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Comparative study of herbicides on yield and economics of wheat

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ABSTRACT

A field experiment was conducted during the winter seasons of 2012-2013 in Chandra Sekhar Azad University of Agriculture and Technology, Kanpur (U.P.). Grain and straw yield varied significantly due to different herbicide and herbicidal combination.Twice hand weeding plot recorded significantly higher grain as well as straw yield. However, the sole application of herbicides, sulfosulfuron and carfentrazon-ethyl did not differed significantly from each other in respect of grain and straw yields but these obtained significantly higher grain and straw yield in sole application of metsulfuron-methyl and Clodinafop. The higher net income (Rs 57061/ha) and B:C ratio (2.25) were found with the application of sulfosulfuron (25g a.i. / ha) + Carfentrazon (10g a.i./ha) followed by application of sulfosulfuron (25g a.i. / ha) and carfentrazon-ethyl (15g ai/ha) net income (Rs 56519/ha) and B : C ratio (2.24).

Key words: B : C ratio, Carfentrazon-ethyl, Clodinafop, Metsulfuron, Sulfosulfuron.

INTRODUCTION

Wheat (*Triticum aestivum* L.*)* is the second most important staple food crop of the world after rice, both in area and production. At global level India ranks 2nd largest producing nation with 13.43% global wheat production after China which contributes 17.7% to the world wheat production . The current average global productivity of wheat is 3 tones ha^{-1} while it is expected 4 tones ha^{-1}. The average wheat yield is 2.9 tones ha^{-1} while the potential wheat yield is around 7-8 tones ha^{-1} in 2020 in the north-west and 4-5 tones ha^{-1} in the north-east (Anonymous, 2012). It has been estimated that at least 110 million tones of wheat will be needed by the year 2020. The major wheat producing states of India are U.P., Punjab, and Haryana with production of 30.29, 17.21 and 12.60 million tones. The first rank of U.P. in percentage share of wheat production is 32.26 the second is Punjab (18.33%) and third is Haryana (13.50%) but productivity is maximum in the Punjab (Anonymous, 2012). Based on the agro-climatic conditions and varying agro ecological production conditions, the country is broadly divided into six wheat growing zones. The maximum wheat growing duration is in Northern Hill Zone and minimum in Peninsular Zone. In India it is grown mostly in the plains where as in the hills it is cultivated in mountainous region of North India under a wide range of climatic condition in Kashmir and other mountainous region to semi arid regions with mild to severe winter. Wheat is consumed mostly in the form of bread as "chapati". Wheat straw is used for feeding the cattle. Wheat contains more protein than other cereals and has a relatively high content of Niacin and Thiamine. It is basically concerned in providing the characteristics substance "glutin" which is very essential for bakers. Several constraints *viz*, delayed sowing, continuity of canal water irrigation, and availability of fertilizers according to need and infestation of weed affect wheat productivity adversely. Wheat crop infested with number of weed namely *Phalaris minor, Chenopodium album, Cyprus rotundus, Mililotus alba, Anagallis arvensis, Convolvulus arvensis etc. Phalaris minor* Linn (canary grass*) and Avena fatua* (wild oat) are primary concern in large area of North-western plain zone. *Chenopodium album* is prominent weed in wheat among broad leaved weeds. About 37% yield losses due to grassy weed have been reported by Katyal *et al* (1980). Conventional method of weed removal i.e. hand weeding is prevalent in different part of country. However due to unavailability of adequate labor and their high charges, weeding operation is often delayed, secondary hand weeding has been proved ineffective because of morphological similarity of Phalaris and wheat plant, particularly in initial stage of growth. In this view, herbicidal application for controlling *Phalaris minor* has been found effective and economical in wheat. The main objective of any experiment to get maximum income with minimum cost. With this aim, the different combination of herbicides used for the purpose of increasing water use efficiency, photosynthesis and dry matter accumulation. It leads to better growth and yield without increase in cost of production. Keeping these facts into consideration the present study was therefore, evaluated the response of herbicides on yield and economics of wheat.

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MATERIALS AND METHODS

The present investigation was conducted in Students Instructional Farm at C.S. Azad University of Agriculture and Technology, Kanpur (U.P.) during *Rabi* season of 2012-13. The experimental farm falls under the Indo-Gangetic alluvial tract and irrigated by tube well. Geographically, Kanpur is situated in the central part of U.P. and subtropical tract of North India between latitude ranging from $25^0 56'$ to $28^0 58'$ North and longitude $79^0 31'$ to $80^0 34'$ East and is located on an elevation of about 125.9 meters above mean sea level in gangetic plain. The Wheat variety HUW 234 was used in the experian The experimental soil was sandy loam with pH 8. It was low in available organic carbon (0.45%) and low in available nitrogen (177 kg/ha) medium available potassium (160 kg/ha) and low in available phosphorus (19.5 kg/ha). The said experiment was laid out in randomized block design consisted 14 treatments and 3 replications. The 100% recommended NPK (150-60-40 kg/ha) was applied to wheat. However, the experimental crop was sown using 100 kg seed/ha with a row to row spacing of 20 cm apart. The detail of treatments were: $\mathbf{T_1}$: sulfosulfuron (25g a.i. / ha),$\mathbf{T_2}$: Carfentrazone (20g a.i./ ha),$\mathbf{T_3}$: sulfosulfuron (25g a.i. / ha) + Carfentrazon (20g a.i./ha), $\mathbf{T_4}$: sulfosulfuron (25g a.i. / ha) + Carfentrazon (15g a.i./ha),$\mathbf{T_5}$: sulfosulfuron (25g a.i. / ha) + Carfentrazon (10g a.i./ha),$\mathbf{T_6}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (20g a.i./ha),$\mathbf{T_7}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (15g a.i./ha),$\mathbf{T_8}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (10g a.i./ha),$\mathbf{T_9}$: Clodinafop (60g a.i./ ha),$\mathbf{T_{10}}$: Metsulfuron (4g a.i./ha),$\mathbf{T_{11}}$: Clodinafop (60g a.i./ha) fb Metsulfuron (4g a.i./ha),$\mathbf{T_{12}}$: sulfosulfuron (25g a.i. / ha) fb Metsulfuron (4g a.i./ha),$\mathbf{T_{13}}$: Twice hand weeding (30 and 60 DAS), $\mathbf{T_{14}}$: Weedy check .Cost of production for all the treatment was worked out on the basis of the prevailing input and market price of the produce in 2012-13.

RESULTS AND DISCUSSION

Yield: The data pertaining to grain and straw yield varied significantly due to different herbicide and herbicidal combination. Unweeded plot recorded minimum values. Clodinafop (60g a.i. /ha) and Metsulfuron (4g a.i. /ha) treatment plot which recorded significantly lesser grain and straw yield than other treatment. Among twice hand weeding plot recorded significantly higher grain as well as straw yield, followed by sulfosulfuron (25g a.i. /ha) + Carfentrazon (15g a.i. /ha) and sulfosulfuron (25g a.i. /ha) fb Carfentrazon (15g a.i. /ha) respectively, sprayed plots (Table 1). In manual weeding *Phalaris minor* weed plants escaped because of morphological similarly of excelled all the herbicidal treatments on growth and yield attributing characters and finally the grain yield. The possible reason to manual weeding would be attributed to airation and increasing the availability of nutrients created by the weedy operation through khurpi. This enabled to utilize more nutrients by the crop. However, carfentrazon-ethyl alone demonstrated satisfactory control of *Phalaris minor* and broad leaf weeds. Tank mixture of sulfosulfuron with carfentrazon-ethyl (25 + 15gai/ha) established its superiority over its sole application in respect of reducing complex weed flora in wheat crop which resulted increase in growth and yield attributes ultimately yield was increased. These results support the finding of Yadav *et al.* (2009).

Table-1: Effect of weed control treatments on yield and economics of wheat

Treatments	Stover yield (q/ha)	Seed yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	Benefit-cost ratio
$\mathbf{T_1}$	**57.69**	**45.28**	25064	80899	54425	2.22
$\mathbf{T_2}$	56.45	45.72	24880	80943	56063	2.25
$\mathbf{T_3}$	56.44	46.16	25379	81556	56177	2.21
$\mathbf{T_4}$	56.83	46.65	24840	81359	56519	2.24
$\mathbf{T_5}$	58.69	46.27	25324	82385	57061	2.25
$\mathbf{T_6}$	55.99	46.40	25861	81757	55896	2.16
$\mathbf{T_7}$	55.60	46.50	26065	81780	55715	2.13
$\mathbf{T_8}$	58.80	45.90	25874	81900	56026	2.16
$\mathbf{T_9}$	51.80	44.10	24865	77280	52415	2.10
$\mathbf{T_{10}}$	57.04	45.65	25277	81022	55745	2.20
$\mathbf{T_{11}}$	56.94	45.25	24807	80432	55625	2.24
$\mathbf{T_{12}}$	56.15	45.30	25737	80265	54528	2.11
$\mathbf{T_{13}}$	57.65	47.65	29000	84005	55005	1.89
$\mathbf{T_{14}}$	56.29	40.50	24800	73569	48769	1.66
SEM±	0.039	1.322	31.271	25.919	16.042	0.031
C.D. (0.05)	0.080	2.717	64.633	53.573	33.158	0.064

$\mathbf{T_1}$: sulfosulfuron (25g a.i. / ha),$\mathbf{T_2}$: Carfentrazone (20g a.i./ ha),$\mathbf{T_3}$: sulfosulfuron (25g a.i. / ha) + Car fentrazon (20g a.i./ha), $\mathbf{T_4}$: sulfosulfuron (25g a.i. / ha) + Carfentrazon (15g a.i./ha),$\mathbf{T_5}$: sulfosulfuron (25g a.i. / ha) + Carfentrazon (10g a.i./ha),$\mathbf{T_6}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (20g a.i./ha),$\mathbf{T_7}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (15g a.i./ha),$\mathbf{T_8}$: sulfosulfuron (25g a.i. / ha) fb Carfentrazon (10g a.i./ha),$\mathbf{T_9}$: Clodinafop (60g a.i./ ha),$\mathbf{T_{10}}$: Metsulfuron (4g a.i./ha),$\mathbf{T_{11}}$: Clodinafop (60g a.i./ha) fb Metsulfuron (4g a.i./ha),$\mathbf{T_{12}}$: sulfosulfuron (25g a.i. / ha) fb Metsulfuron (4g a.i./ha),$\mathbf{T_{13}}$: Twice hand weeding (30 and 60 DAS), $\mathbf{T_{14}}$: Weedy check

Economics: The twice hand weeding plot provided maximum grain yield (47.65 q/ha) but due to higher weeding cost incurred in hand weeding the net income (Rs 5505/ha). The higher net income (Rs 57061/ha) and B:C ratio (2.25) were found with the application sulfosulfuron (25g a.i. / ha) + Carfentrazon (10g a.i./ha)followed by fb application ofsulfosulfuron (25g a.i. / ha) with carfentrazon-ethyl (15g ai/ha) net income (Rs 56519/ha) and B : C ratios (2.24).

It may be concluded that among the sole application of herbicides, sulfosulfuron and carfentrazon-ethyl did not differed significantly from each other in respect of grain and straw yields but these obtained significantly higher grain and straw yield in sole application of metsulfuron-methyl and clodinafop. The higher net income (Rs 57061/ ha) and B:C ratio (2.25) were found with the application of sulfosulfuron (25g a.i. / ha) + Carfentrazon (10g a.i./ ha) followed by application of sulfosulfuron (25g a.i. / ha) and carfentrazon-ethyl (15g ai/ha) net income (Rs 56519/ha) and B : C ratios (2.24).

REFERENCES

Anonymous, (2012). Agriculture Statistics at a Glance. Directorate of Economics and Statistics, Department of Agriculture and Cooperative, Ministry of Agriculture, Govt. of India, New Delhi.

Katyal, S. K., Singh, V. and Bhan, V. M. (1980). Study on performance of new herbicide for control of weeds in wheat under farmers ISWS/QUAT. Weed Science Conf. Bhuwneshwar.

Yadav, D. B. Punia, S.S. Yadav, A. and Lal, R. (2009) Compatibility of sulfosulfuron with corfentrazone- ethyl for the control of complex weed flora in wheat. *Indian Journal of Weed Science,* **41**(3/4): 146-149.