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Effect of Post-emergence Application of Herbicides On Weed Control

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Abstract

The herbicides application increased number of tillers per m^2, number of productive tillers per m^2, biological yield t ha^{-1}, grain yield t ha^{-1} and decreased the weed density per m^2. While number of un-productive tillers per m^2, plant height at maturity, spike length, number of grains per spike, 1000-grain weight and harvest index were not significantly affected by herbicides application over the weedy check. Agro-economical analysis of yield data of wheat indicated higher benefit cost ratio in case of Logran Extra 64 WG (2.86) closely followed by Buctril M 40 EC (2.82). Net income was more in case of Buctril M 40 EC than Logran Extra 64 WG. All the prevailing weeds of the crop were effectively controlled by the application of Buctril M 40 EC.

Introduction

Wheat (*Triticum aestivum* L.) was being cultivated before the human race started to live on this planet. During the year 1996-97, wheat was planted on about 8.085 million hectares in Pakistan with the production of 16.377 million tonnes and the average yield of 2026 kg ha^{-1}. (Khan, 1997). Although wheat is the major food grain crop of Pakistan but its yield is quite low mainly due to the existence of some persistent and noctious weeds. These unvaluable and unwanted plants pose a serious threat by depriving the crop plants of nutrients, moisture and light (Anderson, 1983). Many weeds are noted to have an allelopathic effect on the crop (Khalid and Shad, 1987). Weeds not only decrease the yield but also affect the quality of the crop resulting in lower income. The experimental evidence based on small scale trials conducted by agricultural experts has shown that the losses in wheat production due to weeds ranged from 17-25 percent (Shad, 1987). Hence the weeds must be controlled so as to increase wheat production. Several methods were applied for check weeds population in crop field. Among those, chemical weed control is the most efficient, time, money and energy saving method.

Materials and methods

The experiment was laid out in Randomized Complete Block Design (RCBD) with nine treatments and three replicates. Test variety was Inqulab-91. The plot size was 3x4 ($12m^2$). The crop was sown on a well prepared seedbed. The land was prepared thoroughly by ploughing 3-4 times. More emphasis was given to the levelling of land for uniform distribution of irrigation water. The crop was planted with hand drill in lines 30 cm apart. The seed rate used was 110 kg ha^{-1}. The 1st irrigation was applied after 30 days of sowing (DAS) and subsequently after 2-3 weeks interval. The fertilizers (NPK) were applied uniformly to all the treatments at the rate of 120-90-90 kg ha^{-1}. The sources of NIPIC were Urea, Tripple Super Phosphate (TSP) and Sulphate of Potash (SOP).

The data were analyzed statistically by using the Analysis of Variance Techniques (Steel and Torrie, 1980) and Duncan's Multiple Range Test (Duncan, 1955) was used at 1 percent level of significance to compare the differences among the treatment means, if any.

Results and Discussion

There were significant differences among the treatment means of weed density and productive tillers. As far as different treatments are concerned, Buctril M40 EC plots produced minimum number of weeds 56.33 and 30.00 at 30 and 60 days after herbicide application, respectively.

Table 1: Weeds density (m^{-2}) 30 and 60 days after herbicides application and number of productive tillers (m^{-2}) as affected by different herbicides application

Treatments	Weed Density		
	After 30 days	After 60 Days	Productive tillers
T1	305.00 A	356.67 A	345.00 C
T2	61.00 DE	32.00 EF	383.33 B
T3	64.67 DE	42.33 CDE	358.33 BC
T4	56.33E	30.00F	421.67A
T5	71.67 CD	50.00 BC	358.33 BC
T6	82.00 BC	58.33 B	358.33 BC
T7	68.33 DE	48.33 BCD	345.00 C
T8	66.67 DE	37.00 DEF	366.67 BC
T9	88.33 B	55.33 B	355.00 BC

Means having common letters are not significantly different at 1 percent level of probability

The maximum number of productive tillers per m^2 (421.67) were also observed in Buctril M40 EC plots which showed that the application of Buctril M 40 EC has effectively controlled the weeds as compared to other treatments. These findings were supported by Cheema *et al*. (1988) and Ahmad *et al*. (1991) who noted that Buctril M 40 EC

Table 2: Plant height (cm) at maturity and spike length (cm) as affected by different herbicides application

Treatments	Plant Height	Spike length
T1	93.43 N.S.	12.33 N.S.
T2	95.70	12.84
T3	93.20	12.76
T4	96.23	12.86
T5	93.97	12.68
T6	94.87	12.33
T7	95.73	12.85
T8	91.37	12.62
T9	96.13	12.05

N.S. Non-significant

Table 3: Number of grains per spike and 1000-grain weight (g) as affected by different herbicides application

Treatments	Grains per spike	Seed index
T1	63.24 N.S.	47.21 N.S.
T2	66.41	47.43
T3	65.76	47.35
T4	66.76	47.46
T5	66.40	46.72
T6	61.33	47.36
T7	69.24	47.51
T8	65.71	47.22
T9	61.14	47.39

N.S. Non-significant

Table 4: Biological yield (t ha^{-1}) and grain yield (t ha^{-1} as affected by different herbicides application

Treatments	Biological yield	Grain yield
T1	08.433 b	3.833 e
T2	10.137 a	4.610 ab
T3	10.000 a	4.553 bc
T4	10.677 a	4.860 a
T5	10.027 a	4.250 d
T6	10.000 a	4.193d
T7	10.657 a	4.767 ab
T8	09.777 a	4.303 co
T9	09.937 a	4.290 cd

Means having common letters are not significantly difference at 1 percent level of probability

controlled weeds more economically than conventional methods (Table 1). The data concerning plant height at maturity and spike length indicated that there were non significant variation among all the treatments. However, the maximum plant height (96.23 cm) and spike length (12.86 cm) were recorded in Buctril M 40 EC (Buctril M40 EC) treated plot which were closely followed by Sencor 70WP plots 196.1 cm) plant height and Logran extra 64 WG plots (12.85 cm) spike length respectively. The minimum plant height (91.3 cm) and s pike length (12.05 cm) were produced by Panth and Sencor 70WP plots respectively. Similar results were reported by Randhawa and Kausar (1974) and Khattak (1985) who found that plant height and spike length were not affected by herbicidal treatments (Table 2).

Table 5: Economic analysis of wheat as affected by different herbicides application during 1997-98

Treatment	Total Variable Cost Rs. ha^{-1}	Cost of production Rs. ha^{-1}	Total expenditure Rs. ha^{-1}	Gross income of Grains Rs. ha^{-1}	Gross income of Straw Rs. ha^{-1}	Total Gross Income Rs. ha^{-1}	Net Incom Rs. ha^{-1}	B.C.R
T1	-	13617.00	13617.00	26831.00	5762.50	32593.50	18976.50	2.39
T2	1562.50	13617.00	15179.50	32270.00	6908.75	39178.75	23999.25	2.58
13	1200.00	13617.00	14817.00	31871.00	6808.75	38679.75	23862.75	2.61
T4	1032.50	13617.00	14649.50	4020.00	7271.25	41291.25	26641.75	2.82
T5	222.50	13617.00	13839.50	29760.00	7221.25	36971.25	23131.75	2.67
T6	1400.00	13617.00	15017.00	29351.00	7258.75	36609.75	21592.75	2.44
T7	645.00	13617.00	14262.00	33379.00	7362.50	40741.50	26479.50	2.86
T8	1408.30	13617.00	15025.30	30121.00	6842.50	36963.50	21938.20	2.46
T9	405.00	13617.00	14022.00	30030.00	7103.75	37133.75	23111.75	2.65

T1 = Weedy check
T2 = Dicuran MA 60 WP at 2.5 kg ha^{-1} at Rs. 625/- per 1000 g
T3 = Tolkan 50 WP at 2 kg ha^{-1} at Rs. 480/- per 800 g
T4 = Buctril M 40 EC at 1.75 liters ha^{-1} at Rs. 590/- per 1000 ml
T5 = 2,4-D Powder at 865 g ha^{-1} at Rs. 180/- per 700 g. Wheat straw rate. As 50/- per 40 kg
T6 = Graminon 500 FW at 2.5 liters ha^{-1} at Rs. 448/- per 800 ml. Wheat grains rate. Rs. 280/- per 40 kg
T7 = Logran Extra 64 WG at 250 g ha^{-1} at Rs. 258/- per 100 g
T8 = Panther at 1.625 liters ha^{-1} at Rs. 650/- per 750 ml
T9 = Sencor 70 WP at 250 g ha^{-1} at Rs.405/-per 250

The data concerning the number of grains per spike and 1000 grains weight indicated that the differences among all he treatment means as affected by herbicides application were non-significant. As regard the treatments, maximum lumber of grains per spike (69.24) and seed index (47.51g) were recorded in Logran extra 64 WG plots which were followed by Buctril M40 EC (66.76) grains per spike and (47.46 g) seed index respectively. The minimum number of grains (61.14) per spike and 1000-grain weight (46.72 g) were found in Sencor 70WP and 2,4-D powder plots respectively. The increase in number of grains per spike and seed index might be due to flourishing growth of wheat plants. These findings were in accordance with those of Ahmed *et al*. (1993) who reported that herbicides were more effective in increasing the number of grains per spike and 1000-grain weight of wheat crop (Table 3,4).

The data concerning biological yield and grain yield as affected by different herbicides application. The data revealed that all the treated plots produced more biological and grain yield over control. Among the treatments, Buctril M40 EC plots produced 10.67 t ha^{-1} biological and 4.86 t ha^{-1} grain yield. It was followed by Logran extra 64 WG (10.65 t ha^{-1}) and (4.76 t ha^{-1}) respectively. Minimum biomass (8.43 t ha^{-1}) and grain yield (3.83 t ha^{-1}) were produced by weedy check (Weedy check control) plots. Increase in yield components in weed control plots was probably due to more nutrients uptake by crop plants as compared to control plots. Similar type of extractions were reported by Ahmed *et al*. (1993).

The economic analysis of wheat given in Table 5 revealed that the highest benefit cost ratio of 2.86 was recorded for Logran Extra 64 WG followed by 2.82 for Buctril M 40 EC and 2.67 for 2,4-D Powder respectively. The maximum net income was noted in Buctril M40 EC Rs. 26641.75 ha^{-1} as against the lowest of Rs. 18976.50 ha^{-1} for weedy check plots.

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