTRACT

Efficiency of seven post-emergence weedicides namely DMA-6 (2, 4-D amine) @ 1.7 l/ha, Buctril-M (bromoxynil + MCPA) @ 1.4 l/ha, Banvil-P (dicamba + mecoprop) @ 4.0 l/ha, Envoy (Cyanazine + MCPA) @ 2.0 kg/ha, Dicuran MA (Chlortoluron + MCPA) @ 2.5 kg/ha, Arelon (isoproturon) @ 1.5 kg/ha and Dosanex (metoxuron) @ 8.0 kg/ha was studied against hand weedig on a sandy loam soil. Cultural and chemical weed control practices suppressed weed population. DMA 6 and Buctril-M were found to be economical.

INTRODUCTION

The introduction of high yielding wheat varieties having high fertilizer and irrigation requirements has resulted in tremendous increase in weed population in wheat fields. The extent of losses caused by weeds is alarming. On an average, 15-20% yield reduction due to weeds has been estimated. On weight basis, this amounts to a loss of about 1.5-2.5 million tons per year and in monetary terms Rs. 2,500 million per year (Ahmad *et al.*, 1984). It has been reported further that the crop yield may be increased by about 37% by complete control of weeds (Jalis and Shah, 1984). Experimental studies have shown that weeds consume at least as much NPK fertilizer as the crop plant (Ghauri, 1983). Control of weeds is, therefore, essential for obtaining higher yield and better quality of the produce.

Weed control by manual or mechanical means is in practice since long but with the introduction of labour-intensive cropping system, the traditional practice of controlling the weeds through mechanical practices (hand weeding, hoeing, mowing, burning, machine tillage, etc.) has become expensive. Chemical weedicides have been shown to be beneficial and very effective means for controlling weeds in wheat. It was, therefore, considered appropriate to

compare mechanical and chemical weed control methods under the agro-climatic conditions of Faisalabad.

MATERIALS AND METHODS

The effect of chemical weed control practices on the yield of wheat was studied at Experimental Farm, University of Agriculture, Faisalabad, during 1984-85 and 1985-86 on a sandy loam soil with low organic matter. Wheat variety Pak-81 was used as the test crop. The treatments included DMA-6 (2, 4-D amine) @ 1.7 l/ha, Buctril-M (bromoxynil + MCPA) @ 1.4 l/ha, Banvil-P (dicamba + mecoprop) @ 4.0 l/ha, Envoy (cyanazine + MCPA) @ 2.0 kg/ha, Dicuran MA (Chlortoluron + MCPA) @ 2.5 kg/ha, Arelon (isoproturon) @ 1.5 kg/ha and Dosanex (metoxuron) @ 2 kg/ha, hand weeding and weedy check. Hand weeding was done twice for effective weed control. All the seven weedicides were sprayed when the crop reached 3-4 leaf stage, after calibration with a knapsack sprayer fitted with 4 flat fan nozzles on a specially made boom. Weed population before and after spray was recorded to work out mortality only during first year. The treatments were replicated four times in 6 x 1.80 m plots, using randomized complete block design. Observations on tiller number and weed population were recorded from a meter square area selected at random from each plot. Economic analysis was done by calculating Marginal Rate of Return (Perrin *et al.*, 1979).

RESULTS AND DISCUSSION

In this study weed population mostly comprised broad leaved weeds such as Bathu (*Chenopodium album*), Shahtra (*Fumaria Parviflora*), Rai (*Brassica Nigra*) Maini (*Medicago denticulata*), piazi (*Asphodelus tenuifolius*), Wild peas (*Lathyrus aphaco*), Rewari (*Vicia sativa*) and Billi Booti (*Anagallis arvensis*). Mortality percentage of individual weeds with different herbicides is given in Table 1.

Weedicides employed in this study controlled weeds reasonably well and percentage mortality of weeds ranged from 17.0 to 100.0. Effectiveness of chemical weedicides has been demonstrated by various research workers (Misra, 1966; Veleua., 1983; Ahmad *et al.*, 1985). The data on fertile tillers indicated that both the chemical and cultural weed control practices promoted tillering (Table 2). The data showed that with the suppression of weeds chemically or by cultural method, crop-weed competition was minimised resulting in increased number

Table 1. *Mortality percentage of weeds with different herbicides 1984-85*

	DMA-6	Buctril-M	Banvil-P	Envoy	Dicuran MA	Arelon	Dosanex	Hand weeding	Control
Chenopodium album (Bathu)	82	100	93	98	79	98	100	96	0
Fumaria parviflora (Shahtra)	79	99	84	90	69	38	67	94	0
Brassica nigra (Rai)	100	100	100	100	100	100	100	100	0
Medicago denticulata (Maini)	61	92	89	100	93	100	100		0
Asphodelus tenuifolius (Piazi)	81	78	83	89	72	59	79	95	0
Lathyrus aphaca (Wild peas)	86	92	100	20	25	20	17	95	0
Vicia sativa (Rewari)	88	100	100	93	89	38	73	90	0
Anagallis arvensis (Billi booti)	0	80	91	86	100	83	88	95	0

Table 2. *Effect of weed control practices on the yield and yield components of wheat*

Treatment	Number of fertile tillers m^{-2}		Average No. of grains/spike		1000-grain weight (g)		Grain yield/ha (quintals)		Increase over weedy check	
	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86
DMA-6 @ 1.7 l/ha	294 cd	464 e	45.4ab	32.8cde	40 50a	39.8de*	28.5d	27.7d*	6.7 (27.8)	7.2** (35.1)
Buctril- @ 1.4 l/ha	307 bc	585 ab	51.7 a	38.2ab	39.0 a	46.50 ab	31.1cd	36.1ab	8.8 (39.5)	15.6 (76.1)
Banvel-P @ 4.0 l/ha	317 bc	496cde	48.2 a	33.6cd	41.1 a	41.7bcde	29.8cd	29.8cd	7 5 (33.6)	9 3 (45.4)
Envoy @ 2.0 kg/ha	272 de	475 de	54.7 a	32.9bc	40.8a	43.5 abcd	36.3ab	30.8cd	14 (62.8)	10.3 (50.2)
Dicuran-MA @ 2.5 kg/ha	326 bc	600 a	47.2 ab	41.3 a	39.1a	48.1 a	35.5ab	37.8a	13.2 (59.2)	17.3 (84.4)
Arelon @ 1.5 kg/ha	371 a	466 e	42.7 ab	29.6ef	38.4a	38.6de	33.4bc	29.5cd	11.1 (49.8)	9.0 (43.9)
Dosanex @ 2.0 kg/ha	319 bc	500cd	52.1 a	30.7def	39.9a	40.6cde	32.1cd	31.7bcd	9.8 (43.6)	11.2 (54.6)
Hand weeding	336 b	556ab	52.2 a	34.7bcd	40.9a	45.6abc	37.6a	34.5abc	15.3 (68.6)	14.0 (68.3)
Weedy check	258 e	400 f	35.7 b	28.1f	30.1b	37.2e	22.3e	20.5e	—	—

*Any two means in a column not sharing a letter in common differ significantly at 5% probality level.

**Figures given in parentheses represent pecent increase over weedy check.

Table 3. *Economics of weed control in wheat* *

Treatment	Variable cost (Rs.)	Gross benefit (Rs.)		Net benefit (Rs.)		M.R.R. (%)	
		1984-85	1985-86	1984-85	1985-86	1984-85	1985-86
Weedy check	0	2759.63	2536.88	2759.63	2536-88	—	—
DMA-6 @ 1.7 l/ha	271.50	3526.88	3427.88	3255.38	3156.38	182.59	228.18
Buctril-M @ 1.4 l/ha	306 0	3848.62	4467.38	3542.62	4161.38	832.58	2913.04
Envoy @ 2.0 kg/ha	410.0	4492.13	3811.50	4082.13	3401.50	508.97	-ve
Hand weeding (two)	500.0	4653.0	4269.37	4153.00	3769-37	78.74	-ve
Dosanex @ 2.0 kg/ha	520.0	3972.38	3922.88	3452.38	3402.88	-ve	-ve
Arelon @ 1.5 kg/ha	530.0	4133.35	3650.63	3633.25	3150.63	-ve	-ve
Dicuran @ 2:5 kg/ha	632.50	4393.13	4677.75	3860.63	4145.25	-ve	-ve
Banvel-P @ 4.0 l/ha	682.0	3687.75	3687.75	3006.75	3005.75	-ve	-ve

* Basic data for calculation:

a. Prevailing prices of weedicides during 1984-85 and 1985-86;
   i. DMA-6 @ Rs. 95/1, ii. Buctril-M @ Rs. 140/1, iii. Envoy @ Rs. 150/kg (Assumed), iv. Dosanex @ Rs. 205/kg, v. Arelon @ Rs. 280/kg, vi. Dicuran @ Rs. 169/kg, vii. Banvel-P @ Rs. 143/1.

b. One hand weeding: 10 man-days/ha @ Rs. 25/each.

c. Labour for weedicide application: 2 man-days @ Rs. 25/each.

d. Rent of sprayer : Rs. 60/-

e. Price of wheat: Rs. 175 00 per quintal.

f. Grain yield has been included to workout the economics.

M.R.R. = Marginal rate of return.

of tillers per unit area. In general, tiller number was higher during 1985-86 compared with 1984-85, however, weedicide effects were almost similar during both the years.

Grain number per spike was also affected by different weed control practices (Table 2). The differences between weed control treatments were not significant enough during 1984-85 but during 1985-86, plots treated with Buctril-M and Dicuran MA produced relatively more grains per spike. Increase in grains per spike as a result of weed suppression was also reported by Jalis and Noor (1980) and Veleva (1982).

The weight of 1000-grains is an important component influencing the yield of crop. The data on this component (Table 2) showed that in year 1984-85 weed control treatments had similar performance but during 1985-86 there was a considerable variation among weed control practices. Buctril-M, Envoy, Dicuran MA and hand weeding produced relatively heavier grains.

Crop yield in final analysis is the index showing difference between the treatments. The data showed that weed control practices out-yielded control during both the years (Table 2). The application of Dicuran MA 2.5 kg/ha and hand weeding produced relatively higher yield. Other treatments, in general, produced comparable yield. The differences in yield probably were due to differences in tiller number of respective treatments. The increase in yield over the control ranged from 27.8 to 68.6% in 1984-85 and 36.1 to 84.6% in 1985-86 the latter was a better harvest year for wheat because of timely rains. The increase in yield as a result of weed control has also been amply demonstrated by various workers (Misra, 1966; Kataria, 1981; Khan, 1982; Ahmad *et al.*, 1984; Jalis; and Shah, 1984; Ahmad *et al.*, 1985).

Economic analysis of the data on weed control practices indicated that the use of DMA-6 and Buctril-M was more economical compared with other treatments during both the years of study (Table 3). Hand weeding remains to be the useful alternative. However, with the rising cost of weedicides, it is feared that the use of weedicides might become uneconomical and the farmer will be left with no alternative but to revert to cultural method of weed control.

REFERENCES

Ahmad, S., I. Ahmad, M. Banaras and M. A. Gill. 1984. Effect of row spacing and weed control on growth and yield of wheat. J. Agri. Res. 22(2) : 113-117.

Ahmad, S., R.M. Iqbal,Z.A. Cheema and S. Hussain. 1985. Conventional versus chemical weed control in wheat. Pak. J. Agri. Sci. 22(4) : 221-228.

Ghauri, A. S. K. 1983. Control of weeds in wheat crop. Prog. Farming, 3(2) : 12-15.

Jalis, A. and M. Noor. 1980. Comparison of cultural and chemical weed control in wheat. Annual Report, Plant Physiology Section, AARI, Faisalabad.

Jalis, A. and M. L. Shah. 1984. Weed control in wheat through the use of chemicals. Ziraat Nama, 19(12) : 5 6.

Khan, R. A. 1982. Applied agronomic research on field crops. Annual Prog. Report, Departmentof Agronomy, Univ. of Agri., Faisalabad.

Kataria, P.O. and V. Kumar. 1981. Response of dwarf wheat (*Triticum aestivum*) and four weed spp. to herbicides. Weed Science, 29(5) : 521-524.

Misra, A. 1966. Cultural cum herbicidal approach for best weed control and high yield. Proc. 2nd Weed Control Seminar, Pb. Agri. Univ., Hissar, India. (Weed Abst., 19(1) : 25, 1969).

Perrin, R. K., D. L. Winkelmann, E. R. Moscardi and J. R. Anderson. 1979. From Agronomic Data to Farmers Recommendations. An Economic Training Manual, CIMMYT, Mexico. Bull. No. 27. pp. 15-26.

Veleva, V. T. 1982. Effect of some heribicides on weeds and yield of winter wheat cv. sandovo I. Rasteniev dni Nauki, 19(1) : 48-53. (Weed Abst., 32 (10) : 2347, 1983).

Veleva, V. T. 1983. Effect of some herbicides on growth and yield of new winter wheat cv. lada. Rasteniev dni Nauki, 20(1) : 77-81. (Field Crop. Abst., 36 (12) : 9950, 1983).