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Effect of fertility levels and weed management practices on yield attribute and yield of wheat crop (*Triticum aestivum* L.)

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Abstract
The field experiment was conducted during the *rabi* season of 2018–19 and 2019–20 at Agronomy Research Farm of Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Ayodhya, Uttar Pradesh to assess the effect of fertility levels and weed management practices on yield attribute and yield of wheat crop (*Triticum aestivum* L.) The soil of experimental field was silty loam in texture, low in organic carbon and available nitrogen, medium in available phosphorus and available potassium with near to neutral in reaction. There were two factor, 3 fertility levels (100 % DRF through inorganic fertilizer, 75 % RDF through inorganic + 25 % N through FYM and 50 % RDF through inorganic + 50 % N through FYM) and 5 weed control practices (Sulfosulfuron + Metsulfuron @ 30 g a.i. + 4 g a.i. ha^{-1}, Clodinafop + Metsulfuron @ 60 g a.i. + 4 g a.i. ha^{-1}, Mesosulfuron + Iodosulfuron @ 12.2 g a.i + 2.2 g a.i. ha^{-1}, weed free upto 60 Days and Weedy check. The treatments were replicated three times with fifteen treatment combination in a factorial randomized block design. Among the treatments combination 100 % RDF (NPK- 150:60:40) with weed free upto 60 DAS was recorded maximum value of growth and yield attributes e. i. initial plant population m^{-2}, number of tillers m^{-2}, plant height (cm), dry matter accumulation (g m^{-2}), number of effective tillers m^{-2}, length of spike (cm), number of spikelets $spke^{-1}$, number of grains $spike^{-1}$ and Test weight. Thus, it may be concluded that application of 100% recommended dose of NPK ha^{-1} with weed free upto 60 DAS as proved most superior to other treatment with respect to higher yield attributes and yield of wheat crop.

Keywords: fertility levels, weed management, wheat, growth and yield

Introduction
Among the food-grain wheat is one of the most important stable foods and prime cereal crop which was grown in an area of 30 m ha with the production 99.70 million tonnes and average productivity 33.71 q ha^{-1} in India, (Ramadas *et al.* 2019) [5]. It is grown under a wide range of climates and soils but wheat is best adapted to temperate regions with rainfall between 30 and 90 cm.

Fertility management is an important parameter for optimizing the productivity of wheat crop because wheat crop is highly responsive to applied nutrient through various sources. Continuous use of inorganic fertilizers leads to deterioration in soil chemical, physical, and biological properties, and soil health. The negative impacts of chemical fertilizers, coupled with escalating prices, have led to growing interests in the use of organic fertilizers as a source of nutrients. In general, the application of organic amendments such as crop residues and/or farmyard manure increases significantly soil organic carbon (Yadav *et al.*, 2000) [10]. Organic materials such as FYM have traditionally been used by wheat farmers. FYM supplies all major nutrients (N, P, K, Ca, Mg, S,) necessary for plant growth, as well as micronutrients (Fe, Mn, Cu and Zn). FYM improves soil physical, chemical and biological properties. Improvement in the soil structure due to FYM application leads to a better environment for root development. FYM also improves soil water holding capacity. The fact that the use of organic fertilizer improves soil structure, nutrient exchange and maintain soil health. The use of FYM alone as a substitute to inorganic fertilizer is not enough to maintain the present levels of wheat crop productivity. Therefore, integrated nutrient management in which both organic manures and inorganic fertilizers are used simultaneously is the most effective method to maintain a healthy and sustainably productive soil.

Population of weeds is a major barrier responsible for low productivity of wheat because, weed competes with the crop for moisture, nutrients, space, light etc. Moreover, they increase production cost, decrease yield of the crop, harbours insects and plant diseases, decrease quality of farm produce and reduce values of the land. The weed in India are causing

substantial losses to agriculture production and the annual losses in terms of money come to the Rs.1650 crores (Joshi, 2002) [2]. In wheat, yield losses due to weeds may range from 10 to 82 percent depending upon the density and species of weed, duration of infestation and competing ability of crop plants under different agro-ecological conditions (Rao, 1994) [7]. In agriculture weed causes more damage compared to insects, pests and diseases but due to hidden loss by weed in crop production, it has not drawn much attention of agriculturists (Rao, 2010) [6]. Wheat is generally infested by both grassy weeds *viz.*, *Phalaris minor* and *Avena* species and broad leaf weeds i.e. *Chenopodium album*, *Fumaria parviflora*, *Melilotus indica*, *Anagalles arvensis*, *Lathyrus aphaca* and *Vicia sativa* (Malik *et al.*, 1989) [3].

Wheat is sown at very narrow row spacing. Therefore, cultural methods of weed control could not be performed and manual control becomes unaffordable. Because, weed control through manual methods is time consuming and tedious and become very costly due to unavailability of labour in peak period and labour charges are also high due to shifting of agricultural labours to industries for better and assured wages. Day by day, weed control through herbicides is increasing and popularizing among farmers. Hence, use of herbicides popularized particularly in irrigated wheat crop. The farmers are not aware of proper dose of herbicides, time of application, economics and their persistence in the soil. Several selective herbicides are available in the market, which are treated to be effective for particular crop. The farmers have to make decisions about the selection of right type of herbicides. Several grassy and broadleaf weeds infect wheat causing severe competition for essential nutrient, moisture and space thus reducing wheat yield and also its quality significantly (Singh *et al.*, 1995; Gupta *et al.*, 2011) [8, 1].

Keeping these facts in view, the present investigation was under taken to study the effect of fertility levels and weed management practices on yield attribute and yield of wheat crop (*Triticum aestivum* L.).

Materials and methods

An experiment was conducted during the *rabi* season of 2018–19 and 2019–20 at Agronomy Research Farm of Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Ayodhya, Uttar Pradesh. Soil was silty loam in texture having pH 8.30 and 8.20, organic carbon 0.33 and 0.32% and available N, P and K were 137.60 and 136.82; 15.20 and 14.70; and 249.30 and 248.32 kg ha^{-1} respectively during both the year of experimentation. The treatment comprised of three fertility levels 100 % DRF through inorganic fertilizer, 75 % RDF through inorganic + 25 % N through FYM and 50 % RDF through inorganic + 50 % N through FYM and 5 weed control practices Sulfosulfuron + Metsulfuron @ 30 g a.i. + 4 g a.i. ha^{-1}, Clodinafop + Metsulfuron @ 60 g a.i. + 4 g a.i. ha^{-1}, Mesosulfuron + Iodosulfuron @ 12.2 g a.i + 2.2 g a.i. ha^{-1}, weed free upto 60 Days and Weedy check, during both the years.

The experiment was laid out in a factorial randomized block design with three replications and fifteen treatment combinations. A promising wheat variety PBW-154 was sown on 20 November and 24 November during 2018-19 and 2019-20, respectively. Farmyard manure was applied on the individual plot as per treatments basis after pre-sowing irrigation and before the final preparatory tillage. The experimental crop was uniformly fertilized with 150 kg N, 60 kg P_2O_5 and 40 kg K_2O ha^{-1} in the form of urea, diammonium phosphate and muriate of potash (MOP), respectively as per treatment basis individually. Half dose of nitrogen, full dose of P_2O_5 and MOP was applied as basal dressing. Remaining half dose of nitrogen was top-dressed in two equal splits at CRI stage and tillering stage to ensure good growth of the crop.

First irrigation was given at crown root initial stage after that crop was irrigated 20-25 days interval to avoid any kind of water stress. Herbicides were applied as post emergence *i.e.* 35 DAS with the help of hand-operated Knapsack sprayer, fitted with flat fan nozzle with 250 litter ha^{-1}water. First hand weeding was done at 20 and second at 40 DAS.

Results and Discussion

Yield attributes

The yield of a crop depends upon the yield attributes *viz*., number of effective tillers, spikelets $spike^{-1}$, grains $spike^{-1}$, length of spike and test weight (1000 grain weight). Any factor affecting their parameters ultimately affects the biological and economic yield of a crop. Source components may be number of tillers, plant height, leaf area index and dry matter of the plants before anthesis and sink components *viz*., number of effective $tillers^{-2}$, no. of spike m^{-2}, number of spikelets $spike^{-1}$, length of spike, no. of grain $spike^{-1}$ and test weight. Final yield of wheat is the function of no. of spike m^{-2}, no. of grain $spike^{-1}$ and test weight.

The yield contributing characters (Table-1) *viz.* number of effective tillers m^{-2}, number of spikelets ear^{-1} and 1000-grain weight was significantly influenced by fertility levels except length of spike (cm) and number of grains ear^{-1} and were increased with increase infertility levels during both the year of experiments. The maximum values of all these characters were observed with 100% RDF – through inorganic fertilizer which was at par with 75% RDF – through inorganic fertilizer + 25% N through FYM except test weight during first year of experiments and superior over 50% RDF – through inorganic fertilizer + 50% N through FYM. This might be due to enhanced tillering, photosynthetic area and increased in sink size due to availability of higher quantity of nitrogen at higher level. A similar research finding was reported by Nehra *et al.* (2001) [4]. All weed management practices produced significantly higher number of effective tillers m^{-2}, number of spikelets ear^{-1}, number of grains ear^{-1} and 1000-grain over weedy check while length of spike was found non-significant but numerically higher with weed management practices over weedy check. Weed free upto 60 days produce maximum values of all these characters being at par with Sulfosulfuron + Metsulfuron @ (30 g a.i. + 4 g a.i. ha^{-1}), - Clodinafop + Metsulfuron @ (60 g a.i. + 4 g a.i. ha^{-1}) and superior over weedy check. Similar findings were reported by Tomar and Vivek (2003) [9].

In conclusion, Based on two year experiments conducted at Agronomy Research Farm of Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Ayodhya, (U.P.). Significantly higher grain, straw and biological yield was produced with the application of 100 % RDF being at par with 75% RDF – through inorganic fertilizer + 25% N through FYM except grain and biological yield during first and second year respectively. Than its lower level of 50% RDF – through inorganic fertilizer + 50% N through FYM. Among weed management practices Sulfosulfuron + Metsulfuron @ (30 g a.i. + 4 g a.i. ha^{-1}) was significantly superior over Clodinafop + Metsulfuron @ (60 g a.i. + 4 g a.i. ha^{-1}) and Mesosulfuron +

Iodosulfuron @ (12.2 g a.i + 2.2 g a.i. ha^{-1}). Weed free upto 60 days produce maximum grain, straw and biological yield which was at par with Sulfosulfuron + Metsulfuron @ (30 g a.i. + 4 g a.i. ha^{-1}) and minimum yield was produced with weedy check. It had been concluded that sowing with 100 % RDF and application of herbicide Sulfosulfuron + Metsulfuron @ (30 g a.i. + 4 g a.i. ha^{-1}) found better for higher yield of wheat.

Table 1: Effect of different treatments on yield contributing characters of the wheat crop

Treatments	No. of effective tillers (m^{-2})		Length of spike (cm)		Number of spikelets ear^{-1}		Number of grains $spike^{-1}$		Test weight (g)	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Fertility levels										
F_1 - 100% RDF – through inorganic fertilizer	257.80	255.22	10.30	10.50	16.16	15.96	42.60	43.46	40.21	40.98
F_2 - 75% RDF – through inorganic fertilizer + 25% N through FYM	257.56	255.02	10.10	10.30	16.12	15.84	42.40	43.26	38.30	39.07
F_3 - 50% RDF – through inorganic fertilizer + 50% N through FYM	237.24	234.90	9.90	10.10	14.80	14.60	41.92	42.70	36.68	37.44
SEm±	4.686	4.730	0.151	0.140	0.299	0.235	0.672	0.638	0.574	0.743
CD at 5%	13.575	13.703	NS	NS	0.866	0.682	NS	NS	1.664	2.153
Weed management										
W_1 - Sulfosulfuron + Metsulfuron @ 30 g a.i. + 4 g a. i. ha^{-1}	260.23	257.63	10.30	10.50	16.33	16.07	44.43	45.27	40.19	41.00
W_2 - Clodinafop + Metsulfuron @ 60 g a.i. + 4 g a. i. ha^{-1}	251.33	248.80	10.10	10.30	15.73	15.47	43.80	44.67	38.30	39.08
W_3 - Mesosulfuron + Iodosulfuron @ 12.2 g a.i + 2.2 g a.i. ha^{-1}	250.53	248.07	10.00	10.20	15.67	15.47	43.40	44.27	37.28	38.03
W_4 - Weed free upto 60 DAS	261.30	258.73	10.40	10.60	16.33	16.13	44.50	45.37	40.40	41.20
W_5 - Weedy check	230.93	228.67	9.70	9.90	14.40	14.20	35.40	36.13	35.80	36.50
SEm±	6.050	6.107	0.195	0.180	0.386	0.304	0.867	0.824	0.741	0.960
CD at 5%	17.526	17.690	NS	NS	1.118	0.881	2.512	2.387	2.148	2.780

Table 2: Effect of different treatments on grain, straw, biological yield and harvest index of the wheat crop

Treatments	Grain yield (q ha^{-1})		Straw yield (q ha^{-1})		Biological yield (q ha^{-1})		Harvest index	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Fertility levels								
F_1 - 100% RDF – through inorganic fertilizer	44.50	45.83	64.32	65.15	108.82	110.98	40.81	41.21
F_2 - 75% RDF – through inorganic fertilizer + 25% N through FYM	42.20	43.47	61.59	62.38	103.79	105.85	40.55	40.96
F_3 - 50% RDF – through inorganic fertilizer + 50% N through FYM	36.76	37.86	54.70	55.41	91.46	93.27	40.11	40.51
SEm±	0.740	0.912	0.968	1.200	2.122	1.649	0.614	0.727
CD at 5%	2.144	2.642	2.803	3.476	6.146	4.778	NS	NS
Weed management								
W_1 - Sulfosulfuron + Metsulfuron @ 30 g a.i. + 4 g a.i. ha^{-1}	46.50	47.89	66.86	67.73	113.36	115.62	41.00	41.40
W_2 - Clodinafop + Metsulfuron @ 60 g a.i. + 4 g a.i. ha^{-1}	42.27	43.53	61.61	62.42	103.88	105.95	40.67	41.07
W_3 - Mesosulfuron + Iodosulfuron @ 12.2 g a.i + 2.2 g a.i. ha^{-1}	40.67	41.89	59.80	60.56	100.47	102.45	40.46	40.87
W_4 - Weed free upto 60 DAS	47.03	48.45	67.45	68.31	114.48	116.76	41.06	41.48
W_5 - Weedy check	29.30	30.18	45.29	45.88	74.59	76.06	39.27	39.67
SEm±	0.955	1.177	1.249	1.549	2.739	2.129	0.793	0.938
CD at 5%	2.768	3.411	3.619	4.487	7.935	6.169	NS	NS

References

1. Gupta A, Aggarwal A, Mangla C, Kumar A, Tanwar A. Effect of herbicides *fenoxaprop-p-ethyl* and 2, 4-D ethyl-ester on soil *mycoflora* including VAM fungi in wheat crop. Ind. J Weed Sci 2011;43(1&2):32-40.
2. Joshi NC. Manual of weed control Research publication 7615-B, East Azad nagar, Delhi-110 051 2002.
3. Malik RS, Malik RK, Panwar RS, Bhan VM. The influence of surfactant on the performance of grass herbicides applied under complex weed flora situation in wheat. Ind. J Agro 1989;34:317-321.
4. Nehra AS, Hooda IS, Singh KP. Effect of integrated nutrient management on growth and yield of wheat (*Triticum aestivum*). Ind. J Agro 2001;46:112-117.
5. Ramadas S, Kiran TMK, Singh GP. Wheat production in India: Trends and prospects. Recent advances in grain crop reaserch 2019, 1-16.
6. Rao AN, Nagmani A. Integrated weed management in India-Revisited. Ind. J Weed Sci 2010;42(3&4):123-135.
7. Rao VS. Principles of weed science, oxford and IBN publishing Co. Pvt. Ltd.; New Delhi 1994, 540.
8. Singh S, Malik RK, Panwar RS, Balyan RS. Infleunce of sowing time on winter wild oat control in wheat (*Triticum aestivum*) with isoproturon. Weed Sci 1995;43:370-378.
9. Tomar SS, Vivek. Efficacy of herbicides on *Phalaris minor* and wheat yield. Ind. J Weed Sci 2003;35(3&4):255-256.
10. Yadav RL, Dwivedi BS, Prasad K, Tomar OK, Shurpali NJ, Pandey PS. Yield trends and changes in soil organic C and available NPK in a long-term rice-wheat system under integrated use of manures and fertilizers. Field Crops Research 2000;68:219-246.