Short communication

Indian Journal of Weed Science **46**(3): 289–290, 2014

Herbicides effect on weeds and yield of late sown wheat

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Received: 28 June 2014; Revised: 6 August 2014

Key words: Clodinofop, Fenoxaprop, Late sown wheat, Weeds

Weeds are one of the prominent constraints in achieving potential yield of wheat. Wheat crop suffers with mix flora of weeds. The losses caused by weeds vary depending on the weed species, their abundance, crop management practices and environmental factors. It has been reported that with production of each kilogram of weed, one kilogram wheat grains are reduced (Chaudhary *et al.* 2008). Herbicides are one of the major groups of pesticides which contribute to the increased and economical production of crops and minimize human toil in agriculture production. In this context, the continuous use of a particular herbicide for many years resulted in development of resistance against some weeds which happened in case of isoproturon (Malik and Singh 1995). It become necessary to access the application time, method and doses at micro farming levels which may varied according to soil type, micro climate, weed flora and its severity from their recommendations. Hence, an attempt was made to find out efficacy of alternate herbicides at different doses on wheat growth, yield and its associated weeds.

A field experiment was conducted during *Rabi* season 2010-11 at Agronomy Research Farm (26^0 47' N latitude, 82^0 12' E longitude and an altitude of 113 meters above mean sea level) of N. D. University of Agriculture and Technology, Kumarganj, Faizabad (UP). The soil was slightly alkaline in reaction (7.9 pH), low in organic carbon (0.32%), available nitrogen (180 kg/ha) and phosphorus (8 kg/ha), and medium in potassium (210 kg/ha) contents. The treatments consisted ten weed control treatments *viz*., fenoxaprop-p-ethyl 75 g/ha, fenoxaprop-p-ethyl 100 g/ha, fenoxaprop-p-ethyl120 g/ha, fenoxaprop-p-ethyl 150 g/ha, fenoxaprop-p-ethyl 200 g/ha, fenoxaprop-p-ethyl 240 g/ha, fenoxaprop-p-ethyl 120g/ha, flodinofop 60 g/ha, weedy check and weed free check in randomized complete block design with three replications. Wheat cultivar '*HUW 234*' was sown in second fortnight of December using seed rate 125 kg/ha in row 20 cm apart at 4-5 cm deep by seed drill. The crop was fertilized with NPK 120, 60, 40 kg/ha through urea, single super phosphate and muriate of potash, respectively. Four irrigations were applied as per need of the crop. Herbicides were applied as post-emergence at 35 days after sowing (DAS) with the help of manually operated knapsack sprayer fitted with flat fan nozzle using 600 liters of water per hectare. The recommended cultural practices and plant protection measures were adopted to raise the healthy crop. Observations on weeds and crop were taken as per standard procedure followed and being statistically analyzed to draw the reliable results and relevant data on weeds was subjected to square root transformation to normalize their distribution.

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Wheat crop invaded with *Phalaris minor, Avena ludovaciana, Cynodon dactylon* in grassy; *Melilotus alba, Chenopodium album, Anagallis arvensis* under broad-leaved and *Cyperus rotundus* in sedges group. Results revealed that weed density affected significantly due to different weed control treatments (Table 1). Fenoxaprop applied at 240, 200 and 150 g/ha being equally effective between each other and recorded significantly less density of narrow-leaved weeds over rest of the treatments. However, lowest and highest density was recorded with weed free and weedy treatments. It was observed that the density of broad-leaved weeds were found significantly ineffective among all the test parameters because of fenoxaprop-p-ethyl and clodinofop are the narrow-leaf weed killer. Similarly, weed dry weight was also significantly lowest under these treatments. Application of fenoxaprop 75, 100, 120 g/ha and clodinofop 60 g/ha were found equally effective on same parameter. Selective bio-efficacy of same herbicides against narrow-leave weeds was also observed by Chhokar *et al.* (2007).

The maximum number of productive tillers recorded with Whipsuper fenoxaprop 120 g (370.0/m^2) followed by fenoxaprop 120 g (364.6/m^2), clodinofop 60 g and fenoxaprop 100 g/ha, but did not surpassed the spike count under weed free check (396.5 m^2). However, productive tillers were decreased at each successive increase in doses of fenoxaprop from 200

Table 1. Effect of weed control treatments on weeds growth and performance of wheat

Treatment	Weed density (no./m^2) at 60 DAS	Weed dry weight (g/m^2) at 60 DAS	Productive tillers/m^2	Length of spike (cm)	Grain yield (t/ha)	B: C ratio	Nitrogen uptake (kg/ha)	
							Weeds	Wheat
Fenoxaprop 75 g/ha	13.0 (169.6)	10.2 (103.5)	319.8	7.59	3.53	1.85	3.43	74.9
Fenoxaprop 100 g/ha	12.9 (165.3)	9.9 (97.5)	322.1	7.95	3.72	1.93	3.53	77.8
Fenoxaprop 120 g/ha	12.8 (163.6)	9.0 (80.5)	364.6	8.88	4.06	2.14	2.10	88.0
Fenoxaprop 150 g/ha	12.8 (163.9)	8.5 (71.8)	318.6	7.87	3.62	1.76	3.70	75.4
Fenoxaprop 200 g/ha	12.6 (158.2)	7.8 (60.3)	281.6	7.50	3.39	1.50	4.62	69.2
Fenoxaprop 240 g/ha	12.7 (161.9)	7.0 (48.5)	278.4	6.75	3.33	1.39	3.31	67.3
Whipsuper (fenoxaprop) 120 g/ha	12.9 (165.3)	9.2 (84.1)	370.0	8.91	4.09	2.17	2.01	88.4
Clodinofop 60 g/ha	12.7 (161.1)	9.6 (91.7)	358.8	8.81	3.76	2.13	2.12	83.7
Weedy check	15.5 (239.9)	11.6 (134.0)	197.3	6.11	2.89	1.40	6.54	58.1
Weed free check	0.7 (0.0)	0.7 (0.0)	396.5	9.46	4.38	1.97	0.00	95.4
LSD (P=0.05)	2.50	0.91	53.9	1.04	0.35	-	0.56	6.64

Data are subjected to square root transformation; values in the parentheses are original values

to 240 g/ha. It might be due to the phytotoxic effect of higher dose of fenoxaprop on wheat crop and it has inverse relationship with weed control parameters, crop growth, yield attributes and grain yield. These results were in conformity with the work done by Malik *et al.* (2005). Herbicides applied at lower doses had measured significantly longest spike than higher doses of fenoxaprop at 200 and 240 g/ha. All weed control practices were significantly influenced grain yield in comparison to uncontrolled weeds during crop period. Whipsuper (fenoxaprop 120 g), fenoxaprop 100 and 120 g and clodinofop 60 g/ha being at par and also recorded statistically higher grain yield over rest of chemical weed control treatments. These findings are well corroborated with the results obtained by Yadav *et al.* (2009). Similarly, these grain yield enhancing measures are also observed to be more remunerative by gaining higher benefit: cost ratio except repetitive manual weeding. The nitrogen depletion by crop is directly correlated with grain yield produced by the treatments and inversely associated with fenoxaprop at higher doses. However, weeds under whipsuper (fenoxaprop) at 120 g/ha treatment depleted significantly lesser nitrogen (2.01 kg/ha) followed by rest of treatments except season long weedy conditions (6.54 kg/ha).

SUMMARY

A field experiment was conducted during *Rabi* season of 2010-11 at Faizabad to assess the bio-efficacy of fenoxaprop and formulation of fenoxaprop available as Wipsuper in the market at various doses and clodinofop on weeds and productivity of late sown wheat. Fenoxaprop at higher doses effectively suppressed weeds and produced significantly lowest weed dry weight but it did not able to enhance nitrogen removal by crop as at lower doses. Post-emergence application of Whipsuper (fenoxaprop) 120 g, fenoxaprop 100 and 120 g and clodinofop 60 g/ha in late sown wheat eliminates crop weed competition at tillering and grant growth period which ultimately provides congenial conditions to crop for better harnessing of available crop growth resources and produced profitable grain yields.

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