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To study the effect of different herbicides on productivity of timely sown wheat (*Triticum aestivum* L.)

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Abstract
A field experiment was conducted at agronomy research farm of Acharya Narendra Deva University & technology, Kumarganj, Ayodhya (U.P.) during Rabi season (2021-22). The experiment was laid out in randomized block design with three replications. There were ten treatments i.e. [T_1] Clodinafop @ 60 g a.i. ha^{-1}, [T_2] Sulfosulfuron @ 25 g a.i. ha^{-1}, [T_3] Metsulfuron @ 4 g a.i. ha^{-1}, [T_4] Carfentrazone ethyl @ 20 g a.i. ha^{-1} and tank mixture of [T_5] Clodinafop + Metsulfuron @ (60+4) 64 g a.i. ha^{-1}, [T_6] Clodinafop + Carfentrazone @ (60+20) 80 g a.i. ha^{-1}, [T_7] Sulfosulfuron + Metsulfuron @ (30+2) 32 g a.i. ha^{-1}, [T_8] Sulfosulfuron + Carfentrazone (25+20) 45g a.i. ha^{-1}, [T_9] Weed free were evaluated against mixed weed flora in wheat except and [T_{10}] Weedy check. The result revealed that all the growth parameters, yield attributes and yield of wheat is obtained significantly higher under [T_9] weed free treatment but statistically at par with [T_7] Sulfosulfuron + Metsulfuron @ (30+2) 32 g a.i. ha^{-1}, [T_5] Clodinafop + Metsulfuron @ (60+4) 64 g a.i. ha^{-1}, [T_6] Clodinafop + Carfentrazone (60+20) 80 g a.i. ha^{-1}, [T_8] Sulfosulfuron + Carfentrazone (25+20) 45g a.i. ha^{-1}. The highest net return (81054.50 Rs. ha^{-1}) and benefit cost ratio (2.04) was recorded under Sulfosulfuron + Metsulfuron @ (30+2) 32 g a.i. ha^{-1}, It was close to Clodinafop + Metsulfuron @ (60+4) 64 g a.i. ha^{-1}. Thus, it may be recommended for highest yield of wheat and net return.

Keywords: Field experiment, agronomy research farm, Acharya Narendra Deva University & technology

Introduction
Wheat (*Triticum aestivum* L.) is the second most important cereal crop next to rice and accounts for 36.2% of total food grain basket of the country. It is grown under diverse agro climatic conditions. The total area of wheat in the world is 219.01 million hectares with production of 778.6 million tonnes and productivity is 34.74 q ha^{-1} annually. The largest producer of wheat in the world is the European Union followed by China, India and United States of America (Anonymous - 2021-22) [1]. The global consumption of wheat saw a slight increase over the last year, with over 783 million tonnes consumed in 2020-21, but is kept satisfied with an equally high production figure (Anonymous-2021-22) [1]. It has been estimated that India will need at least 109 million tonnes of wheat by 2020 as against present production of 95.5 million tonnes (2018-19) Anonymous 2018-19.

In India, wheat cultivation stretches under wide range of agro-climatic conditions and it has to encounter multifarious biotic and abiotic stresses. As far as India is concerned, about 91% of the total wheat production is contributed by six northern states *viz*., Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan and Bihar. Among them U.P. ranks first in respect of area (9.54 mha) and production (32.74 mt), however, the productivity (3432 kg ha^{-1}) is comparatively low as compared to Punjab (5123 kg ha^{-1}) and Haryana (5195 kg ha^{-1}) states (Anonymous, 2018-19) [2]. Wheat is the backbone of food security of India. It is utilized for bread, cakes, cookies, noodles, petri-products and chapatti etc. Wheat grains contains starch 60-68%, protein 8-15%, fat 1.5-2.0%, cellulose 2.0-2.5%, and minerals 1.5-2.0%. Wheat crop contributes substantially to the national food security by providing more than 50% of the calories to the people who mainly depend on it.

Methods and Materials

The experiment was carried out during rabi season 2021-2022 at agronomy research farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.). The soil of experimental field was texturally silty loam. the soil was low in nitrogen, organic carbon, phosphorus, zinc and rich in potassium. There action of soil was slight lyalka line. On the whole the soil was moderate for the cultivation of wheat crop. The experiment was comprised with ten weed control treatments i.e. alone application of [T_1] Clodinafop 60 g a.i. ha^{-1} [T_2] Sulfosulfuron 25 g a.i. ha^{-1}, [T_3] Metsulfuron 4 g a.i. ha^{-1}, [T_4] Carfentrazone ethyl 20 g a.i. ha^{-1} and tank mixture of [T_5] Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, [T_6] Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, [T_7] Sulfosulfuron+ Metsulfuron 25 + 4 g a.i. ha^{-1}, [T_8] Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, [T_9] Weed free and [T_{10}] Weedy check. These treatments were evaluated under randomized block design with three replications. The experimental crop was uniformly fertilized with 120 kg N, 60 kg P_2O_5 and 40 kg K_2O ha^{-1} in the form of urea, Di-ammonium phosphate and muriate of potash, respectively. Wheat variety HD-2967 was sown in rows 20 cm apart using 100 kg seed/ha on 15th November 2021-22.

Results and Discussion

Growth characters

Data related to initial plant population given in table-.1 indicate that initial plant population did not influence by weed management practices. However maximum initial plant population recorded under weed free treatment. Plant height given in table-1 clearly indicated that the plant height increased with advancement of the age and the rate of increase was more pronounced between at 30 to 90 DAS. Data further revealed that the different herbicides affect plant height significantly at all stage of crop growth except 30 DAS. Maximum plant height was recorded in weed free treatment which was significantly highest than rest of the treatments, while among herbicides combination of Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{-1} recorded highest plant height, it was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}and Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}while significantly superior than rest of the herbicides. whereas, lowest plant height was recorded with weedy check. The increase in plant height was due to greater availability of nutrient which result profuse growth of plants at various growth factors. The results are in close agreement with those reported by Singh *et al*. (2013) [10] and Sheoran *et al*. (2013) [11]. Data related to number of tillers (m^{-2}) given in table-1 indicate that all treatments affect number of tillers significantly at all stage of crop growth except 30 DAS. At all the growth stages maximum number of tillers was recorded in weed free treatment which was significantly higher than rest of the treatments. Among herbicides maximum number of tillers recorded with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{-1}, being at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1} and Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, while significantly higher than rest of the herbicides. this might be due to there was minimum crop-weed competition and better availability of nutrient under well managed plot which resulted in better number of tillers m^{-2} then other treatments. The results are concluded with the finding of Singh *et al*. (2003) [12].

Dry matter accumulation presented in Table- 2 indicate that all treatments affect dry matter accumulation significantly at all stage of crop growth except at 30 DAS. At 60, 90 DAS and at harvest significantly higher dry matter accumulation was recorded in treatment weed free which was at par with Sulfosulfuron + Metsulfuron 30 + 2 g a.i. ha^{-1}, Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1} and Sulfosulfuron 25 g a.i. ha^{-1}. Among herbicides maximum dry matter accumulation recorded with Sulfosulfuron+ Metsulfuron 25 + 4 g a.i. ha^{1} was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1} and Sulfosulfuron 25 g a.i. ha^{-1} while significantly higher than rest of the herbicides. This might be due to greater diversion of nutrients to the crop plants and more synthesis of food materials in plants under less weedy condition. These results are in close agreement with those reported by Singh *et al*. (2013) [10], Sheoran *et al*. (2013) [11].

Leaf Area Index

leaf area index presented in Table-2, indicate that all herbicides affect leaf area index significantly at all stage of crop growth except 30 DAS. The leaf area increased with increase in stage of crop up to 90-day stage and declined thereafter. Mainly due to senescence. Data further revealed that maximum leaf area index was recorded in weed free treatment at all stage. At 30 DAS maximum leaf area index (1.64) recorded in weed free treatment it was at par with rest of the treatment. Whereas at 60 and 90 DAS maximum leaf area index (5.06) and (5.27) respectively recorded under weed free treatment which was at par with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{-1}, Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, Sulfosulfuron 25 g a.i. ha^{-1}and Clodinafop 60 g a.i. ha^{-1}while significantly higher than the rest of the treatmens. Among herbicides maximum leaf area index was recorded with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1}was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, Sulfosulfuron 25 g a.i. ha^{-1}and Clodinafop 60 g a.i. ha^{-1}while significantly higher than the rest of the herbicides. The better leaf area index with these treatments might be due to fact that sufficient moisture and nutrient availability due to less weed density resulted better growth i.e. leaf number and size leading to increased leaf area index. Better leaf area index with best highest weed control reported by Pandey and Kumar (2005) [13].

Yield attributes

The data on number of spikes (m^{-2}) are presented in table-3. Data revealed that all treatments produced significantly higher No. of spike over weedy check. Higher number of spike (m^{-2}) recorded under weed free treatment which was at par with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1}, Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, Sulfosulfuron 25 g a.i. ha^{-1}and Clodinafop 60 g a.i. ha^{-1}while significantly higher than rest of the treatments. Among herbicides Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1}recorded higher number of spike (m^{-2}), It was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}, Sulfosulfuron 25 g a.i. ha^{-1}and Clodinafop 60 g a.i. ha^{-1}while significantly higher than rest of the herbicides.

The maximum number of spikes with these treatments might be due to fact that sufficient moisture and nutrient availability to crop plants due to less weed density resulted better growth ie. maximum number of spike. These results are in close agreement

with those reported by Singh *et al*. (2013) [10] and Sheoran *et al*. (2013) [11].

Length of spike (cm)

The data are interrelated to length of spike of wheat are presented in table-3. Clearly revealed that all treatments had significant effect on length of spike (cm). highest length of spike (11.10 cm) was recorded with weed free treatment which was at par with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1}, Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1}while significantly higher than rest of the treatments. Among herbicides Sulfosulfuron+ Metsulfuron 25 + 4 g a.i. ha^{1} recorded highest length of spike (10.80 cm), it was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i. ha^{-1} while significantly higher than rest of the herbicides.

The highest length of spike with these treatments might be due to fact that sufficient moisture and nutrient availability to crop plants due to less weed density resulted highest length of spike. The result conformed by Singh *et al*. (2003) [12].

No. of spikelet's spike^{-1}

Thedata pertaining to No. of spikelets spike^{-1} are presented in table-3. clearly revealed that all treatments had significant effect on No. of spikelets spike^{-1}. Maximum number of spikelets spike^{-1} (18.40) was recorded under weed free treatment which was at par with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1},Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i.ha^{1} while significantly higher than rest of the treatments. Among herbicides, Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1} recorded maximum No. of spikelets spike^{-1} (18.00), it was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i.ha^{1} and Sulfosulfuron 25 g a.i. ha^{-1} while significantly higher than rest of the herbicides.

This might be due to effective weed control by such treatment enhanced more growth and development and resulted maximum number of spikelet's spike^{-1}. The same result conformed by Singh *et al*. (2003) [12].

No. of grain spike^{-1}

The data interrelated to No. of grains spike^{-1} are presented in table-3. clearly indicate that all treatments had non-significant effect on No. of grains spike^{-1}, however maximum No. of grains spike^{-1} (42.40) was recorded under weed free treatment. While among herbicides Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1} recorded maximum No. of grains spike^{-1} (42.20).

It might be due to the smothering effect of respective herbicides. Which result in more translocation of food from source to sink their wise maximum number of grains spike^{-1}. These results are in close agreement with those reported by Singh *et al*. (2013) [10] and Sheoran *et al*. (2013) [11].

The effect of different herbicides had non-significant effect on test weight (g) of wheat. However maximum test weight (38.85g) was recorded with weed free treatment. Among herbicides Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1} was recorded maximum test weight (38.78g).

it might be due to less weed competition for different resources resulted translocation of food from source to sink and it is cumulative function of various growth parameter and yield attributes *viz*., number of tillers, grain spike^{-1}, length of spike and test weight. These results are in close agreement with those reported by Singh *et al*. (2013) [10].

Grain yield

The data pertaining to the grain yield of wheat presented in table-3 indicate that all treatment had significant effect on grain yield and straw yield. The highest grain yield (52.60 q. ha^{-1}) and straw yield (77.60 q. ha^{-1}) was recorded under the weed free treatment which was at par with Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1}, Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i.ha^{1} and Sulfosulfuron 25 g a.i. ha^{-1}while significantly higher than rest of the treatments. Among herbicides Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1} was recorded highest grain yield (51.40 q. ha^{-1}) and straw yield (75.90 q. ha^{-1}), which was at par with Clodinafop + Metsulfuron 60 + 4 g a.i. ha^{-1}, Sulfosulfuron + Carfentrazone ethyl 25 + 20 g a.i. ha^{-1}, Clodinafop + Carfentrazone ethyl 60 + 20 a.i.ha^{1} and Sulfosulfuron 25 g a.i. ha^{-1} while significantly higher than rest of the herbicides. It might be due to the smothering effect of respective herbicides, which resulted in more translocation of food from source to sink there wise more yield. All treatments had non-significant effect on harvest index. However highest harvest index (40.40) was recorded under the weed treatment. Among herbicides Sulfosulfuron+ Metsulfuron 30 + 2 g a.i. ha^{1} was recorded highest harvest index (40.38). It might be due that proper weed management increased the proportionate distribution of photosynthetic sink i.e. grain which resulted increased harvest index. The result was confirmed by the Singh *et al.* (2017) [4].

Table 1: Effect of different herbicides on initial plant population and plant height of timely sown wheat

Treatments		Initial plant population	Plant height (cm)			
			30 DAS	60 DAS	90 DAS	At harvest
T_1	Clodinafop propagyl 15WP @ 60 g a.i. ha^{-1}	162.12	23.16	76.50	87.30	90.00
T_2	Sulfosulfuron 75 WG @ 25 g a.i. ha^{-1}	162.33	23.19	79.05	90.21	93.00
T_3	Metsulfuron methyl 20% WP @ 4.0 g a.i. ha^{-1}	162.04	23.15	71.74	81.87	84.40
T_4	Carfentrazone ethyl 40 DF @ 20 g a.i. ha^{-1}	161.87	23.12	70.38	80.32	82.80
T_5	Chlodinafop propagyl + Metsulfuron methyl (60+4) @ 64 g a.i. ha^{-1}	162.75	23.25	85.68	97.78	100.80
T_6	Clodinafop propagyl + Carfentrazone ethyl (60+20) @ 80 g a.i. ha^{-1}	162.41	23.20	83.30	95.06	98.00
T_7	Sulsosulfuron + Metsulfuron methyl (32+2) @ 29 g a.i. ha^{-1}	162.88	23.27	87.38	99.72	102.80
T_8	Sulsosulfuron + Carfentrazone ethyl (25+20) @ 45 g a.i. ha^{-1}	162.54	23.22	84.49	96.42	99.40
T_9	Weed free	163.17	23.31	89.42	102.04	105.20
T_{10}	Weedy check	157.92	22.56	59.16	67.51	69.60
S.Em±		7.30	0.89	3.64	4.16	2.97
CD at 5%		NS	NS	10.80	12.36	8.84

Table 2: Effect of different herbicides on growth parameters at different growth stage of timely sown wheat

Treatments		Dry matter accumulation (gm^{-2})				Leaf Area Index			Number of tillers/m^2			
		30 DAS	60 DAS	90 DAS	At harvest	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	AH
T_1	Clodinafop propagyl 15WP @ 60 g a.i. ha^{-1}	96.50	584.12	939.00	1150.00	1.61	4.30	4.68	170.23	304.53	306.05	300.00
T_2	Sulfosulfuron 75 WG @ 25 g a.i. ha^{-1}	96.63	590.15	962.03	1157.00	1.62	4.35	4.75	170.45	312.75	314.31	306.62
T_3	Metsulfuron methyl 20% WP @ 4.0 g a.i. ha^{-1}	96.45	529.70	882.84	1051.00	1.61	4.06	4.22	170.14	287.13	288.57	281.50
T_4	Carfentrazone ethyl 40 DF @ 20 g a.i. ha^{-1}	96.35	520.38	867.30	1032.50	1.60	3.99	4.16	169.96	283.87	284.79	277.81
T_5	Chlodinafop propagyl + Metsulfuron methyl (60+4) @ 64 g a.i. ha^{-1}	96.88	629.50	1049.16	1249.00	1.63	4.85	5.05	170.89	331.66	333.32	325.16
T_6	Clodinafop propagyl + Carfentrazone ethyl (60+20) @ 80 g a.i. ha^{-1}	96.68	613.57	1022.62	1217.40	1.62	4.71	4.90	170.53	326.23	327.86	319.83
T_7	Sulsosulfuron + Metsulfuron methyl (30+2) @ 32 g a.i. ha^{-1}	96.95	641.59	1069.32	1273.00	1.63	4.94	5.15	171.02	336.31	338.06	329.79
T_8	Sulsosulfuron + Carfentrazone ethyl (25+20) @ 45 g a.i. ha^{-1}	96.75	621.84	1036.39	1233.80	1.62	4.78	4.97	170.67	329.05	330.69	322.60
T_9	Weed free	97.13	656.21	1093.68	1302.00	1.64	5.06	5.27	171.33	341.99	343.70	335.29
T_{10}	Weedy check	94.00	451.58	752.64	896.00	1.55	3.34	3.45	165.82	259.49	260.79	254.40
S.Em±		1.96	19.98	43.76	41.79	0.08	0.24	0.17	8.15	11.2	11.24	9.90
CD at 5%		NS	59.35	130.03	124.16	NS	0.70	0.49	NS	33.41	33.41	29.60

Table 3: Effect of different herbicide on yield attributes of timely sown wheat

Treatments		No. of spike (m^{-2})	Length of spike (cm)	No. of spikelet $spike^{-1}$	Grain per ear head	Test weight (g)	Grain yield (q. ha^{-1})	Straw yield (q. ha^{-1})	Biological yield (q. ha^{-1})	Harvest index (%)
T_1	Clodinafop propagyl 15WP @ 60 g a.i. ha^{-1}	284.34	9.50	15.60	41.00	38.60	44.23	67	112	40.18
T_2	Sulfosulfuron 75 WG @ 25 g a.i. ha^{-1}	292.02	9.80	16.20	41.20	38.65	46.50	69.2	115.7	40.19
T_3	Metsulfuron methyl 20% WP @ 4.0 g a.i. ha^{-1}	268.10	8.90	14.80	40.80	38.58	42.20	62.9	105.10	40.15
T_4	Carfentrazone ethyl 40 DF @ 20 g a.i. ha^{-1}	264.58	8.70	14.50	40.60	38.54	41.40	61.85	103.25	40.10
T_5	Chlodinafop propagyl + Metsulfuron methyl (60+4) @ 64 g a.i. ha^{-1}	309.68	10.60	17.60	42.00	38.75	50.40	74.50	124.9	40.35
T_6	Clodinafop propagyl + Carfentrazone ethyl (60+20) @ 80 g a.i. ha^{-1}	304.60	10.30	17.10	41.60	38.67	49	72.74	121.74	40.25
T_7	Sulsosulfuron + Metsulfuron methyl (30+2) @ 32 g a.i. ha^{-1}	314.08	10.80	18.00	42.20	38.78	51.40	75.90	127.3	40.38
T_8	Sulsosulfuron + Carfentrazone ethyl (25+20) @ 45 g a.i. ha^{-1}	307.23	10.40	17.40	41.80	38.70	49.7	73.68	123.68	40.28
T_9	Weed free	319.32	11.10	18.40	42.40	38.85	52.6	77.6	130.2	40.40
T_{10}	Weedy check	242.29	7.80	12.20	39.65	37.60	34.80	54.8	89.6	38.84
S.Em±		14.49	0.32	0.66	0.93	1.82	2.30	2.62	4.24	-
CD at 5%		43.05	0.96	1.96	NS	NS	6.83	7.90	12.98	NS

Conclusion

Wheat (*Triticum aestivum* L.) stands as a crucial cereal crop, contributing significantly to global food security, with India being one of the leading producers. The cultivation of wheat encounters various challenges, including biotic and abiotic stresses, highlighting the necessity for effective management strategies.

The field experiment conducted during the Rabi season of 2021-2022 at the agronomy research farm of Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.), showcased the impact of different weed control treatments on wheat growth and yield attributes.

The results revealed that weed-free treatment, along with certain herbicide combinations such as Sulfosulfuron + Metsulfuron, Clodinafop + Metsulfuron, Sulfosulfuron + Carfentrazone ethyl, and Clodinafop + Carfentrazone ethyl, exhibited superior performance in terms of growth parameters, yield attributes, and grain yield compared to the weedy check.

Notably, these herbicide combinations significantly enhanced plant height, number of tillers, dry matter accumulation, leaf area index, number of spikes per square meter, length of spike, number of spikelets per spike, grain yield, and straw yield. Additionally, the weed-free treatment and certain herbicide combinations demonstrated comparable performance, indicating their efficacy in managing weed competition and optimizing wheat productivity.

The findings underscore the importance of efficient weed management practices in maximizing wheat yield potential. Furthermore, the study emphasizes the need for continued research and adoption of integrated weed management strategies to mitigate the challenges posed by weed infestation, ultimately contributing to sustainable wheat production and food security.

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