E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(3): 639-643
Received: 02-01-2024
Accepted: 03-02-2024

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Studies on weed density and weed control efficiency of post emergence herbicides in wheat (*Triticum aestivum* L.)

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DOI: https://doi.org/10.33545/2618060X.2024.v7.i3i.492

Abstract
An experiment comprising seven post emergence treatments *viz*., Sulfosulfuron 75 WP @ 25 g a. i. ha^{-1}, Sulfosulfuron 75 WP + Metsulfuron 5 WP @ 32 g a. i. ha^{-1}, Fenoxaprop Methyl 10 WP @100 g a. i. ha^{-1}, Pinoxaden 5EC @ 50 g a. i. ha^{-1}, Vesta (Clodinofop propargyl 15% + Metsulfuron 5 wp @ 60 g a. i. ha^{-1}), Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} and Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30-35 days after sowing along with un-weeded control was conducted in randomized block design with 3 replications at Crop Research Farm, Nawabganj, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (Uttar Pradesh) in wheat cv. K1006 during Rabi 2019-20. The most successful method for controlling a wide range of broad-leaved weeds, such as *Chenopodium album*, *Convolvulus arvensis*, *Melilotus indica*, *Anagallis arvensis*, *Rumex dentatus*, *Coronopus didymus*, etc., was to apply Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}). For grassy weeds, such as *Phalaris minor* and *Avena fatua*, the most effective combination was Sulfosulfuron 75WP + Metsulfuron 5 WP @ 32 g a. i. ha^{-1}. However, the maximum weed control efficiency was observed by Broadway (Carfentrazone ethyl 20% + Sulfosulfuron @ 25/WG @ 100 g a.i. ha^{-1}) (87.35%), Halauxifen methyl 6.95% w/w + Pyroxsulam 25% w/w/WG @ 19.71g ha^{-1} (85.26%). This would ensure sustained productivity and profitability in wheat cultivation.

Keywords: Wheat, post emergence herbicides, weed density introduction

Introduction
An ancient and staple food crop, wheat (*Triticum aestivum* L.) is grown in a variety of agroclimatic conditions. Around 775.8 million metric tonnes of wheat are produced worldwide, and approximately 107.9 million metric tonnes are produced in India (USDA- WAP 6-21). In comparison to current production, the FAO projects that by 2050, wheat demand will increase globally by about 900 million tonnes, and in India by 140 million tonnes. Weeds are one of the main factors affecting wheat productivity and production; they can cause a 73% loss in grain yield (Pandey and Verma, 2004) [8]. Both direct and indirect methods - such as modified land preparation, soil moisture regulation, planting techniques, seeding rate, and fertilizer management-can be used to control weeds. Chemical weed control plays a significant role in reducing weed populations and increasing wheat grain yield when used in conjunction with direct methods of weed control. However, due to weed resistance, residue in crops and soil, pollution risks, and health risks to non-target organisms, there is currently no herbicide that can provide the required level of weed control on its own (Singh *et al*., 2012) [10]. To solve this issue, it has been determined that three different herbicides - Fenoxaprop-p-ethyl, Clodinafop-p-ethyl, Clodinafop-propargyl, and Sulfosulfuron are effective at controlling *Phalaris minor*, an isoproturon-resistant plant, in rice-wheat growing areas. However, because Fenoxaprop and Clodinafop are unique to *A. ludoviciana* and *Phalaris minor*, they are useless against weeds with broad leaves. Furthermore, the density of broad-leaved species such as *Anagallis arvensis*, Rumex spp., *Chenopodium album*, *Convonvulus arvensis*, *Melilotus alba*, *Vicia* spp., etc. has

increased dramatically as a result of the ongoing use of these herbicides. Nevertheless, three herbicides - 2, 4-D, metsulfuron, and carbentrazone - are still working quite effectively to combat the issue of broad-leaved weeds. By applying 2, 4-D, Metsulfuron, or Carfentrazone at 30-35 DAS in succession, Clodinafop, Fenoxaprop, or Sulfosulfuron, has reduced the issue of complex weed flora in wheat to a greater extent. However, the aforementioned herbicide applications required two different operations, especially in the case of 2, 4-D and Metsulfuron, which have an antagonistic effect on the efficacy of Fenoxaprop and Clodinafop (Yadav *et al*., 2009) [14] and raise costs. Another herbicide, a premix formulation of Sulfosulfuron + Metsulfuron, was suggested as a defense against complex weed flora and performed admirably; however, its residual toxicity on susceptible subsequent crops (Sorghum and Maize) in rotation raised concerns about its broad acceptability. Similarly, it has been reported that metsulfuron + lodosulfuron, which is advised against complex weed flora, causes phytotoxicity to both wheat and the crop that follows it - sorghum. Nonetheless, a variety of broad-leaved, narrow-leaved, and sedge plants continue to pose a threat to wheat crops (Dheer *et al*., 2024) [2]. Therefore, research on the impact of the most promising post-emergence herbicides on the density of a complex weed flora is desperately needed in order to maintain wheat production's profitability and productivity.

Materials and Methods

The present investigation comprising 7 treatments *viz*., T_1= Sulfosulfuron 75WP @ 25 g a. i. ha^{-1}, T_2= Sulfosulfuron 75 WP + Metsulfuron 5WP @ 32 g a. i. ha^{-1}, T_3= Fenoxaprop Methyl 10WP @100 g a. i. ha^{-1}, T_4= Pinoxaden 5EC @ 50 g a. i. ha^{-1}, T_5= Vesta (Clodinofop propargyl 15% + Metsulfuron 5wp @ 60 g a. i. ha^{-1}), T_6= Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha- 1, T_7= Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}), along with unweeded control was subjected in randomized block design with 3 replications at Crop Research Farm, Nawabganj, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (Uttar Pradesh) in wheat cv. K1006 during Rabi 2019-20. The experimental site is situated between latitude range of 25.260 to 28.580 north and at longitude of 79.310 to 80.340 East with a height about 125.9 meter above the mean sea level. The annual rainfall was about 800 mm extending normally from July to mid-October with a few showers in winter season. The experimental field was characterized by having organic carbon 0.49, available nitrogen (175 kg/ha), available potassium (19.30 kg/ha), available phosphorus (145 kg/ha), sandy loam in nature and alkaline in reaction (pH 7.8). The experimental crop was sown using 100 kg seed per hectare with a row to row spacing of 23 cm apart. Prior to sowing the required quantity of wheat seed was treated with Bavistin @ 2.5 g kg^{-1} of seed for healthy growth and development of the crop (Dheer and Yadav, 2024) [4].

All the herbicides were sprayed through knap sack sprayer using 500-liter water per hectare as post emergence at 30 to 35 days after sowing. Fertilizers @ 150 kg N ha^{-1}, 60 kg P_2O_5 ha^{-1} and 40 kg ha^{-1} K_2O were applied. The sources of fertilizers were Urea, Di- Ammonium Phosphate and Muriate of Potash. Half dose of nitrogen fertilizer and full doses of phosphorus and potassium were placed below the seed prior to sowing. Rest 50% nitrogenous fertilizer was broadcasted in two equal splits at tillering stage and pre-heading stage of the crop. Four irrigations were supplemented in crop at 23, 45, 68, 83 days after sowing of wheat. Weed population was recorded at 30, 60, 90 days after sowing and at harvest. For recording the weed population, an area of 0.5 m × 0.5 m (0.25 m^2) was marked at three spots in each treatment and observations were made from the same marked area and average was worked out and expressed the weed density m^{-2} area. The final data were transformed using the formula $\sqrt{(X + 0.5)}$ for statistical analysis according to Fisher (1937) [5].

Results and Discussions

Phalaris minor (m^{-2})

The results on density of *Phalaris minor* as influenced by different herbicides at various stages of crop growth are presented in Table 1. All the treatments reduced density of *Phalaris minor* significantly over unwedded check at all crop growth stages. The application of Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha^{-1} at 30-35 DAS was found most effective for reduced the density of weed followed by Vesta (Clodinofop propargyl 15% + Metsulfuron 5wp @ 60 g a. i. ha^{-1}) and Broadway (Carfentrazone eyhyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}). Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha- 1and Fenoxaprop Methyl 10WP @100 g a. i. ha^{-1} showed almost at par in reduction to *Phalaris minor*. Similar effect of Sulfosulfuron + Metsulfuron (Walia *et al*., 2010) [13] and Sulfosulfuron or ready mixture of Sulfosulfuron + Carfentrazone (Chhokar *et al*., 2015) [1] have also been reported.

Chenopodium album (m^{-2})

The observations recorded periodically on the population of *Chenopodium album* as influenced by different herbicides are summarized in Table 1. The treatments had significant effect on density of *Chenopodium album* at all stages of crop growth. The application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found most effective to minimize the weed density of *Chenopodium album* followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1}. Unwedded control revealed the maximum density of *Chenopodium album*. Similar response of premix herbicide i e. Carfentrazone + Sulfosulfuron is also reported by Walia *et al*. (2010) [13].

Table 1: Effect of post emergence herbicides on weed density (m^{-2}) of *Phalaris minor* and *Chenopodium album* in wheat

Treatment	*Phalaris minor*				*Chenopodium album*			
	30	60	90	At harvest	30	60	90	At harvest
T_1	5.66 (2.48)	1.66 (1.47)	3.00 (1.87)	2.33 (1.68)	10.66 (3.34)	6.00 (2.55)	6.66 (2.68)	5.33 (2.41)
T_2	5.00 (2.35)	1.00 (1.22)	2.33 (1.68)	1.66 (1.47)	9.33 (3.14)	5.66 (2.48)	5.33 (2.41)	5.00 (2.35)
T_3	4.33 (2.20)	1.33 (1.35)	2.66 (1.78)	2.00 (1.58)	9.00 (3.08)	6.33 (2.61)	6.66 (2.68)	5.33 (2.41)
T_4	4.66 (2.27)	1.66 (1.47)	3.00 (1.87)	2.33 (1.68)	9.66 (3.19)	7.00 (2.74)	7.66 (2.86)	6.00 (2.55)
T_5	4.00 (2.12)	1.33 (1.35)	2.66 (1.78)	1.66 (1.47)	9.33 (3.14)	8.66 (3.03)	9.00 (3.08)	7.00 (2.74)
T_6	3.66 (2.04)	1.00 (1.22)	2.33 (1.68)	2.00 (1.58)	8.66 (3.03)	2.33 (1.68)	3.33 (1.96)	2.66 (1.78)
T_7	4.33 (2.20)	1.00 (1.22)	2.33 (1.68)	1.66 (1.47)	8.33 (2.97)	2.33 (1.68)	3.00 (1.87)	2.00 (1.58)
Unwedded Control	5.33 (2.41)	6.33 (2.61)	6.66 (2.68)	5.66 (2.48)	8.33 (2.97)	9.66 (3.19)	10.00 (3.24)	11.33 (3.44)
CD (5%)	0.27	0.32	0.23	0.28	0.73	0.61	0.65	0.56

***Convolvulus arvensis* (m^{-2})**

It is revealed from Table 2 that the treatments had significant effect on reducing the density of *Convolvulus arvensis* significantly over unweeded check at all crop growth stages. The application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found superior for reducing the density of weed followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha^{-1}. Similat results have also been reported by Singh *et al*. (2013) [11].

***Melilotus indica* (m^{-2})**

The results depicted that all herbicides reduced density of *Melilotus indica* significantly over unwedded check at all stages (Table 2). The application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found most effective in supressing the *Melilotus indica* followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha $^{-1}$.

Table 2: Effect of post emergence herbicides on weed density (m^{-2}) of *Convolvulus arvensis* and *Melilotus indica* in wheat

Treatment	*Convolvulus arvensis*				*Melilotus indica*			
	30	60	90	At harvest	30	60	90	At harvest
T_1	3.33 (1.96)	2.66 (1.78)	2.33 (1.68)	2.00 (1.58)	4.33 (2.20)	3.66 (2.04)	3.33 (1.96)	3.00 (1.87)
T_2	3.00 (1.87)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)	3.33 (1.96)	3.00 (1.87)	2.66 (1.78)	2.00 (1.58)
T_3	3.33 (1.96)	2.33 (1.68)	2.66 (1.78)	2.33 (1.68)	4.00 (2.12)	3.33 (1.96)	3.66 (2.04)	2.66 (1.78)
T_4	3.66 (2.04)	3.00 (1.87)	3.66 (2.04)	2.66 (1.78)	4.33 (2.20)	4.00 (2.12)	3.33 (1.96)	3.00 (1.87)
T_5	2.66 (1.78)	2.33 (1.68)	2.66 (1.78)	2.00 (1.58)	3.66 (2.04)	3.33 (1.96)	3.66 (2.04)	2.66 (1.78)
T_6	2.66 (1.78)	1.00 (1.22)	1.66 (1.47)	0.66 (1.08)	3.33 (1.96)	1.33 (1.35)	1.66 (1.47)	0.66 (1.08)
T_7	3.00 (1.87)	1.00 (1.22)	0.66 (1.08)	0.33 (0.91)	3.66 (2.04)	1.33 (1.35)	1.00 (1.22)	0.33 (0.91)
Unwedded Control	3.66 (2.04)	4.33 (2.20)	5.00 (2.35)	5.33 (2.41)	4.00 (2.12)	4.66 (2.27)	5.33 (2.41)	5.00 (2.35)
CD (5%)	0.24	0.21	0.22	0.18	0.31	0.29	0.25	0.22

***Anagallis arvensis* (m^{-2})**

The results obtained at various stages on the population of *Anagallis arvensis* as influenced by different treatments are presented in Table 3. The results revealed that all weed management practices reduced density of *Anagallis arvensis* considerably over unwedded check at all stages. The post emergence application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found most effective for supressing the growth and development of *Anagallis arvensis* followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha $^{-1}$.

***Rumex dentatus* (m^{-2})**

The data on density of *Rumex dentatus* as influenced by different herbicides at various stages of crop growth are presented in Table 3. The results indicated that the herbicidal practices had significant effect on reducing the density of *Rumex dentatus* at all stages. The post emergence application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found most effective for reducing the density of *Anagallis arvensis* followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha^{-1}. Singh *et al*. (2023) [12] reported similar effect of tank mix application of Carfentrazone + Metsulfuron. Halauxifen + florasulam 12.76 g, metsulfuron 4 g and metsulfuron + carfentrazone 4 + 20 g ha^{-1} provided complete weed control (Chhokar *et al*., 2015) [1].

***Coronopus didymus* (m^{-2})**

It is evident from the data presented in Table 4 that the post emergence application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) at 30- 35 DAS was found considerably effective for supressing the growth and development of *Coronopus didymus* followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a.i. ha^{-1} and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a.i. ha $^{-1}$.

Table 3: Effect of post emergence herbicides on weed density (m^{-2}) of *Anagallis arvensis* and *Rumex dentatus* in wheat

Treatment	*Anagallis arvensis*				*Rumex dentatus*			
	30	60	90	At harvest	30	60	90	At harvest
T_1	5.33 (2.41)	4.66 (2.27)	4.33 (2.20)	3.33 (1.96)	5.33 (2.41)	4.33 (2.20)	4.00 (2.12)	3.66 (2.04)
T_2	4.66 (2.27)	2.33 (1.68)	2.00 (1.58)	1.66 (1.47)	4.66 (2.27)	3.33 (1.96)	3.00 (1.87)	2.66 (1.78)
T_3	5.00 (2.35)	4.33 (2.20)	4.00 (2.12)	3.66 (2.04)	4.33 (2.20)	4.00 (2.12)	3.66 (2.04)	3.33 (1.96)
T_4	5.33 (2.41)	5.00 (2.35)	4.33 (2.20)	3.66 (2.04)	4.66 (2.27)	4.33 (2.20)	4.00 (2.12)	3.66 (2.04)
T_5	4.66 (2.27)	4.33 (2.20)	4.00 (2.12)	3.00 (1.87)	5.66 (2.48)	3.66 (2.04)	3.33 (1.96)	3.00 (1.87)
T_6	4.33 (2.20)	1.33 (1.35)	2.00 (1.58)	1.00 (1.22)	4.33 (2.20)	1.58 (2.00)	1.47 (1.66)	1.22 (1.00)
T_7	4.33 (2.20)	1.00 (1.22)	1.33 (1.35)	0.66 (1.08)	5.33 (2.41)	1.35 (1.33)	1.22 (1.00)	1.08 (0.66)
Unwedded Control	3.00 (1.87)	3.66 (2.04)	4.33 (2.20)	5.00 (2.35)	4.66 (2.27)	5.33 (2.41)	6.00 (2.55)	6.33 (2.61)
CD (5%)	0.43	0.37	0.35	0.33	0.48	0.41	0.37	0.32

Other weeds (m^{-2})

The term other weed is used to denote the weeds occurring in the field other than *Phalaris minor*, *Chenopodium album*, *Convolvulus arvensis*, *Melilotus indica*, *Anagallis arvensis*, *Rumex dentatus*, *Coronopus didymus*. The data pertaining to the population of other weeds as influenced by different treatments is presented in Table 4. The treatments showed significant effect on reducing the density of other weed also at all stages over unweeded control. Further, the post emergence application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG

@ 100 g a. i. ha^{-1}) at 30- 35 DAS was found again superior over rest of the treatment in supressing the density of other weeds also. Jackson *et al*. (2018) [6] reported that Halauxifen- methyl + florasulam being a new post emergence herbicide, controls an extensive range of broad -leaved weeds in cereals. Punia *et al*. (2018) [9] reported that effects of different broad-leaf herbicides against complex weed flora in wheat and weed control efficiency (WCE) was higher with Carfentrazone 20 g ha^{-1} (91.8%) compared to Carfentrazone 10 g ha^{-1} (78.9%). Carfentrazone at different doses also provided better control of weed as compared to 2, 4-D amine at 60 DAT and at harvest. Malik *et al*. (2012) [7] also reported similar results. Dheer and Yadav (2021a) [3] have also emphasized the higher weed control efficiency of ready-mix application of Carfentrazone ethyl 20% + Sulfosulfuron 25%, Halauxifen Methyl 6.96% + Pyroxsulam 25% and Sulfosulfuron 75WP + Metsulfuron 5WP over a complex weed flora in wheat.

Table 4: Effect of post emergence herbicides on weed density (m^{-2}) of *Coronopus didymus* and other weeds in wheat

Treatment	*Coronopus didymus*				Other weeds			
	30	60	90	At harvest	30	60	90	At harvest
T_1	4.00 (2.12)	3.33 (1.96)	3.66 (2.04)	3.00 (1.87)	5.00 (2.35)	1.66 (1.47)	2.33 (1.68)	2.00 (1.58)
T_2	4.00 (2.12)	3.00 (1.87)	3.33 (1.96)	2.66 (1.78)	4.66 (2.27)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)
T_3	4.33 (2.20)	4.00 (2.12)	4.33 (2.20)	3.66 (2.04)	5.00 (2.35)	1.66 (1.47)	2.33 (1.68)	2.00 (1.58)
T_4	4.33 (2.20)	4.00 (2.12)	4.33 (2.20)	4.00 (2.12)	5.00 (2.35)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)
T_5	4.00 (2.12)	3.33 (1.96)	3.00 (1.87)	2.66 (1.78)	4.66 (2.27)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)
T_6	4.33 (2.20)	1.66 (1.47)	2.33 (1.68)	2.00 (1.58)	4.66 (2.27)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)
T_7	3.66 (2.04)	1.33 (1.35)	2.00 (1.58)	1.66 (1.47)	4.33 (2.20)	1.33 (1.35)	2.00 (1.58)	1.33 (1.35)
Unwedded Control	4.33 (2.20)	4.66 (2.27)	5.66 (2.48)	6.33 (2.61)	4.00 (2.12)	5.33 (2.41)	6.66 (2.68)	6.33 (2.61)
CD (5%)	0.28	0.23	0.27	0.21	0.47	0.39	0.34	0.27

Weed control efficiency

The spectrum of weeds has a bearing on the efficiency of the management practices adopted. The treatments namely, Sulfosulfuron 75wp + Metsulfuron 5wp @ 32g a.i. ha^{-1}, Vesta 74 (Clodinafop 15% propargyl + Metsulfuron 5wp @ 19.71g ha^{-1}), Halauxifen methyl 6.95% w/w + Pyroxsulam 25% w/w/WG @ 19.71g ha^{-1}, Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25WG @ 100 g a.i. ha^{-1}) and unweeded control. Weed control efficiency of Fenoxaprop 10wp @100g a.i. ha^{-1}, Pinoxaden 5EC @ 50g a.i. ha^{-1} and hand weeding (20 DAS and 40 DAS) was decreased at 90 DAS but increased at harvest stage. In case of Sulfosulfuron 75wp @ 25g a.i. ha^{-1}, its weed control efficiency was decreased successively after 60 DAS. However, the maximum weed control efficiency was observed by Broadway (Carfentrazone ethyl 20% + Sulfosulfuron @ 25/WG @ 100 g a.i. ha^{-1}) (87.35%), Halauxifen methyl 6.95% w/w + Pyroxsulam 25% w/w/WG @ 19.71g ha^{-1} (85.26%). Weed control efficiency of Vesta (Clodinofop propargyl 15% + Metsulfuron 5wp @ 19.71g a.i. ha^{-1}) and Sulfosulfuron 75wp + Metsulfuron 5wp @ 32 g a.i. ha^{-1} was also considerable being at 73.27% and 71.98%, respectively, presented in Fig. 1. Almost similar findings have also been reported by Meena and Singh *et al.* (2023), Tomar and Tomar (2014), and Li *et al*. (2016).

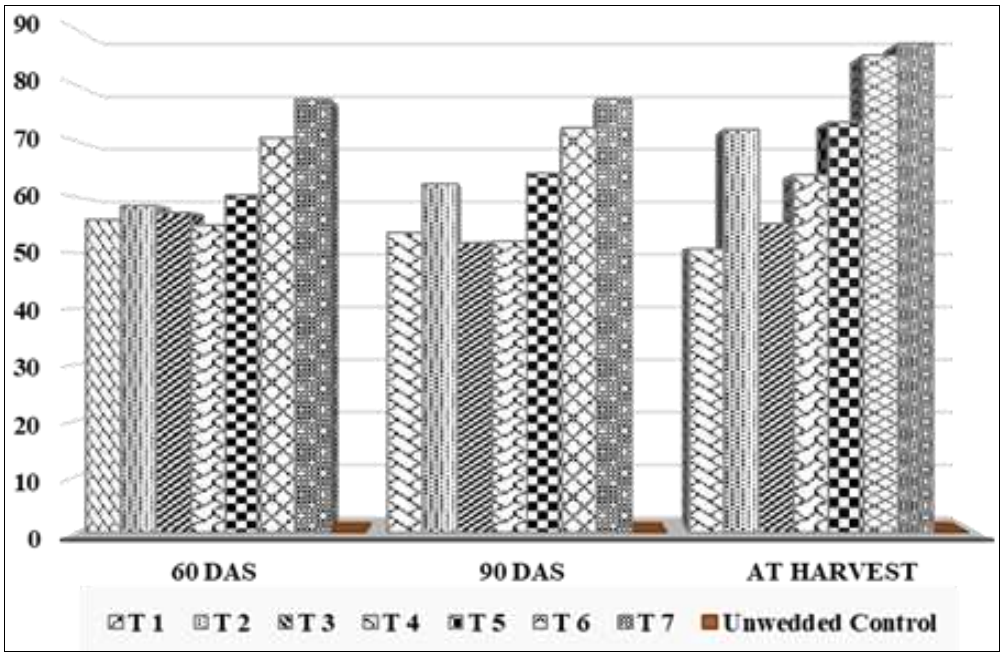

Fig 1: Effect of post emergence herbicides on weed control efficiency in wheat

Conclusion

Keeping above findings in view, it is concluded that the post emergence application of Broadway (Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1}, and Sulfosulfuron 75WP + Metsulfuron 5WP @ 32 g a. i. ha $^{-1}$ at 30-35 days after sowing were found most effective treatments to minimize the density of wide spectrum of broad leaved and grassy weeds, respectively in wheat production. In the terms of weed control efficiency Broadway

(Carfentrazone ethyl 20% + Sulfosulfuron 25% WG @ 100 g a. i. ha^{-1}) followed by Halauxifen Methyl 6.96% WW + Pyroxsulam 25% WW/WG @ 19.71 g a. i. ha^{-1} showed most effective treatment to control the weed density in wheat.

Acknowledgement
Authors are grateful to the Head, Department of Agronomy for proving all facilities during the course of investigation.

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