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Evaluation of post emergence herbicides to control diverse weed flora in wheat

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ABSTRACT

Weed management is a critical factor influencing wheat yield and quality. Post-emergence herbicides offer a flexible approach to controlling weeds after crop emergence. The paper critically evaluates the performance of different herbicide classes and their impact on wheat productivity, weed resistance, weed spectrum, crop safety, and herbicide resistance control. This field experiment was conducted in Randomized Block Design with ten treatments and three replications in which six different herbicides and their combination are used with a control (150:60:40 NPK/ha). Among herbicide treatments significantly highest plant height (67.72 cm) dry weight (16.48 g), number of tillers (107.33) and lowest weed dry weight of *Phalaris minor* (7.8 g/m^2) *Rumex dentatus* (0 g/m^2) total other weeds (0 g/m^2) and total weeds (8.8 g/m^2) while *Rumex dentatus* and total other weeds are completely controlled in EPoE and PoE application of aclonifen + diflufenican

Key words: *Post-emergence herbicides, Wheat, Weed control, Herbicide efficacy, Weed resistance.*

Introduction

India is the world's second-biggest producer of wheat (*Triticum aestivum* L.), having a production of 98.61 Mt, having an average productivity of 33.18 q/ha covering an area of around 217.8 mha (Singh *et al.*, 2023 and Knoema, 2022).

Weeds are one of the major factors limiting wheat productivity since they compete with crops for growth factors. The impact of weed population pressure on grain yield is significant (Kamuti *et al.*, 2015). The most problematic and unavoidable grassy weed of wheat in the rice-wheat (RW) cropping system in the northwest Indo-Gangetic Plains of India, is *Phalaris minor* (Punia *et al.*, 2017). However, due to the continuous use of single herbicide it has developed herbicide resistance, thus use of alternate herbicides to control this menacehas become a necessity. The current study was undertaken with the above-mentioned objective, involving novel herbicides like pyroxasulfone and Aclonifen + diflufenican which successfully controls *P. minor* biotypes (Busi *et al.*, 2012; Chaudhary *et al.*, 2022).

Materials and Methods

Experiment was carried at Research Farm of ICAR-CSSRI, Karnal (Haryana), in Randomized block design consisting of 10 treatments replicated thrice (Rabi 2023-24). After doing preparatory irrigation

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the seed bed was prepared for proper seed germination, 100 kg/ha seed of DBW-222 is sown in the experimental field while maintaining 22.5 x 5 cm spacing. At the time of sowing of wheat, *Phalaris minor* seeds were also broadcasted in the experimental field. Weed observation was recorded during 30, 60 and 90 days after sowing with use of quadrant, simply we just count the weeds present inside the quadrant individually than remove their roots and shed dry them for a week to remove moisture from them and measure for dry weight of weeds.

Results and Discussion

Weed Parameters

At 60 DAS, Among the herbicide's treatments, significantly lowest weed density of Phalaris minor (38.7/m^2) observed in EPoE application of pyroxasulfone + metribuzin (127.5 + 105 g/ha), *Medicago denticulata, Rumex dentatus* and total weeds (1.3/m^2), (0.7/m^2) and (52.7/m^2) was recorded in PoE application of Clodinafop + Metribuzin 60+300 g/ha and total other weeds was completely control in EPoE application of aclonifen + diflufenican + metribuzin 2000 + 300 g/ha and significantly lowest weed dry weight was recorded in *Phalaris minor*, total other weeds and total weeds (7.8 g/m^2), (0 g/m^2) and (8.8 g/m^2) was recorded in EPoE application of aclonifen + diflufenican 2000 g/ha, *Medicago denticulata and Rumex dentatus* (0.1 g/m^2) and (0 g/m^2) was recorded in PoE application of Clodinafop + Metribuzin 60+300 g/ha and PoE application of aclonifen + diflufenican + metribuzin 2000 + 300 g/ha respectively as mentioned in Table 2 when clodinafop +metribuzin 60 + 210 g/ha was applied as a post-emergenceit completely controlled *M. denticulata*in terms of both weed density and dry matter (Chhokar and Sharma, 2023).

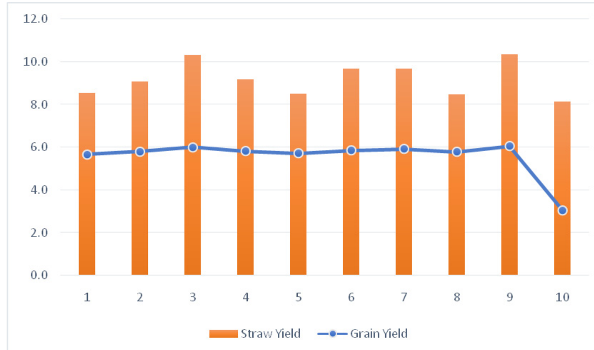

Fig. 1. Effect of different weed control treatment on yield parameters of wheat

Yield Parameter

Among the herbicide's treatments, significantly highest grain and straw yield (6.0 t/ha) and (10.3 t/ha) was recorded in EPoE application of aclonifen + diflufenican 2000 g/ha.

Conclusion

It is concluded that in wheat EPoE application of aclonifen + diflufenican2000 g/ha is found effective to control weeds and improve growth and yield under North western indogangatic plains.

Table 1. Effect of different weed control treatment on weed parameters of wheat

S. No.	Treatments	Weed Density (/m^2)		Weed dry weight (g)	
		Phalaris minor	Total weeds	Phalaris minor	Total weeds
1.	Pyroxasulfone 127.5g	7.62 (59.3)	11.01 (121.7)	3.05 (8.7)	4.4 (19.3)
2.	Pyroxasulfone 127.5g+ Metsulfuron 4g	6.6 (42.7)	8.2 (66.7)	3.31 (10.3)	3.71 (13.1)
3.	Aclonifen + Diflufenican 2000g	7.03 (48.7)	7.94 (62.3)	2.91 (7.8)	3.1 (8.8)
4.	Pyroxasulfone 127.5g + Metribuzin 105g	6.07 (38.7)	7.36 (55)	3.13 (9.2)	3.36 (10.7)
5.	Pyroxasulfone 127.5g+ Metribuzin 300g	8.05 (67.3)	8.83 (78.3)	4.04 (15.7)	4.14 (16.6)
6.	Aclonifen + Diflufenican 2000g	10.27 (107.3)	10.45 (111)	4.33 (18.2)	4.38 (18.7)
7.	Aclonifen + Diflufenican 2000g + Metribuzin 300g	7.63 (63.3)	8.12 (69)	3.17 (9.2)	3.2 (9.4)
8.	Clodinafop 60g + Metribuzin 300g	7.01 (49.3)	7.26 (52.7)	3.5 (11.3)	3.55 (11.6)
9.	Hand Weeding	1(0)	1(0)	1 (0)	1 (0)
10.	Weedy Check	11.43(144.7)	14.54(221)	15.44 (237.9)	16.47 (270.7)
	F-test	S	S	S	S
	Sem±	1.3	1.07	0.40	0.41
	CD at 5%	3.89	3.20	1.22	1.25

Conflict of Interest: None

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