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Effect of post emergence herbicides on yield and economics of wheat

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Abstract
A field experiment was carried out at Research Farm, Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during *rabi* season 2016-17 and 2017-8, on effect of post emergence herbicides on yield and economics of wheat. Twelve herbicide treatments comprised of post emergence application of Halauxifen – methyl 6.95% + Pyroxsulam 25% with and without surfactant at different doses and compared with alone application of Halauxifen-methyl 10.42% with surfactant, Pyroxsulam 4.5% with surfactant, Sulfosulfuron + Metsulfuron – methyl with surfactant and untreated plot (weedy check plot). The experiment was laid out in randomized block design with thrice replication. The experimental results revealed that Maximum grain yield (4818 kg ha^{-1}), straw yield (6561 kg ha^{-1}), gross monetary returns (96718 Rs. ha^{-1}), net Monetary returns (68695 Rs. ha^{-1}) and benefit cost ratio (3.09) were recorded under application of Halauxifen-methyl 6.95% + Pyroxsulam 25% + Surfactant at 23.96 *a.i.* g ha^{-1} as compared to rest of the treatments.

Keywords: Wheat, yield, economics and herbicide

Introduction
Wheat (*Triticum aestivum* L.) belongs to family "Poaceae" and genus "*Triticum*". It is an essential grain food component and is a very important commodity among cereal crops (Montazeri *et al.,* 2005) [11]. A total 17% world's cropped area is under wheat cultivation which together adds 35% of the staple food and 20% of the calories (Chhokar *et al.,* 2006) [6]. In India on an area of about 29.58 million hectares under wheat with the production of 99.70 million tonnes and the productivity of 33.71q ha^{-1} (Anonyms, 2018) [1]. In state of Madhya Pradesh, it is grown in 5.56 million hectare area with the production of 15.91million tonnes and share in all India production is 15.96 % (Agricultural Statistics, 2016) [2, 5].

Weeds problem is one of the major barriers responsible for low productivity of irrigated wheat because, several grassy and broad leaved weeds infest wheat causing severe competition for sunlight, essential nutrients, moisture and space which leads reduction in wheat yield and also its quality (Chhokar *et al.,* 2012; Chopra *et al.,* 2015) [7, 8]. Uncontrolled growth of weeds on an average caused about 48 % reduction in grain yield of wheat when compared with weed-free conditions (Singh *et al.,* 2012) [17]. It was also reported 30% wheat yield loss and sometimes completes failure of crop (Zand *et al*. (2007). The weed in India are causing substantial losses to agriculture production and the annual losses in terms of money come to the Rs. 1650 crores (Joshi, 2002) [14]. In agriculture weed causes more damage compared to insects, pests and diseases but due to hidden loss by weed in crop production, it has not drawn much attention of agriculturists (Rao, 2001) [13].

Manual and mechanical methods are laborious, tiresome and expensive to increase cost of laboures, draft animals and implements and weed cannot effectively be managed merely due to crop mimicry. Therefore, the use of chemical weed control has become necessary (Marwat *et al.,* 2008) [10]. Chemical weed control methods are most ideal, practical, effective, time saving and economical means of reducing early weed competition and crop production losses (Ashiq *et al.,* 2007) [3]. But, the exclusive reliance on herbicide and some weed species becoming resistant and inter – and – intra specific shift.

All types of weeds are not controlled by a single herbicide and the continuous use of a single herbicide results in weed shifts and evolution of herbicide resistance. The presence of mixed weed flora warrants integrated use of chemical control measures. This indicated the need for intervention of herbicides with different mode of action in the rotation or sequential application for control of complex weed flora in wheat. Tank-mix or pre-mix use of different herbicide chemistries or sequential application of pre-and post-emergence herbicides at

different times showed effective weed control (Baghestani *et al*. 2008) [4]. Besides managing mixed weed flora, the integrated use of herbicides may help in managing herbicide resistance problems. Therefore present study, effect of post emergence herbicides on yield and economics of wheat. was under taken.

Materials and Methods

A field experiment was conducted during two consecutive *Rabi* seasons of year 2016-17 and 2017-18 at Research Farm, Department of Agronomy, JNKVV Jabalpur, Madhya Pradesh. Twelve herbicide treatments comprised of post emergence with and without surfactant at different doses *viz*.,T_1 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + Surfactant (14.38 *a.i.* g ha^{-1}), T_2 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + Surfactant (19.17 *a.i.* g ha^{-1}), T_3 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + Surfactant (23.96 *a.i.* g ha^{-1}), T_4 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG (14.38 *a.i.* g ha^{-1}), T_5 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG (14.38 *a.i.* g ha^{-1}), T_6 Halauxifen – methyl 6.95% + Pyroxsulam 25% WG (14.38 *a.i.* g ha^{-1}), and alone application of T_7 Pyrosulam 4.5% + surfactant (18.75),T_8 Halauxifen-methyl 10.42% + Surfactant (5.21), T_9 Sulfosulfuron + Metsulfuron – methyl + Surfactant (32 a.i. g ha^{-1}), T_{10} Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + Surfactant (47.93 *a.i.* g ha^{-1}), T_{11} (hand weeding twice (30 & 60 Days after sowing) and weedy check (control). The experiment was laid out in Randomized Block Design and replicated thrice.

The soil of the experimental area was clay, neutral in reaction (pH 7.16), medium in organic carbon content (0.54 %), normal in electrical conductivity (0.29 dS/m), medium in available N (260.12 kg ha^{-1}) and P (12.25 kg ha^{-1}) and high in available K (295.10 kg ha^{-1}). The Wheat variety '*GW 273'* was sown in the experimental field with seed rate of 100 kg ha^{-1} in the row distance (22.5 cm.) during both the years. Fertilizers were given uniformly to all the plots through urea, single super phosphate and muriate of potash at the rate of 120 kg Nitrogen, 60 kg Phosphorus and 40 kg Potassium ha^{-1} during both the years. Half of the nitrogen and full quantity of phosphorus and potash was given as basal and remaining nitrogen was given in two splits just after day of first and second irrigation in both the years. Five irrigations were given to the crop at all the critical stages of irrigated wheat. However, a shallow come up irrigation was given immediately after sowing to the wheat crop in all the plots. Herbicides were applied as post emergence *i.e*. 35 DAS with the help of hand-operated Knapsack sprayer, fitted with flat fan nozzle with 300 litter ha^{-1} water. First hand weeding was done at 30 days after sowing (DAS) and second at 60 DAS in hand weeding treatment. A package and practices were adopted as recommended by JNKVV, Jabalpur.

Results and Discussion

Effect of different herbicide treatments on yield of wheat

The mean data of two *Rabi* season (2016-17 and 2017-18) pertaining to grain yield (kg ha^{-1}) as influenced by different weed control treatments is presented in Table 1.

Application of different weed control treatments brought about marked increase in the grain yield of wheat over weedy check during both the years of experimentation. It indicates that controlling weeds resulted in significant increase in grain yield compared to weed check. Among the herbicidal treatment, highest grain yield was recorded under application of (T_1) Halauxifen – methyl 6.95 % + Pyroxsulam 25 % with surfactant at 23.96 *g a.i.* ha^{-1} (4818 kg ha^{-1}) followed by (T_2) Halauxifen – methyl 6.95 % + Pyroxsulam 25 % with surfactant at 19.17 *g a.i.* ha^{-1} (4617 kg ha^{-1}). Weed control measure had also significant effect on straw yield of wheat. Crop grown with any of the weed control practice gave significantly higher straw yield than that grown under weedy conditions (Table 1). The highest straw yield (6646 kg ha^{-1}) was obtained under herbicidal treatments with application of (T_1) Halauxifen – methyl 6.95 % + Pyroxsulam 25 % with surfactant was applied at 23.96 *g a.i.* ha^{-1} (6561 kg ha^{-1}) which was at par with application of (T_2) Halauxifen – methyl 6.95 % + Pyroxsulam 25 % with surfactant at 19.17 *g a.i.* ha^{-1} (6499 kg ha^{-1}).

Ready mixture application of post emergence herbicide with surfactant gave better result as compared to application of without surfactant. The application of single herbicides was less effective as compared to mixed application but the differences were significantly superior over the weedy check. The enhancement in wheat grain productivity with integrated approach could be attributed to suppression of weed density, weed growth and biomass that favored increase in yield attributes such as number of tillers per meter row length, grains per spike and test weight. Reduction in grain yield with increased weed density similar findings were recorded by Katara *et al*., 2012 [9] and Chaudhari *et al*., 2016 [5].

Table 1: Effect of different herbicide treatments on grain and straw yield of wheat

Treatment		Doses *a.i* g ha^{-1}	Straw yield kg ha^{-1}			Grain yield kg ha^{-1}		
			2017	2018	mean	2017	2018	Mean
T_1	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	14.38	6658	6286	6472	4536	4474	4505
T_2	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	19.17	6683	6314	6499	4687	4548	4617
T_3	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	23.96	6723	6400	6561	4891	4745	4818
T_4	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	14.38	6556	6277	6417	4391	4305	4348
T_5	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	19.17	6519	6299	6409	4482	4404	4443
T_6	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	23.96	6630	6345	6487	4655	4575	4615
T_7	Pyroxsulam 4.5% with surfactant	18.75	6371	6374	6372	4241	4282	4262
T_8	Halauxifen-methyl 10.42% with surfactant	5.21	6338	6345	6342	4247	4273	4260
T_9	Sulfosulfuron + Metsulfuron – methyl 80 with surfactant	32	6385	6366	6375	4281	4294	4288
T_{10}	Halauxifen – methyl 6.96 % Pyroxsulam 25% with surfactant	47.93	6364	6334	6349	4211	4174	4192
T_{11}	Hand weeding twice	30 & 60 DAS	6786	6507	6646	4955	4882	4919
T_{12}	Control (weedy check)	-	5872	5841	5857	3790	3734	3762
SEm ±			42	50	46	33.3	29.2	31.3
CD (P=0.05)			125	147	136	98.3	86.3	92.3

Table 2: Economics as influenced by different treatments

Treatment		Doses *a.i* g ha^{-1}	Total cost of Cultivation (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio
T_1	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	14.38	32143	91106	58963	2.8
T_2	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	19.17	32368	93111	60743	2.9
T_3	Halauxifen – methyl 6.95% + Pyroxsulam 25% with surfactant	23.96	32593	96716	64123	3.0
T_4	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	14.38	32023	88271	56248	2.8
T_5	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	19.17	32248	89904	57656	2.8
T_6	Halauxifen – methyl 6.95% + Pyroxsulam 25% without surfactant	23.96	32473	93045	60572	2.9
T_7	Pyroxsulam 4.5% with surfactant	18.75	31818	86682	54864	2.7
T_8	Halauxifen-methyl 10.42% with surfactant	5.21	31868	86594	54726	2.7
T_9	Sulfosulfuron + Metsulfuron – methyl 80 with surfactant	32	31693	87139	55446	2.8
T_{10}	Halauxifen – methyl 6.96 % Pyroxsulam 25% with surfactant	47.93	33718	85438	51720	2.5
T_{11}	Hand weeding twice	30 & 60 DAS	36648	98629	61981	2.7
T_{12}	Control (weedy check)	-	30648	64850	34202	2.1

Effect of different herbicide treatments on Economics of wheat

Data given in Table 2 indicated that effectiveness of any production system is ultimately evaluated on the basis of its economics. Economic analysis is the basic consideration in determining that which treatment gives the highest return while marginal analysis indicates the relative contribution of additional expenditure. All weed control treatments gave higher net benefit over weedy check. Economic analysis promised that maximum net return of (Rs. 64123 ha^{-1}), gross monetary return (Rs. 96716 ha^{-1}), and benefit cost ratio (3.0) was obtained from application of Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + surfactant 23.96 g *a.i* ha^{-1}. These results were in enclose conformity with Sharma., 2009, Paighan *et al*., 2013 [12], Singh *et al.*, 2013 [16], and Chaudhary *et al*. 2016 [5].

The lowest gross return (Rs. 64850 ha^{-1}), net return (Rs 34202 ha^{-1}) and B:C ration (2.1) was observed with weedy treatment. This is because of more weed - crop competition for light, nutrients, space and moisture in weed control treatment plot as compare to other treatments, which produced higher grain and straw yield.

Conclusion

On the basis of findings of two years investigation it can be concluded that weed management practices with the pre mix application of Halauxifen – methyl 6.95% + Pyroxsulam 25% WG + surfactant 23.96 g *a.i*. ha^{-1} should be recommended for the control of complex weed flora in irrigated wheat as these resulted in significantly higher grain yield. However, in monetary terms both the herbicides combinations gave higher net return and B-C ratio.

References

1. Anonyms. Pocket Book of Agricultural Statistics, Directorate of Economics & Statistics New Delhi, 2018, 75.
2. Agricultural Statistics, Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, 2016. (Website: http://www.dacnet.nic.in/PDF/Glance-2016.pdf).
3. Ashiq NM, Noor A. Comparative efficacy of different herbicides against broadleaf weeds in wheat. Pak. J Weed Sci. Res. 2007; 13(3, 4):149-156
4. Baghestani MA, Zand E, Soufizadeh S, Beheshtian M, Haghighi A, Barjasteh A *et al*. Study on the efficacy of weed control in wheat (*Triticum aestivum* L.) with tank mixtures of grass herbicides with broad-leaved herbicides. Crop Protection. 2008; 27:104-111.
5. Chaudhary D, Singh PK, Chopra NK, Rana SC. Effect of herbicide and herbicide mixture on weeds in wheat. Indian Journal Agricultural Research. 2016; 50(2):107-122.
6. Chhokar RS, Sharma RK, Chauhan DS, Mongia AD. Evaluatiom of herbicides against *Phalaris minor* in wheat in north-western Indian plains. Eur. Weed Res. 2006; 46:40-49.
7. Chhokar RS, Sharma RK, Sharma I. Weed management strategies in wheat-A review. J Wheat Res. 2012; 4:1-21.
8. Chopra NK, Chopra N, Choudhary D. Bioefficacy of sole and tank mix of pinoxaden and clodinafop with carfentrazone and metsulfuron for control of complex weed flora in wheat (*Triticum aestivum*). Indian J Agron. 2015; 60:104-108.
9. Katara P, Kumar S, Rana SS, Chander N. Combination of pinoxaden with other herbicides against complex weed flora in wheat. Indian Journal Weed Science. 2012; 44(4):225-230.
10. Marwat KB, Muhammad S, Zahid H, Gul B, Rashid H, Study of various weed management practices for weed control in wheat under irrigated conditions. Pak. J Weed Sci. Res. 2008; 14(1, 2):1-8.
11. Montazeri M, Zand E, Baghestani MA. Weeds and their control in wheat fields of Iran, first ed. Agric. Res.Edu. Org. Press, Tehran. 2005.
12. Paighan VB, Gore AK, Chavan AS. Effect of new herbicide on growth and yield of wheat. Indian Journal Weed Science. 2013; 45(4):291-293.
13. Rao VS. Principles of weed science. Oxford and IBH publishing co., New Delhi, 2001, 2-3
14. Joshi NC. Manual of weed control. Research publication 7615-B, East Azad Nagar, Delhi, 2002.
15. Sharma OL. Efficacy of post emergence herbicides to control broad leaf weeds in wheat in Indira Gandhi canal area of western Rajasthan. Indian Journal Weed Science. 2009; 41(1, 2):52-54.
16. Singh RK, Singh SRK, Gautam US. Weed Control Efficiency of Herbicides in Irrigated Wheat (*Triticum aestivum* L.). Indian Research Journal Extension Education. 2013; 13(1):126
17. Singh R, Singh P, Singh VK, Singh VP, Pratap T. Effect of different herbicides on weed dry matter and yield of wheat. Int. Agron. Congr. 2012; 2:138-139.