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Ajit Kumar
M.Sc. Scholar, Department of Agronomy, National Post Graduate College, Barhalganj, Gorakhpur, Uttar Pradesh, India

Dr. Prabhat Kumar Chaturvedi
Head, Department of Agronomy, National Post Graduate College Barhalganj, Gorakhpur, Uttar Pradesh, India

Rakesh Kumar
Ph.D. Scholar, Department of Agronomy, National Post Graduate College, Barhalganj, Gorakhpur, Uttar Pradesh, India

Dhyan Singh Yadav
M.Sc. Scholar, Department of Agronomy, National Post Graduate College, Barhalganj, Gorakhpur, Uttar Pradesh, India

Corresponding Author:
Ajit Kumar
M.Sc. Scholar, Department of Agronomy, National Post Graduate College, Barhalganj, Gorakhpur, Uttar Pradesh, India

Effects of weed control treatments on wheat (*Triticum aestivum* L.) crop and associated weeds

Ajit Kumar, Dr. Prabhat Kumar Chaturvedi, Rakesh Kumar and Dhyan Singh Yadav

Abstract
A field experiment entitled "Wheat (*Triticum aestivum* L.) Yield and yield component as influenced by herbicide and their mixture" was conducted during rabi season of 2020-21 at Crop Research Farm of National Post Graduate College, Barhalganj, Gorakhpur (U.P.). The experiment was conducted in R.B.D and sown on 5th December 2020 with three replications comprising nine treatments of weed management i.e. T1-Weedy, T2-Hand weeding 20 + 40 DAS, T3-Metribuzine 70% W P 0.30 (30 DAS), T4-Clodinafop-Propagules 15% W P 0.40 (30 DAS), T5-Metsulfuron Methyl 20% W P 0.02 (30 DAS), T6-Sulfosulfuron 75% W P 0.033 (30 DAS), T7-Metribuzine + Metsulfuron 0.30 + 0.02 (30 DAS), T8-Clodinafop + Metsulfuron 0.40 + 0.02 (30 DAS) and T9-Metsulfuron + Sulfosulfuron 0.02 + 0.033 (30 DAS) as post emergence with the objective to identify suitable herbicide, their appropriate rate and time of application for weed control during rabi season. The soil of the experimental field was silty loan in texture with low, medium and high in N, P and K, respectively. The experimental site is situated in subtropical zone in indo gangetic planes. The crop was harvested on 18th April 2021. The result indicated that the different weed management methods in terms of plant height, number of tillers per hill, dry weight, length of spike, number of grains per spike, test weight, grain yield, straw yield, harvest index, weed dry weight, weed control efficiency, gross return (Rs/ha), net return (Rs/ha.) and B:C ratio, respectively were significantly highest with the treatment T9-Metsulfuron + Sulfosulfuron 0.02 + 0.033 (30 DAS) over rest of the treatment, except treatment T8 i.e. Clodinafop + Metsulfuron 0.40 + 0.02 (30 DAS), which were at par to each other.

Keywords: Wheat, weed, weedicide, hand weeding, metribuzine, cladinafop, metsulfuron methyl, sulfo-sulfuron, growth attributing parameters, yield attributing parameters, yield, straw yield, economics

Introduction
Wheat (*Triticum aestivum* L.) is a member of Poaceae family, is one of the important staple foods of the world, which meet most of the protein requirement of the people and considered as integral component of the food security system of the several nations. The wide uses of wheat gluten are mainly baked breakfast and analog meat products. Wheat provides nearly 36% of the carbohydrate and 20% food calories, which is consumed by 2 billion people (36% of the world population) as staple food. There has been tremendous increase in area, production and productivity of this crop during the green revolution phase of Indian agriculture. Wheat ranks 1st in the world among the cereals both in respect of area i.e. 219.51 m. ha. and production i e. 758.02 m. t. (USDA report 2017-18). The wheat is grown in India in 315 m. ha. and produced 107.6 m. t. of wheat in 2019-20 (GOI 2021). The average production of wheat in India is 3.4 t per ha. U.P. ranks first with respect to area 9.67 m.ha. and production 33.6 m. t. The productivity is much lower 3.48 t per ha. as compared to Punjab 4.5 t. per ha. (Anonymous, 2017) [1].

Wheat are one of the most significant variables affecting wheat yield and production (Chaudhary, *et al*. 2017) [3]. It also deteriorates the great of the farm produce and hence, reducing the price on market. Weeds also make the harvesting operation difficult, raised cost for different farm operations, Clog waterways and deteriorate water quality. Crop losses caused by weed competition are larger than that caused by disease and insect. Hence, effective weed management are very important for sustaining food grain production to feed increasing population and also insure food and nutritional security. The prominent weeds noted in wheat fields are Phalaris minor, Chenopodium album, Anagalis arvensis and Cynodon dactylon etc. Weeds alone cause about 33-50% to reduction in wheat yield. Weed infestation is one of the main causes of low wheat yield. It reduces wheat yield by 37.5 0% (Waheed *et al*. 2009) [13].

Under the present circumstances control of weed through the herbicide is effective. Introduction of herbicide has made it possible to control a wide spectrum (30 DAS) of Sulfosulfuron 32 g per ha was found effective to reduce density and biomass of weeds.

Improper weed management is one of the major bottlenecks in realizing the potential of wheat crop under different ecological situations. Estimates of losses by weed revival that weeds alone account for 45% of the annual loss of agricultural produce by pest in India. In wheat yield losses by weeds may range from 10 to 82% depending upon type of weed spp., extent of severity, duration of weed infestation competing ability of the crop plant under different agro-ecological conditions. (Rao, 1994) [8]. The introduction of high yielding dwarf varieties having heavy demand of inputs, the problem of weed infestation has increased manifolds as it created favorable conditions for invasion as well as luxuriant growth of weed particularly of Phalaris minor and *Avena* spp. throughout wheat growing area in our country (Gill *et al*. 1984 and Singh and Tripathi, 1986) [4, 10]. The weed management are critical to improve the wheat production, productivity and income of the farmers. Therefore, this study was conducted to understand the weed management relationship in field condition and identify suitable weed control methods for optimal wheat production.

Material and Methods

The field experiment was carried out at the Crop Research Farm of National Post Graduate College, Barhalganj, Gorakhpur, U.P. during Rabi season of 2020. The experimental site is situated in subtropical zone in Indo-gangetic plains and lies between 260471 North latitude, 820101 East longitude and 1130m above sea level. The soil of the experimental field was silty loam in texture and slightly alkaline in reaction with PH, 7.6, EC 0.20 ds-m, organic carbon 0.40% and available Nitrogen 196 kg ha-1, Phosphorus 18.9 kg ha-1 and Potassium 260.50 kg ha-1 at 0-15 cm soil depth. The experiment was conducted in Randomised Block Design and sown on 5th December 2020 with three replications comprising nine treatments of weed managementi i.e. T1-Weedy, T2-Hand weeding 20 + 40 DAS, T3-Metribuzine 70% W P 0.30 (30 DAS), T4-Clodinafop-Propagules 15% W P 0.40 (30 DAS), T5-Metsulfuron Methyl 20% W P 0.02 (30 DAS), T6-Sulfosulfuron 75% W P 0.033 (30 DAS), T7-Metribuzine + Metsulfuron 0.30 + 0.02 (30 DAS), T8-Clodinafop + Metsulfuron 0.40 + 0.02 (30 DAS) and T9-Metsulfuron + Sulfosulfuron 0.02 + 0.033 (30 DAS). All the agronomical cultural practices such as field preperation, seed rate, time of sowing, sowing method, fertilizer management, irrigation management and plant protection measures have been performed as per requisite and recommendation of the crop except weed management practices, which were applied to the crops as per treatment of the experimental crops. The crop was harvested manually at the maturity dated on 18th April 2021and grain and straw were recorded.

Result and Discussion

Growth Parameters

As experiment was conducted to observe the influence of Weed Management on growth and yield of Wheat. The data pertaining to growth, yield and quality along with statistical interpretations are presented and discussed.

The data (Table-1) revealed that the different weed management approaches as a source of weed control had a significant influence on plant growth characters *viz*. plant height, number of tillers per hill, and dry weight during the year of study. Results clearly indicates that the maximum plant height, number of tillers per plant and dry weight (70.55, 12.64 and 17.83 respectively) were recorded with the Treatment T9 i.e. Metsulfuron + Sulfosulfuron 0.02 + 0.033 (30 DAS) which were significantly superior over rest of the treatment, except treatment T8 i.e. Clodninafop + Metsulfuron 0.40 + 0.02 (30 DAS) while the lowest values were observed (plant height-42.47 cm, number of tillers per plant-9.51, dry weight-14.22 g, respectively) with the Treatment T1 i.e. Weedy. Increased values in these yield attributes might have been due to negligible weed crop-competition and increased nutrients and water uptake by the crop leading to increased rate of photosynthesis, supply of photosynthates to various metabolic sinks might have favoured yield attributes and overall improvement in vegetative growth which favorably influenced the tillering, flowering, fruiting and ultimately resulted into increased grain weight and test weight. These findings are in close conformity with those reported by Singh and Saha, 2001, Yadav, *et al*., 2001 and Jat, *et al*., 2003 [1, 14, 6].

Table 1: Growth attributes of Wheat as affected by different Herbicides and their mixture

Treatment	Plant Height (cm)	No. of Tillers hills^{-1}	Dry weight (g)
T1	42.47	09.51	14.22
T2	64.38	10.06	16.22
T3	65.67	09.75	16.11
T4	66.51	11.02	16.21
T5	67.12	10.92	16.27
T6	61.41	10.56	16.29
T7	63.84	09.77	16.25
T8	70.53	12.15	17.78
T9	70.55	12.64	17.83
S.Em		0.65	0.67
CD at 5%		1.41	1.44

Yield Parameters

Yield attributes is the resultant of the vegetative and reproductive development of the plant. Length of panicle (Cm), number of grain panicle^{-1}, test weight (g), grain yield (q ha^{-1}) and stover yield (q ha^{-1}) as influenced by different combinations of herbicides have been shown in Table 2 clearly indicates that length of panicle, number of grains panicle-1, test weight, grain yield, and stover yield (11.64 cm, 33.38, 53.05 g, 53.01q ha-1, and 75.64 q ha^{-1}, respectively) were recorded highest with the Treatment T9 i.e. Metsulfuron + Sulfosulfuron 0.02 + 0.033 (30 DAS) which were significantly superior over rest of the treatment, except treatment T8 i.e. Clodinafop + Metsulfuron 0.40 + 0.02 (30 DAS), this may be due to better availability of nutrients owing to lower weed population and dry weight under well managed treatments which resulted better growth and development of plants vis a vis yield attributes, while the lowest values were observed (length of panicle 5.77 cm, number of grain per panicle 22.10, test weight 41.31g, grain yield 19.15 q ha-1 and straw yield 26.45 q ha^{-1} %, respectively) with the Treatment T1 i.e. Weedy. The increase in yields with these treatment may be attributed to be reduced in crop-weed competition due to broad spectrum control of both broad and narrow leaf weeds and concomitant increase

in nutrient availability to the crop plants resulting in a marked improvement in the crop yield attributes and yield also. This finding sir enclose confirm it with those reported by Bharat and Kachroo 2010, Paighan *et al*. 2013 and Singh 2013 [2, 7, 12].

Table 2: Yield attributes and yield of Wheat as affected by different herbicides and their mixture

Treatment	Length of Spike (cm)	No of grain Spike^{-1}	Test weight (g)	Grain yield (q ha^{-1})	Stover yield (q ha^{-1})	Harvest index
T1	5.77	22.10	41.31	19.15	26.45	37.07
T2	7.89	26.90	44.89	50.07	65.92	40.05
T3	8.72	32.08	48.37	51.07	69.96	41.41
T4	10.58	30.56	48.75	50.53	67.94	40.97
T5	8.36	29.93	47.46	48.56	63.14	41.38
T6	8.50	28.89	49.21	45.70	72.34	43.04
T7	8.47	28.58	45.76	48.03	66.30	44.15
T8	11.26	32.45	53.05	52.13	75.38	45.58
T9	11.64	33.38	53.17	53.01	75.64	45.64
S.Em	0.34	0.56	1.54	0.70	0.19	
CD. (at 5%)	0.73	1.20	3.32	1.50	0.42	

Economic Feasibility

To examine the economic feasibility and viability of different treatments under investigation, economics of Wheat production in terms of gross return (Rs per ha), net return (Rs ha^{-1}) and B C ratio were calculated for different treatments and the outcome is presented in Table 3.

Table 3: Gross return, net return and benefit: cost ratio of Wheat as affected by different herbicides and their mixture

Treatments	Gross return (₹ ha^{-1})	Net Return (₹ ha^{-1})	B:C ratio
T1	48541.25	-18115.75	-0.27
T2	130843.25	60185.99	0.85
T3	135303.75	67576.49	0.99
T4	133251.75	66034.49	0.98
T5	127758.75	60826.49	0.90
T6	128927.50	59320.24	0.85
T7	127009.25	59006.99	0.86
T8	140046.75	72554.49	1.07
T9	144764.75	74882.49	1.08

It is obvious from the above Table that the Treatment T9 i.e., Metsulfuron +Sulfosulfuron 0.02 + 0.033 (30 DAS) registered highest gross return (Rs 144764.75), net return (Rs 74882.49) and benefit cost ratio (1.08) per-1 this might be due to higher yield in the treatment compared to other treatments.

References

1. Anonymous. Economic survey of India. Economics Devision, Ministry of Finance, Govt. of India; c2017.
2. Bharat R, Kachroo D. Bio-efficacy of ferbicide on weed in wheat (*Triticum aestivum* L) and its residual effect on succeeting cucumber (*Cucums sativus*). Indian Journal of Agronomy. 2010;55(1):46-50.
3. Chaudhary DD, Patel VJ, Patel HK, Mishra A, Patel BD, Patel RB. Assessment of premix broad spectrum herbicide for weed management in Wheat. Indian J Weed Sci. 2017;49(1):33-35.
4. Gill HS, Singh A, Walia US. Tolerance of weed cultivars to metaxuran. Indian J Weed Science. 1984;16:176-181.
5. GOI. Economic survey. A flagship annual document of nutrient uptake by weed crop and it's subsequent effect on grain quality in wheat (*Triticum aestivum* L.). Indian Journal of Agricultural Sciences. 2021;78(6):540-542.
6. Jat AS, Dadeech RC, Ram B, Jat ML. Effect of herbicide, Phosphorus and *Phosphate solublizer* on growth, yield and wheat control efficiency of wheat in Central Plateau and Hills Zone of India. Indian Journal of Agronomy. 2003;49(1):53-56.
7. Paighan VB, Gore AK, Chavan AS. Effect of new herbicides on growth and yield of wheat Indian Journal of wheat. Indian Journal of Weed Science. 2013;45(1):291-293.
8. Rao VS. Principles of wheat science, Oxford and IBH, Publishing Co Pvt. Ltd., New Delhi; c1994. p. 540.
9. Food uses of wheat gluten. Journal of the American Oil Chemists Society, 56(3), 443-446.
10. Singh PP, Tripathi SS. Broad spectrum weed control in wheat by use of combination of herbicides. Indian J of Agronomy. 1986;31:273-279.
11. Singh SK, Saha GP. Productivity and profitability of wheat as influence by cultural and chemical weed control. Indian Journal of Agronomy. 2001;46(3):475-479.
12. Singh T Weed management in irrigated wheat (*Triticum aestivum* L.) through tank mix herbicide in Malwa plateau of Central India. Indian Journal of Agronomy. 2013;55(1):46-50.
13. Waheed AR, Qureshi GS Jakhar, Tareen H. Weed community a dynamics in wheat crop of district Rahim Yar Khan, Pakistan. Pakistan Journal of Botany. 2009;41(1):247-254.
14. Yadav RP, Srivastav UK, Dwivedi SC. Response of Wheat and associated weeds to irrigation schedule and pendimethyline. Indian J of Agronomy. 2001;46(1):122-125.