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Performance of Sulfosulfuron Against Weeds in Irrigated Wheat (*Triticum aestivum* L.)

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Abstract

A field experiment was conducted during the winter *(rabi)* season 2005-06 and 2006-07 to study the effect of herbicides on performance of sulfosulfuron against weeds in irrigated wheat (*Triticum aestium* L.). Results revealed that significantly higher plant dry weight was recorded from weed-free plot, which was statistically at par with sulfosulfuron at 35, 40 and 45 g/ha treated plots at 60, 90 and 120 days stages of crop growth. Among various doses of herbicide, sulfosulfuron at 40 g/ha treated plots which were at par with sulfosulfuron at 25, 30, 35, 45 g/ha and weed-free but remained at par with sulfosulfuron at 20 g/ha and weedy check at 90 and 120 days stages of crop growth. However, various doses of sulfosulfuron recorded significantly taller plant and more plant population with higher dry matter production compared to weedy check while weed-free and sulfosulfuron at 30, 40 and 45 g/ha were at par themselves at all stages the of crop growth. Similarly, significantly higher values of all the yield components (i.e. spike number and grains/ spike) were noticed under alternated doses of sulfosulfuron as compared to weedy check. Finally, significantly higher grain yield (37.83 q/ha) was obtained from weed-free plot, which was at par with various doses of sulfosulfuron weed in the experiment, except sulfosulfuron at 20 g/ha.

Key words : Sulfosulfuron, Weed control, Plant height, Dry matter, Wheat yield.

During the last four decades wheat production and productivity increased almost six times in India and its alone contributes about one third of total food grain production. In recent years, however, there is stagnation in wheat productivity. A formidable factor that limits its productivity is severe weed competition during the initial crop growth stages. Continuous and appropriate use of isoproturon since 1978 (1) has caused shift in weed flora and development of resistance in *Phalaris minor* to the herbicides (2). Thus, it is imperative to screen herbicides, with alternate mode of action for effective weed control and to ensure better crop yield. Many sulphonylurea herbicides have been increasingly used in wheat due to their low application rate and less persistence in environmment (3). Hence, this trial assessed weed control efficacy and growth parameters, yield attributes and yield of wheat due to sulfosulfuron applied at different doses.

Methods

A field trial was carried out in a randomized block design at the Agricultural Research Farm (Pili Kothi) of the Department of Agronomy, T. D. P. G. College in V. B. S. Purvanchal University, Jaunpur during 2005-06 and 2006-07. The mechanical analysis of the soil showed that textural class of the experimental plot was sandy loam while the chemical analysis indicated that the soil reaction slightly alkaline i.e. 7.64 and electrical conductivity were normal (0.02 ds/m). The soil was found to be low in organic carbon (0.46%), available nitrogen (261.36 kg/ha) and available phosphorus (7.46 kg/ha). However, it was medium in potash (193.15 kg/ha). The experiment comprising eight weed control treatments (sulfosulfuron at 20, 25, 30, 35, 40, 45 g/ha, weed-free and weedy check) and were replicated thrice in a randomized block design. The crop was sown on 1 December during the both year. Wheat crop was sown with the seed rate of 100 kg/ha and row to row spacing of 20 cm was kept apart for the maintaining of optimum plant population. The crop was fertilized with 160, 60 and 40 kg/ha of N, P_2O_5 and K_2O, respectively and irrigated as par need. Half the

Table 1. Effect of different treatments on growth characters of wheat (pooled data of two years). NS = Non-significant, DAS = Day after sowing.

Treatments	Dose (g/ha)	Plant height (cm) on DAS 60	90	120	Plant population (per m^2) on DAS 60	90	120	Plant dry weight (g/m^2) on DAS 60	90	120
Sulfosulfuron	20	25.79	61.66	69.28	346.30	310.65	270.65	348.60	770.20	806.80
Sulfosulfuron	25	26.19	62.03	69.72	357.00	318.00	280.00	381.00	823.00	860.40
Sulfosulfuron	30	26.22	63.12	71.38	355.65	322.65	286.00	432.80	856.80	895.60
Sulfosulfuron	35	26.52	66.26	74.98	365.00	330.00	291.65	478.80	895.60	937.40
Sulfosulfuron	40	26.47	64.11	74.53	366.00	329.65	292.00	488.60	905.20	940.60
Sulfosulfuron	45	25.95	63.72	73.58	370.65	332.00	290.65	466.00	900.80	938.20
Weed-free	-	27.72	66.22	76.98	405.65	361.30	309.00	510.80	921.40	962.80
Weedy	-	26.32	58.32	67.06	335.65	290.30	250.00	305.60	685.40	710.40
CD (P = 0.05)	-	NS	NS	NS	NS	NS	NS	53.22	129.34	112.17

dose of N and full dose of P_2O_5 and K_2O was applied at the first irrigation given 25 days after sowing (DAS). Herbicides sulfosulfuron (TN : leader, 75% WP, monsanto) at 20, 25, 30, 35, 40, 45 g/ha were applied as a post -emergence at 30 to 35 DAS with manually operated Knapsack sprayer delivering a spray volume of 600 liter/ha through flat-fan nozzle. The crop was raised with all the recommended package of practice based on requirements. To study the effect of herbicides sulfosulfuron on growth parameter of wheat data on plant population, plant height, plant dry weight were recorded at all the stages of crop growth. Crop was manually harvested in second week of May during the year. At harvest, data on grain yield and various yield attributes were recorded. The grain yield data was recorded and adjusted to 40% of the moisture content. All the data recorded were analyzed by ANOVA method as suggested by Cochran and Cox (4).

Results and Discussion

Effect of Sulfosulfuron on Growth Characters

Data reveal that the grassy weeds continued to increase up to 90 DAS and declined thereafter whereas broadleaf weeds increased up to 60 DAS and declined thereafter, and similar trend was reflected in case of population of total weeds. Wheat cultivar with more number of tillers and consequently more dry matter accumulation allowed lower weed intensity thereby, lower dry matter accumulation of weeds. Malik et al. (5) also reported 77.9, 75.55, 73.22, 63.40, 38.66, 64.62, 50.19, 27.28 and 46.48% reduction in grain yield due to weeds, respectively. Application of various doses of sulfosulfuron results in significantly higher plant population per unit area, plant height and plant dry weight were recorded in weed-free plots. In weedy condition severe crop weed competition started from 30 days of crop growth,which evidenced from higher total weed density and dry weight at 60 and 90 days stages of crop growth and resulted into lowest dry matter production of crop plant at 60 and 90 days stages of crop growth (Table 1). However, increase in dry weight of crop plant is directly related with growth and development of crop. Proper growth of crop required sufficient availability of moisture, nutrient, sun light and CO_2. If weeds were not controlled by various doses of sulfosulfuron then weeds could competete for aforesaid input with crop and ultimately hampered plant growth attributes. Plant height, plant population per unit area, plant dry weight and length of spike, number of spikes per unit area, number of grains per spike and test weight were also lowest in weedy check, which subsequently resulted into lowest grain yield.

Effects of sulfosulfuron on Yield attributes and Yield of Wheat

However, data reveal that weed-free condition produced significantly higher grain yield (37.83 q/ha), which was statistically at par with sulfosulfuron at 25, 30, 35, 40 and 45 g/ha treated plots and remained at par with sulfosulfuron at 20 g/ha and weedy check (Table 2). The reason for higher grain yield in various doses of sulfosulfuron treated plots were due to low

Table 2. Effect of different treatments on yield attributes and yield of wheat (pooled mean).

Treatments	Dose (g/ha)	Spikes/m^2	Spike/ length	Grains/ spike	Test weight (g)	Grain yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)	Harvest index
Sulfosulfuron	20	265.65	9.06	42	34.50	31.03	37.48	68.51	0.452
Sulfosulfuron	25	274.00	9.52	43	36.75	33.52	38.00	71.52	0.468
Sulfosulfuron	30	280.00	9.86	45	38.00	35.00	38.52	73.52	0.476
Sulfosulfuron	35	286.00	10.08	46	38.71	36.15	39.00	75.15	0.481
Sulfosulfuron	40	288.65	10.15	46	38.89	36.25	39.30	75.58	0.479
Sulfosulfuron	45	285.65	10.10	46	38.81	36.16	39.64	75.80	0.477
Weed-free	-	305.00	10.62	47	39.85	37.83	40.03	77.86	0.485
Weedy	-	240.00	8.73	40	31.51	25.00	30.23	55.23	0.452
CD $P = 0.05$	-	NS	1.12	NS	3.78	4.86	3.43	8.36	NS

dry weight of weeds and less density of total weed, which in turn provide favourable environment for growth and development of crop. Singh and Singh (6) also reported similar results. The higher grain yield per hectare in weed-free plots and various doses of sulfosulfuron treated plots were mainly due to higher yield attributing characters and harvest index. The higher yield attributing characters in weed-free and different doses of sulfosulfuron treated plots as compared to weedy plot may be due to better growth of plant as evident from higher dry matter accumulation at different stages of crop growth. Application of various doses of sulfosulfuron significantly increased the grain yield over weedy check. This is attributed higher dry matter accumulation in crop leading to higher number of grains per spike and test weight. The application of sulfosulfuron at 40 g/ha increase the grain yield by 45% over weedy check and remain at par with weed-free. This increases in grain yield under other doses of sulfosulfuron were accompanied with an increase in all attributing characters i.e. length of spike, spikes/m^2, grains/spike and test weight. The data revealed that grain yield was significantly higher in all herbicides treatment as compared to unsprayed control in both the years whereas all the herbicides treatment were statistically at par in respect of straw yield (Table 2). However, significantly higher grain yield in these herbicides treatments were due to better weed control which gave reduction in weed dry matter compared to unweeded control thus resulting in better crop growth and development including tillering, dry matter production and grain formation thereby favoring the grain yield. However, increase in grain yield might be attributed to significant reduction in weed-crop competition owing to effective control of weeds and marked improvement in crop growth and yield attributes.

References

1. Gill H. S., U. S. Walia and L. S. Brar. 1978. Control of Phalaris minor Retz. and wild oats in wheat with new herbicides. *Pesticides* 12 : 55—56.
2. Malik R. K. and S. Singh. 1995. Littleseed canarygrass Phalaris minor resistance to isoproturon in India. *Weed Tech.* 9 : 419—425.
3. Parrish S. K., J. E. Kaufmann, K. A. Croon, Y. Ishida, K. Ohta and S. Itoh. 1995. MON 37500 : A new selective herbicides to control annual and perennial weeds in wheat. *Proc. Brighton Crop Prot. Conf. Weeds.* 20—23 Nov. 1995. Brighton, UK 1 : 57—63.
4. Cochran W. G. and G. N. Cox. 1957. *Experimental designs.* John Wiley and Sons, Inc., New York, USA.
5. Malik R. S., A. Yadav, R. K. Malik and S. Singh. 2005. Efficacy of clodinafop, fenoxaprop, sulfosulfuron and triasulfuron alone and as tank mixture against weeds in wheat. *Ind. J. Weed Sci.* 37 : 180—183.
6. Singh R. and B. Singh. 2004. Effect of irrigation time and weed management practices on weeds and wheat yield. *Ind. J. Weed Sci.* 36 : 15—17.