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Effect of weed management on growth and growth attributes of wheat (*Triticum aestivum* L.)

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Abstract
At the Agronomy farm of the NUJ College of Agriculture & Research in Jaipur, a field experiment titled "Effect of Weed Management on Growth, Yield and Quality of Wheat (Triticum aestivum L.)" was carried out from Rabi 2023–24. The study area is situated in Rajasthan's agroclimatic zone III A, or the semi-arid eastern plain zone, at 26055' N latitude and 75049' E longitude. Weedy Check (T1), Weed Free (T2), Pendimethalin (0.75 kg ha-1) as PE (T3), Pyroxasulfone (127.5 g ha-1) as PE (T4), 2, 4-D ester (500 g ha-1) as POE (T5), Metsulfuron (4 g ha-1) as POE (T6), Pendimethalin (0.75 kg ha-1) as PE + 2, 4-D ester (500 g ha-1) as POE (T7), Pendimethalin (0.75 kg ha-1) as PE + Metsulfuron (4 g ha-1) as POE (T8), Pyroxasulfone (127.5 g ha-1) as PE + Metsulfuron (4 g ha-1) as POE (T9), One Hand Weeding at 30 DAS (T10). Therefore, it may be suggested to use metsulfuron (4 g ha-1) as POE and pyrosulfone (127.5 g ha-1) as PE to promote plant growth.

Keywords: wheat, growth and weed, Metsulfuron, Pyroxasulfone, Pendimethalin.

Introduction
The NUJ College of Agriculture & Research, Jaipur, agronomy farm hosted a field experiment titled "Effect of Weed Management on Growth, Yield, and Quality of Wheat (Triticum aestivum L.)" during Rabi 2023–24. With an average productivity of 3507 kg ha-1 and a total production of 102.19 million metric tons, wheat is farmed on 29.14 million hectares in India (Anonymous, 2020) [1]. From a 3.52 million-hectare area with a productivity of 5183 kg ha-1, Punjab, the food bowl of India, provided 18.24 million metric tons of wheat (Anonymous 2020) [1]. Nevertheless, 2, 4-D usage has limitations and is stage-specific, particularly if adjacent fields are planted with broadleaf crops (Swan, 1975) [10]. Owing to years of consistent use, 2, 4-D's effectiveness has been documented. should be decreased, particularly in relation to difficult-to-control broadleaf weeds as Malva neglecta, Rumex dentatus L., and Rumex spinosus L. Herbicide-resistant weeds and a change in the weed population are two additional issues brought on by the extensive use of herbicides (Lemerle *et al*., 2004) [5]. Among the common weeds found in wheat fields are Cynodon dactylon, Phalaris minor, Chenopodium album, and Anagallis arvensis. The yield of wheat is reduced by 33–50 percent alone from weeds. One of the primary causes of low wheat output is weed infestation, which can cut wheat yield by 37–50% (Waheed *et al*. 2009) [13]. Plant population per m-1 row

Materials and Methods
The experiment was conducted during *Rabi* 2023-24 at the agronomy farm, NUJ College of Agriculture & Research, Jaipur. Geographically, the study area is located at 75049 E longitude and $26^0$55’ N latitude, and this region falls under agro-climatic zone III A of Rajasthan (Semi-arid eastern plain zone). The number of plants m^{-1} row length was counted from randomly selected three locations in each net plot at 20 DAS. The mean plant stands m^{-1} row length was worked out and recorded as plants m^{-1} row length. Five shoots were selected randomly from each net plot and tagged permanently. The height of these five shoots was measured at 30, 60, and 90 DAS and at harvest from the base of the plant to the top of the main shoot by meter scale,

and their mean was expressed as plant height (cm). The whole plants from randomly selected 0.5 m row length from each experimental plot at each crop growth stage were cut from the ground level from sample rows. Samples were first sun dried and then dried in an oven at 700 °C for 72 hours to a constant weight. Thereafter, the dried samples were weighed, and dry matter accumulation m^{-2} was recorded at each stage. A meter scale was placed in each plot along the crop row at three spots selected randomly, and the total number of tillers was counted at harvest, and the mean value was converted to per square meter.

Results and Discussion

Results revealed that different weed control treatments differed significantly in their effect on plant height and dry matter accumulation of wheat. The variation among treatments in their effects on growth parameters of crops was found to be associated with almost similar variation in weed control. All the treatments significantly enhanced these growth characters of wheat at most of the stages compared to weedy check plots. Pyroxasulfone at 127.5 g ha-1 as PE + Metsulfuron at 4 g ha-1 as PoE treatment recorded the maximum plant height at all the stages. It also attained significantly higher dry matter production at 60 and 90 DAS and at harvest over weed check.

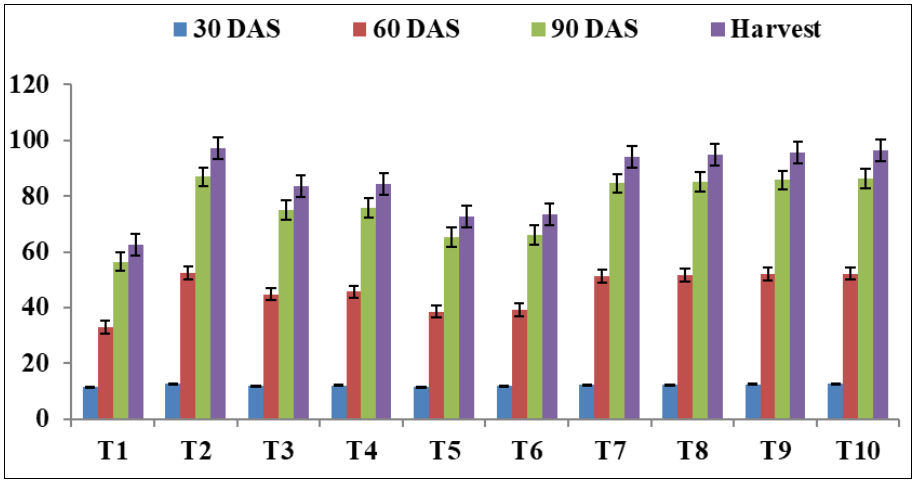
The improvement in growth characters of wheat due to weed control treatments in the present investigation could mainly be ascribed to the reduced density and dry weight of weeds. It resulted in the in the least competition for growth inputs, *viz*., space, moisture, nutrients, light, etc. The weed-free environment provided by these treatments reduced the crop-weed competition to the extent of their efficacy in weed control, which led to better crop growth in terms of plant height, tillering, and dry matter accumulation. A weed-free environment also saved nutrients, moisture, sunlight, and space that would have otherwise been utilized by freely growing weeds under infested conditions. Thus, adequate availability of light and space as well as better edaphic and nutritional environmental conditions along with improvement in physiological and morphological characters of the plant in the rhizosphere led to a greater photosynthetic rate, thereby more accumulation of dry matter under better treatments. Contrary to this, uncontrolled weed growth throughout the crop season in weedy check plots arrested the crop growth due to severe crop-weed competition. Similar findings were also obtained by Katara *et al.* (2012) [2], Shoeran *et al.* (2013) [9], Verma *et al*. (2015) [12], Puniya *et al.* (2016) [7], Rana *et al.* (2016) [8], Jena *et al.* (2017) [3], Patil *et al.* (2018) [6], Verma *et al.* (2018) [11], and Kumar *et al*. (2019) [4] in wheat and barley crops.

Tillers were recorded under application of Pyroxasulfone at 127.5 g ha^{-1} as PE + Metsulfuron at 4 g ha^{-1} as PoE (T10), which was closely followed by T_2, T_7, T8, and T9 but significantly higher than T_1, T_3, T_4, T5, and T_6. The minimum number of tillers m^{-2} inwheat was found with the weedy check plot (T_1). The increase in number of tillers m^{-2} with application of Pyroxasulfone at 127.5 g ha^{-1} as PE + Metsulfuron at 4 g ha^{-1} as PoE (T_{10}) was in the tune of 45.50, 12.84, 12.06, 27.55, and 26.92% as compared to the treatments T_1, T_3, T_4, T5, and T_6, respectively

Table 1: Effect of weed management on Plant population m^{-1} row length, Plant height (cm), Dry matter accumulation (g m^{-2}), Total number of tillers m^{-2} of wheat

S. No.	Treatments	Plant population m^{-1} row length	Plant height (cm)				Dry matter accumulation (g m^{-2})				Total number of tillers m^{-2}
		At 20 DAS	At 30 DAS	At 60 DAS	At 90 DAS	At harvest	At 30 DAS	At 60 DAS	At 90 DAS	At harvest	
T_1	Weedy Check	24.09	11.41	33.05	56.48	62.50	89.79	285.1	622.1	773.8	347.4
T_2	Weed Free	26.41	12.68	52.38	86.89	97.06	97.08	427.1	936.0	1173.1	540.2
T_3	Pendimethalin at 0.75 kg ha^{-1}as PE	24.84	11.92	44.82	74.96	83.41	93.27	372.4	811.1	1014.3	469.5
T_4	Pyroxasulfone at 127.5 g ha^{-1} as PE	25.60	12.07	45.67	75.82	84.40	94.04	375.5	819.4	1025.3	472.7
T_5	2, 4-D ester at 500 g ha^{-1}as PoE	24.52	11.62	38.51	65.33	72.49	90.72	327.1	714.0	890.3	406.3
T_6	Metsulfuronat 4 g ha^{-1}as PoE	24.71	11.79	39.16	66.06	73.36	92.08	330.6	721.1	899.7	410.7
T_7	Pendimethalin at 0.75 kg ha^{-1}as PE + 2, 4-D ester at 500 g ha^{-1} as PoE	25.16	12.17	51.28	84.53	94.22	95.70	417.6	911.1	1141.5	531.3
T_8	Pendimethalin at 0.75 kg ha^{-1}as PE + Metsulfuronat 4 g ha^{-1} as PE	25.35	12.35	51.62	85.10	94.92	96.06	419.8	916.9	1149.2	533.5
T_9	One hand weeding at 30 DAS	25.88	12.46	52.03	85.70	95.60	96.42	422.1	923.3	1157.3	535.9
T_{10}	Pyroxasulfone at 127.5 g ha^{-1}as PE + Metsulfuronat 4 g ha^{-1}as PoE	25.98	12.57	52.18	86.36	96.40	96.75	425.2	929.5	1165.1	537.4
SEm±		1.05	0.59	1.68	1.68	2.68	3.5	13.7	29.5	37.6	18.0
Cd (P = 0.05)		NS	NS	5.00	5.00	7.98	NS	40.7	87.7	111.6	53.5

*NS=Nonsignificant



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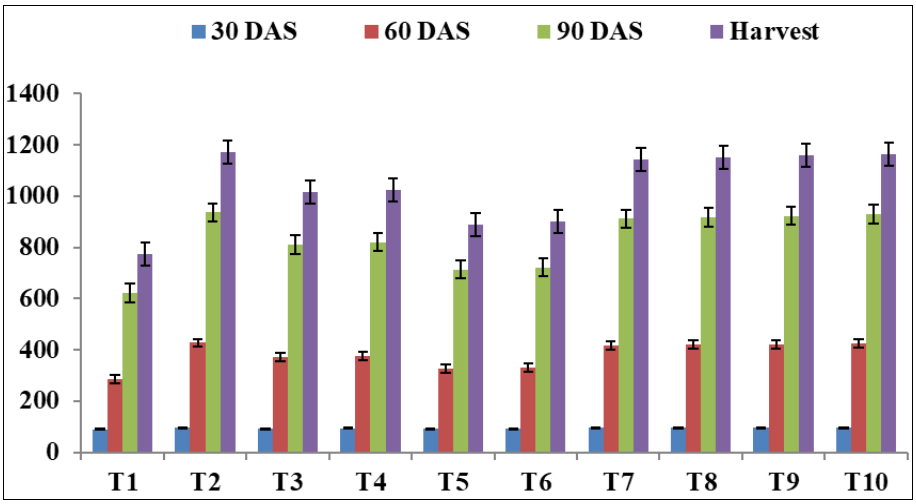

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References

1. Anonymous. All India Coordinated Research Project on Wheat and Barley. ICAR-Indian Institute of Wheat and Barley Research; c2020. p. 1.1.
2. Katara P, Kumar S, Rana SS, Chander N. Combination of pinoxaden with other herbicides against complex weed flora in wheat. Indian Journal of Weed Science. 2012;44(4):225-30.
3. Jena T, Singh RK, Singh MK. Growth and yield attributes of barley as influenced by different herbicides. Trends in Biosciences. 2017;10(2):582-585.
4. Kumar S, Vivek NS, Rana K, Kumar R, Naresh RK, Dhyani BP. Effect of weed and nutrient management on the growth and yield of barley (*Hordeum vulgare* L.) and associated weeds. International Journal of Current Microbiology and Applied Sciences. 2019;8(02):993-1001.
5. Lemerle DR, Cousens D, Gill GS, Pelzer J, Moerkerd M, Murphy EE, *et al*. Reliability of higher seeding rates of wheat for increased competitiveness with weeds in low rainfall environments. Journal of Agricultural Science. 2004;142:395-409.
6. Patil SK, Suryavanshi GB, Patil JB, Kusale SP. Effect of integrated weed management on growth, yield and economics of wheat (*Triticum aestivum* L.). International Journal of Chemical Studies. 2018;6(6):51-54.
7. Puniya MM, Yadav SS, Bajya DR, Kumar A. Influence of weed management and nitrogen fertilization on weed dynamics, nutrient depletion by weeds, productivity and profitability of barley (*Hordeum vulgare*) in hot semi-arid region of western India. Indian Journal of Agricultural Sciences. 2016;86(9):1151-1157.
8. Rana MC, Rajni, Sharma, Rana SS. Evaluation of combinations of herbicides to manage mixed weed flora in wheat. International Journal of Advances in Agricultural Science and Technology. 2016;3(6):40-48.
9. Shoeran S, Punia SS, Yadav A, Singh S. Bioefficacy of pinoxaden in combination with other herbicides against complex weed flora in wheat. Indian Journal of Weed Science. 2013;45(2):90-92.
10. Swan DG. Necessity for proper timing of applications of 2,4-D to winter wheat. Down to Earth. 1975;13:23-25.
11. Verma G, Vivek RK, Jat L, Sachan DK, Tiwari R. Effect of weed management on weed dynamics, growth and yield of barley (*Hordeum vulgare* L.) under inceptisol of western Uttar Pradesh. International Journal of Chemical Studies. 2018;6(6):249-259.
12. Verma SK, Singh SB, Prasad SK, Meena RN, Meena RS. Influence of irrigation regimes and weed management practices on water use and nutrient uptake in wheat (*Triticum aestivum* L. Emend. Fiori and Paol.). Bangladesh Journal of Botany. 2015;44(3):437-442.
13. Waheed AR, Qureshi GS, Jakhar, Tareen H. Weed community dynamics in wheat crop of district Rahim Yar Khan, Pakistan. Pakistan Journal of Botany. 2009;41(1):247-254.