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Short communication

Effect of weed management practices on productivity of wheat

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Wheat is an important crop worldwide. Its production increased from a mere 11.0 million tones during 1960-61 to 95.85 million tones during 2013-14. This is more than eight-fold increase in wheat production mainly due to the adoption of short stature high yielding varieties, increased fertilizers use, irrigation and herbicides. Weed infestation is one of the major biotic constraints in wheat production. It is infested with diverse type of weed flora under diverse agro-climatic conditions. The yield losses due to weeds vary depending on the weed species, their density and environmental factors. Use of herbicides and their mixtures become inevitable due to industrialization (Yadav and Malik 2005).

A field study was conducted during winter season of 2014-15 at Instructional Farm, Rajasthan College of Agriculture, Udaipur. The soil of the experimental field was clay loam in texture with alkaline in reaction. The available N, P and K were 259.5, 20.6 and 399.3 kg/ha, respectively. Ten treatments were taken consisting of 2,4-D (0.5 kg/ha), metsulfuron (4 g/ha), isoproturon (1.0 kg/ha), sulfosulfuron (25 g/ha), 2,4-D + isoproturon (0.25 kg/ha + 0.75 kg/ha), 2,4-D + sulfosulfuron (0.25 kg/ha + 20 g/ha), metsulfuron + isoproturon (3 g/ha + 0.75 kg/ha), metsulfuron + sulfosulfuron (3 g/ha + 20 g/ha), weed free and weedy check. The experiment was conducted in randomized block design with 3 replications. Wheat variety '*Raj. 4037*' was sown in rows 22.5 cm apart on 6 December in 2014 with seed rate of 150 kg/ha using package of practices available for "Sub-Humid Southern Plain and Aravalli Hills'' of Rajasthan. All the herbicides were sprayed at 35 DAS by knapsack sprayer using a spray volume of 600 liters/ha. Data on weed count and weed biomass from an area enclosed in a quadrate of 0.25 m^2 under different herbicides were recorded 90 days after sowing (DAS). All the weeds inside the quadrate were collected for dry matter accumulation after counting category-wise. The dried samples after oven drying were weighed and expressed in g/m^2. Weed control efficiency was calculated at 90 DAS on the basis of total weed dry matter and expressed in percentage. Weed index was calculated in relation to seed yield in weed free treatment and expressed in percentage. Data on category-wise total weed density, weed dry weight were subjected to square root transformation ($\sqrt{x+0.5}$) to normalize their distribution.

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Wheat crop was infested with complex weed flora, consisting of broad-leaf weeds and grassy weeds, *viz. Phalaris minor, Cyperus rotundus, Cynodon dactylon, Chenopodium album, Chenopodium murale, Convolvulus arvensis, Anagallis arvensis, Cichorium intybus, Avena ludoviciana etc*. Broad-leaf weeds were dominant in the experimental site, accounting for 78.2% of density and 71.9% dry matter of total weeds in weedy check at 90 DAS (Table 1). Significant variation in weed density and dry weight of weeds were recorded due to different weed management practices. Among different herbicidal treatments, minimum grassy and broad-leaf weed density and their dry weight of 3.09, 3.11, m^2 and 1.64, 1.35, g/m^2 were recorded under metsulfuron + sulfosulfuron, respectively. Amongst sole application of herbicides, sulfosulfuron and isoproturon were found statistically at par to each other in controlling total weed density and both of these treatments were found superior over 2,4-D and metsulsulfuron (Table 1).

Weed control indices influenced considerably due to weed management practices. Among different herbicidal treatments, the highest weed control efficiency (91.5 %) was recorded in metsulfuron + sulfosulfuron (Table 1). The results corroborate with the finding of Bharat and Kachroo (2007) and Khokhar and Nepalia (2010). Different weed management treatment significantly affected the grain yield of wheat crop as compared to weedy check. Grain yield increased significantly due to metsulfuron + sulfosulfuron closely followed by metsulfuron + isoproturon, 2,4-D + isoproturon and 2,4-D +

Table 1. Effect of herbicides on weed density, weed dry weight and weed control efficiency at 90 DAS

Treatment	Weed density (/m^2)		Weed dry weight (g/m^2)		Weed control efficiency (%)		Grain yield (t/ha)
	Broad-leaf weeds	Grassy weeds	Broad-leaf weeds	Grassy weeds	Broad-leaf weeds	Grassy weeds	
2,4-D	4.47 (19.67)	6.87 (46.67)	2.23 (4.51)	2.73 (7.01)	75.5	2.8	4.17
Metsulfuron	3.80 (14.21)	6.86 (46.67)	2.04 (3.78)	2.74 (7.03)	79.5	2.5	4.22
Isoproturon	5.17 (26.33)	3.43 (11.33)	3.13 (9.29)	1.73 (2.52)	49.6	65.0	4.13
Sulfosulfuron	4.85 (23.00)	3.15 (9.67)	3.28 (10.29)	1.59 (2.05)	44.2	71.6	4.24
2,4-D + isoproturon	3.81 (14.33)	3.28 (10.33)	1.86 (2.96)	1.55 (1.92)	83.9	73.4	4.58
2,4-D + sulfosulfuron	3.94 (15.00)	3.38 (11.00)	1.81 (2.78)	1.46 (1.62)	84.9	77.5	4.41
Metsulfuron + isoproturon	3.71 (13.33)	3.18 (9.67)	1.73 (2.51)	1.38 (1.42)	86.4	80.3	4.86
Metsulfuron + sulfosulfuron	3.09 (9.67)	3.11 (9.67)	1.64 (2.21)	1.35 (1.33)	88.0	81.5	5.22
Weedy check	13.63 (185.33)	7.22 (51.67)	4.35 (18.45)	2.77 (7.21)	0.0	0.0	3.55
Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	100.0	100.0	5.35
LSD(P=0.05)	0.79	0.68	0.37	0.29	-	-	0.91

Data subjected to $\sqrt{x+0.5}$ transformation and figures in parenthesis are original weed count /m^2

sulfosulfuron. The extent of increase in grain yield was 47.2, 37.1, 29.0 and 24.4% as compared to weedy check, respectively. Amongst sole application of herbicides, plots treated with sulfosulfuron recorded the highest grain yield. However, these results were at par with each other. Weed managements treatments might have significantly reduced the uptake of nutrients by weeds, which concurrently provided better environment for crop growth characteristics and yield attributes. The results so obtained for the higher grain yield under different treatments are in close conformity with the finding of Bharat and Kachroo (2010).

SUMMARY

Application mixture of metsulfuron 3 g/ha + sulfosulfuron 20 g/ha as post-emergence spray (35 DAS) was found best in controlling grassy and broad-leaf weeds and recorded the highest yield amongst all the weed management treatments with the 47.2% increase in grain yield of wheat as compared to weedy check.

REFERENCES

Bharat R and Kachroo D. 2007. Bio-efficacy of various herbicides and their mixtures on weeds and yield of wheat (*Triticum aestivum*) under subtropical agro-ecosystem. *Indian Journal of Agronomy* **52**: 53-57.

Bharat R and Kachroo D. 2010. Bio-efficacy of herbicides on weeds in wheat (*Triticum aestivum*) and its residual effect on succeeding cucumber (*Cucumis sativus*). *Indian Journal of Agronomy* **55**: 46-50.

Khokhar AK and Nepalia V. 2010. Effect of herbicides and nutrient management on weed flora, nutrient uptake and yield of wheat (*Triticum aestivum*) under irrigated conditions. *Indian Journal of Weed Science* **42**: 14-18.

Yadav A and Malik RK. 2005. *Herbicide resistant Phalaris minor in wheat-A sustainability issue.* Resource book, Department of Agronomy and Directorate of extension Education, CCSHAU, Hisar, India. 24 p.