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Effect of fertility levels and weed management practices on growth and yield attributes of wheat (*Triticum aestivum* L.) under irrigated condition

Hariom Mishra, Ravi Shanker Singh, Ankit Gupta, Vineet Kumar Shukla and Deepraj Verma

Abstract
An experiment on "Effect of fertility levels and weed management practices on yield and economics of wheat (*Triticum aestivum* L.) productivity under irrigated condition". was conducted at Agronomy Research Farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) during *Rabi* season of 2019-20. The experiment was laid out in Factorial Randomized block design with three replications keeping four fertility levels viz., 100% RDF-IF (150kg/h), 125% RDF-IF (25% through FYM), 100% RDF + 25%RDN through FYM, 75%RDF-IF+25%RDN through FYM and four weed management practices Weedy Check, Weed free up to 60 days, Sulfosulfuron @ 30g/h + Carfentazole @ 20g/h, Clodinafop propagynol (60g) + metsulfuron (4g) = (64g/h). Results revealed that among fertility levels application of 125% RDF-IF (25% through FYM) and in weed management practices weed free followed by Clodinafop propagynol (60g) + metsulfuron (4g) = (64g/h) a.i ha^{-1} proved as superior than other treatments with respect to higher crop growth and yield and yield attributes.

Keywords: weed management, wheat, growth parameter and yield attributes

Introduction
Wheat (*Triticum aestivum* L.) is the world's most widely cultivated food crop. It is eaten in various forms by more than one thousand million human beings in the world. In India it is second important staple food crop, rice being the first. Nutrient utilization efficiency is extremely low in India. Weed crop competition is one of the major causes of low nutrient use efficiency including incorrect dose, time and technique of fertilizer application, insufficient soil moisture state, and weed infestation imbalanced use of chemical fertilizer has led to think about the use of organic manures in intensively growing areas for sustainable production system. *Phalaris minor* was successfully controlled with isoproturon. However some resistant biotypes have emerged, possibly as result of continued use, particularly in Punjab, Haryana, Uttarakhand, and a few pockets in western Uttar Pradesh (Singh and Singh 2002) [1]. Considering this facts in view, some new herbicide molecules individually and in combination are to be tested to study their bio-efficiency in control *Phalaris minor* and other weeds in wheat. For effective management of complex weed flora, mixture of more than one herbicide is required. Herbicide mixtures increase weed control efficacy against complex weed flora (Singh *et al*., 2011) [2]. Keeping the above fact in view the present investigation of fertility level and weed management on yield attributes and growth of wheat

Materials and Methods
The experiment was conducted at the Agronomy Research Farm, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.), 26.47^0N latitude, 82.12^0E longitude and an altitude of 113 meters above mean sea level during winter (Rabi) season 2019-20. The experiment was laid out under factorial randomized block design with three replications. Soil texture was silty loam. Organic carbon was found 0.32%, whereas value of available N, available P and available K was 180 $kgha^{-1}$, 14.7 $kgha^{-1}$ and 280.5 ha^{-1}. Soil having value of 8.5 result of chemical analysis given in indicated that the soil was low in nitrogen, organic carbon, phosphorus and rich in potassium. There action of soil was slightly alkaline. Treatment under fertility levels were 100% RDF-IF (150kg/h), 125% RDF-IF (25% through FYM), 100% RDF + 25%RDN through FYM and 75%RDF-IF+25%RDN through

FYM while weed management practices comprises Clodinafop propagynol (60g) + metsulfuron (4g) =(64g/h), Sulfosulfuron @ 30g/h + Carfentazole @ 20g/h, Weed free up to 60 days and Weedy Check. All herbicide were applied at 25 Days after sowing with the help of knapsack sprayer having spray volume of 700 liter/ha. Plant height (cm) at 30, 60, 90 DAS and at harvest, number of tillers/m^2 at 30, 60, 90 DAS and at harvest, dry matter accumulation/m^2 (g) at 30, 60, 90 DAS and at harvest, leaf Area Index at 30, 60, 90 DAS. The data recorded on different observations were analyzed statistically by using the analysis of variance (ANOVA) technique assuggested by Gomez and Gomez (1984) [3].

Result and Discussion

Data related to plant height indicate that 125% RDF-IF (25% through FYM) have maximum plant height which was at par with 100% RDF + 25%RDN through FYM. The minimum plant height was obtained 75%RDF-IF+25%RDN through FYM. Application of the 125% RDF-IF (25% through FYM) having maximum LAI, at par with 100% RDF + 25%RDN through FYM and significantly higher leaf area index over rest fertility. Application of 125% RDF-IF (25% through FYM) was found significantly higher dry matter accumulation over rest fertility levels. Lowest dry matter accumulation was found with 75%RDF-IF+25%RDN through FYM at all stages of crop growth. Increasing rate of fertility levels application from 75% to 125% recommended dose of Fertilizer ha^{-1} significantly enhanced the plant population, growth parameter viz. height, leaf area index and dry matter accumulation. Plant height, leaf area index and dry matter accumulation increased significantly with higher fertility levels {125% RDF-IF (25% through FYM)} when smothering of weed density and decrease crop weed competition**.** These results were in close proximity with the finding of Sarvade *et al.* (2014) [5]. Pandey *et al.* (2006) [6] reported that application of 125% of the recommended dose of fertilizer out of which recorded significantly higher plant height, leaf area index and dry matter.

The maximum plant height was obtained in weed free which was at par with Clodinafop propagynol + metsulfuron and minimum plant height was obtained with weedy check. weed management practices affected significantly the number of tiller (m^2) in which data revealed that weed free produces more number of tillers over weedy check and at par with all rest of the treatments. Dry matter accumulation was recorded significantly higher under weed free over rest weed management practices. While between herbicides Clodinafop propagynol (60g) + metsulfuron (4g) = (64g/h) accumulates maximum dry matter. Increased infestation of weeds has negative effect on the crop growth which will be reflected in terms of dry matter and which will leads to poor resource utilization *i.e*. nutrient uptake, particularly during the critical period of crop weed competition *i.e*. 30 - 50 DAS (Chaudhary *et al.* 2008) [7]. Application of Clodinafop propagynol (60g) + metsulfuron(4g) = (64g/h) ha^{-1} was recorded significantly higher plant height, leaf area index and dry matter accumulation due to reduced crop weed competition, effectively suppressed predominant weeds (both on density and biomass) throughout crop growth period. The maximum number of tillers and plant dry matter were recorded in Clodinafop propagynol (60g) + metsulfuron (4g) = (64g/h) followed by Sulfosulfuron @ 30g/h + Carfentazole @ 20g/h(Shahida *et al.* 2008) [8]. Application of Clodinafop propagynol (60g) +metsulfuron (4g) = (64g/h) recorded significantly tallest plant height, higher number of tiller and plant dry matter accumulation (Meena and Singh, 2011) [9]

Table 1: Effect of fertility levels and weed management practices on growth of wheat of wheat

Treatments	Plant height	Tillers (m^{-2})	Dry matter accumulation	Leaf area index
Fertility levels				
100% RDF-IF (150kg/h)	67.59	286.46	1124.60	4.71
125% RDF-IF (25% through FYM)	75.05	292.83	1190.13	5.02
100% RDF + 25%RDN through FYM	74.47	279.70	1156.50	4.80
75%RDF-IF+25%RDN through FYM	68.68	288.40	1077.93	4.62
SEm ±	1.33	6.03	23.35	0.07
CD at 5%	3.86	NS	67.44	0.22
Weed Management:				
Clodinafop propagynol(60g) +metsulfuron(4g)=(64g/h)	74.87	303.52	1216.18	5.07
Sulfosulfuron @ 30g/h + Carfentazole @ 20g/h	71.84	298.29	1170.83	5.03
Weed Free (Up to 60 days)	77.31	305.06	1268.13	5.29
Weedy check	67.59	261.86	972.93	4.04
SEm ±	1.33	6.03	23.35	0.07
CD at 5%	3.86	17.44	67.44	0.22

Yield Attributes

When increasing of fertility levels then increased the length of spike, grain $spike^{-1}$, grain weight $spike^{-1}$. Application 125% recommended dose of fertilizer out of which 25% through FYM was found significantly higher length of spike over 75%RDF-IF+25%RDN through FYM and at par over rest fertility levels. All weed management practices had significant effect on yield attributes, maximum number of spike m^{-2}, length of spike (cm), grain $spike^{-1}$, grain weight $spike^{-1}$ and test weight (g) as recorded under weed free which was significantly higher than weedy check while at par with rest of the weed management practices. Between herbicide Clodinafop propagynol + metsulfuron shows superior performance on yield attributes. These results were in close proximity with the finding of Malghani *et al.* (2010) [10]. Increasing fertilizer dose from 75 to 100% of recommended dose significantly increased yield attributes, such as spikes m^{-2}, grain per spike, spike length, test weight (Gupta *et al.* 2007) [11].

Table 2: Effect of fertility levels and weed management practices on yield attributes of wheat of wheat

Treatments	Number of spike m^{-2}	Length of spike (cm)	Grain $spike^{-1}$	Grain weight $spike^{-1}$	Test weight (g)
Fertility levels:					
100% RDF-IF (150kg/h)	277.73	10.40	41.47	1.62	39.19
125% RDF-IF (25% through FYM)	285.58	10.82	42.10	1.67	39.73
100% RDF + 25%RDN through FYM	283.87	10.63	41.57	1.64	39.53
75%RDF-IF+25%RDN through FYM	271.16	10.20	40.73	1.59	38.93
SEm ±	4.32	0.15	0.33	0.04	0.34
CD at 5%	NS	0.45	0.97	0.08	NS
Weed Management:					
Clodinafop propagynol(60g) +metsulfuron(4g)=(64g/h)	292.56	10.83	42.45	1.68	39.50
Sulfosulfuron @ 30g/h + Carfentazole @ 20g/h	290.23	10.60	41.38	1.62	39.20
Weed Free (Up to 60 days)	291.32	11.04	43.98	1.76	40.00
Weedy check	257.21	9.90	39.05	1.52	38.80
SEm ±	4.32	0.15	0.33	0.04	0.34
CD at 5%	12.47	0.45	0.97	0.08	1.00

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