RESEARCH PAPER International Journal of Agricultural Sciences, June to December, 2009, Vol. 5 Issue 2 : 513-515

Study on the effect of various post emergence herbicides on wheat (*Triticum aestivum* L.) cv. GW 322 under middle Gujarat conditions

A.K. MAHIDA*, M.V. PATEL AND J. R. PARMAR
B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA

ABSTRACT

A field experiment was carried out during the *rabi* season of 2006-07 at College Agronomy Farm, B.A. College of Agriculture, Anand Agricultural University, Anand. The experiment was laid out in Randomized Block Design consisting of ten treatments. The data revealed that isoproturon @ 0.750 kg ha^{-1} applied at 35 DAS gave the least weeds dry weight as well as minimum number of weed population. As far as yield was concerned wheat yield was found maximum (5655 kg ha^{-1}) under hand weeding treatment, followed by post emergence application of isoproturon @ 0.750 kg ha^{-1} (5456 kg ha^{-1}) and metsulfuron methyl @ 4 g ha^{-1} (5220 kg ha^{-1}) applied at 35 DAS. Higher grain yield was recorded under the isoproturon @ 0.750 kg ha^{-1} due to better weed control efficiency and higher crop dry matter production.

Key words : Wheat, Post-emergence herbicide, Weed control in wheat

INTRODUCTION

In wheat growing bowl of the country, infestations of grassy weeds like little seed canary grass (*Phallaris minor*), wild oats (*Avena* spp.) and broad leaf weeds like *Chenopodium album*, *Chenopodium murale*, *Amaranthus spinosus* and *Rumex dentate* are increasing at an alarming rate. Weed compete with plant for light, moisture, nutrients and space which are limited. Weeds is a major limiting factor in successful crop production and cause huge yield losses which, however depend upon type and intensity of weed flora, duration of crop weed competition, various soil factors and agro-climatic conditions prevailing under a particular region. The severe crop weeds competition results in reduction of yield. Isoproturon has been recommended for the control of grassy weeds in wheat. However, the herbicide causes deformities when it is not used at right time and dose. Hence, there is a need to look for alternate effective herbicides to control of broad leaf weeds in wheat. The present study was therefore, under taken to evaluate the efficiency of isoproturon and other newly developed herbicides for weed control. Metsulfuron is also found effective against many broad leaf weeds.

MATERIALS AND METHODS

An investigation was carried out during *rabi* season of 2006-2007 at College Agronomy Farm, Anand Agricultural University, Anand (Gujarat). The soil of experimental field had pH 7.7, Available N 230.90 kg ha^{-1}, available P_2O_5 74 kg ha^{-1} and available K_2O is 289 kg ha^{-1}. Wheat variety GW-322 was drilled using seed rate of 120 kg ha^{-1}, with recommended package of practices. The experiment was laid out in Randomized Block Design with ten treatment combinations *viz.*, W_1 (Sulfosulfuron @ 15 g ha^{-1} + surfactant 0.5 % as POE), W_2 (Metsulfuron methyl @ 4 g ha^{-1} as POE), W_3 (2, 4 D (Na salt) @ 500 g ha^{-1}as POE), W_4 (Isoproturon @ 0.5 kg ha^{-1} + Urea 0.5 % + $ZnSo_4$ 0.5 % as POE), W_5 (Isoproturon 0.750 kg ha^{-1} as POE), W_6 (2, 4-D (Ethyl ester) 0.750 kg ha^{-1} as POE), W_7 (Metsulfuron methyl @ 4 g ha^{-1} + 2 4 D (Na salt) @ 500 g ha^{-1}as POE), W_8(Isoproturon 0.750 kg ha^{-1} + 2, 4 D (Na salt) @ 500 g ha^{-1} as POE), W_9 (Hand weeding (at 25 and 50 DAS) and W_{10} (weedy check). Spraying of all the herbicides was done at 35 DAS using knapsack sprayer in a spray volume of 650 liter water ha^{-1}. Weed count and weed dry weights were recorded with the help of random quadrates at 30 and 60 DAS as well as at harvest. Number of weeds and dry weight of weeds were subjected to square root transformation prior to statistical analysis.

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented below:

Effect on weeds:

The dominant weed species in weed check were: *C. album, C. murale, Cyperus rotundus, Cynodon dactylon* and *Melilotus indica.* All the treatments resulted in significant decrease in total number of weeds and their dry weight as compared to weedy check (Table1). The data in Table 2 clearly indicated that maximum number of weeds and total dry weight was recorded under the treatment weedy check, because of the higher infestation of weeds with crop for growth factor. Post emergence application of isoproturon @ 0.750 kg / ha effective in

*** Author for correspondence**

Table 1 : Influence of herbicidal treatments on number of grains ear^{-1} head, number of spikelets ear^{-1} head, test weight, gross realization, net realization and cost benefit ratio of wheat

Treatments	Number of grains ear^{-1} head	Number of spikelets ear^{-1} head	Test weight (g)	Gross realization Total (Rs. ha^{-1})	Net realization	Cost :Benefit ratio (CBR)
W_1:	26.78 ^{e}	12.94 ^{bcd}	39.88 ^{bcde}	49906	36958	1: 3.85
W_2 :	31.60 ^{b}	13.84 ^{b}	40.38 ^{b}	55014	42440	1: 4.38
W_3 :	31.21 ^{bc}	13.32 ^{bc}	40.23 ^{b}	52992	40695	1: 4.31
W_4 :	27.30 ^{de}	13.00 ^{bcd}	39.98 ^{bcde}	50043	37568	1 :4.01
W_5 :	32.05 ^{ab}	14.04 ^{b}	42.18 ^{a}	57466	44862	1 : 4.56
W_6:	28.9 ^{bcde}	13.18 ^{bcd}	40.18 ^{bcd}	50515	37687	1: 3.94
W_7:	27.70 ^{cde}	13.10 ^{bcd}	40.08 ^{bcd}	50132	37433	1 : 3.95
W_8 :	30.56 ^{bcd}	13.28 ^{bc}	40.20 ^{bc}	51419	38689	1: 4.04
W_9:	35.56 ^{a}	16.34 ^{a}	42.98 ^{a}	59568	46381	1: 4.52
W_{10} :	20.55 ^{f}	10.24 ^{e}	38.45 ^{e}	37734	25657	1: 3.12
S.E. $\pm$	1.12	0.62	0.52	-	-	-
C.D. (P=0.05)	Sig.	Sig	Sig.	-	-	-
C.V.%	12.20	14.79	12.20	-	-	-

All figures are subjected to square root transformation. Figures indicating common letters in column do not differ significantly from each other at 5% level of significance according to Duncan New Multiple Range Test

minimizing dry weight of weeds (16.08 kg ha^{-1}), while metsulfuron methyl @ 4 g/ha found at par with this treatment (20.17 kg ha^{-1}) in terms of reducing dry weight of weeds at harvest. Similar results were also reported by Sardana *et al.* (2001).

Weed control efficiency also found higher (95.51%) in hand weeding treatments. Post emergence application of isoproturon @ 0.750 kg ha^{-1} found second (88.03%) best treatment in terms of weed control efficiency (Table 2).

Effect on crop:

Significantly the higher number of grains ear^{-1} head, number of spikelets ear^{-1} head and test weight (g) were observed under weed-free plot.

Minimum grain yield of wheat (3525 kg ha^{-1}) was recorded in weedy check treatment. It was because of the severe crop weed competition in weedy check, as evident from the data on dry matter of weeds.

Maximum grain yield of wheat (5655 kg ha^{-1}) was recorded in weed free treatment. Higher seed yield was attributed to more number of effective tillers m^{-1}row lengths. Among all the herbicides treatments application of isoproturon @ 0.750 kg ha^{-1} recorded second highest seed yield (5456 kg ha^{-1}) which resulted in lowest dry matter of weeds and effectively controlled weeds. Isoproturon, which was widely known to inhibit hill reaction of photosynthesis production resulting in suppress ion of the growth of weeds. This high yielding treatment was significantly at par with application of metsulfuron methyl @ 4 g ha^{-1} (5220 kg ha^{-1}). Metsulfuron methyl is a sulfonylurea herbicides are taken up rapidly by both roots and foliage and they are potent inhibitor of plant growth include loss of leaf nyctinasty, abscission, vein discoloration etc. The increased in grain yield recorded

Table 2 : Effect of different weed control treatments on weed dry weight, weed control efficiency and grain yield of wheat

Treatments	Weeds dry weight 60 DAS (g/m^2)	Weeds dry weight At harvest (kg ha^{-1})	Weed control efficiency (%)	Grain yield (kg ha^{-1})
W_1:	7.50 ^{b} (56.25)	36.65 ^{b} (1280)	45.30	4725 ^{e}
W_2 :	3.43 ^{de} (11.98)	20.17 ^{de} (433)	81.50	5220 ^{abc}
W_3 :	3.66 ^{de} (13.53)	24.81 ^{cd} (640)	72.65	5020 ^{bc}
W_4 :	7.43 ^{b} (55.50)	33.32 ^{b} (1120)	52.14	4738 ^{e}
W_5 :	3.10 ^{ef} (9.60)	16.08 ^{e} (280)	88.03	5456 ^{ab}
W_6:	5.22 ^{c} (27.35)	30.22 ^{bc} (920)	60.68	4774 ^{e}
W_7	7.10 ^{b} (50.68)	32.47 ^{b} (1060)	54.70	4745 ^{e}
W_8 :	4.09 ^{d} (16.80)	29.79 ^{bc} (890)	61.97	4864 ^{cd}
W_9 :	2.65 ^{f} (7.18)	9.93 ^{f} (105)	95.51	5655 ^{a}
W_{10} :	8.45 ^{a} (72.25)	48.23 ^{a} (2340)	0.00	3525 ^{f}
S.E. $\pm$	0.23	2.02	-	159.7
C.D. (P=0.05)	Sig.	Sig.	-	Sig.
C.V.%	8.95	14.42	-	10.36

with the application of herbicides was owing to increased number of spikes/ m row length and test weight which may be reflected owing to increase in the availability of nutrients, water, light and space which provide more congenial environment for development of the crop. The present results are in close conformity with the findings of Pandey and Singh (1994); Azad (1997) and Pandey *et al.* (2001).

Economics:

The benefit: cost (B:C) ratio as influenced by various herbicidal treatments revealed that minimum cost of cultivation was observed in weedy check plots and maximum net return was obtained in weed – free plots. However higher B:C ratio was observed in the plot treated with isoproturon @ 0.750 kg ha^{-1}(1: 4.56).

REFERENCES

Azad, B.S. (1997). Influence of nitrogen and isoproturon on nutrient uptake by weeds and wheat. *Indian J. Agron.*, **42** (3): 471-473.

Pandey, J. and Singh R.P. (1994). Effect of sulfonylurea herbicides on weed control in wheat. *Indian J. Agron.*,**39** (4) : 565-568.

Pandey, Jitendra, Mishra, B.N., and Verma, A.K. (2001). Effect of metsulfuron methyl, 2, 4 D and their tank mix on weeds and yield of wheat. *Ann. Agric. Res.*, **22** (1) : 100-103.

Sardana, Virendra, Walia, U.S. and Mahajan, Gulshan (2001). Management of broadleaf weeds in wheat. *Indian J. Weed, Sci.*, **33** (1&2) : 69-71.

Received : November, 2008; Accepted : May, 2009