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Effect of Varieties and Irrigation Methods on Growth and Yield of Wheat (*Triticum aestivum* L.)

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Abstract **– The trial was conducted to evaluation the effect of effect of different wheat varieties with irrigation method in wheat crop under semi-arid conditions, field experiments was carried out in 2018-19 growing season. Experimental units were arranged in *Factorial Randomized Block Design* (RBD) with three replications. fresh and dry weight and number of functional tillers plant^{-1} were found highest with variety HUW 234 at 90 days stage of crop, which comes under vegetative growth phase after that slow increase were observed upto harvest stage, this may be due to the varietal characteristics under prevailing conditions. Grain yield (q ha^{-1}) and straw yield (q ha^{-1}) were recorded highest with variety. HUW-234 and check basin irrigation method. The increase in total produce grain yield and straw yield are resultant of growth and attributing characters.**

Keywords **– Wheat, Varieties and Irrigation Method.**

I. INTRODUCTION

Wheat (*Triticum aestivum L.*) is the most widely cultivated food crop in India after rice as a Rabi season (winter) crop, wheat plays a vital role in stabilizing the food grain production in the county. It is mostly eaten in the form of chapaties, poories, daliya, halwa, bread, flex, biscuits and cakes. It furnishes the bread of life for most of the people in the country. Wheat grain have importance place in Indian economy as well as daily human diet.

Wheat grain contains 9-18 per-cent moisture, 12 per-cent protein, 2.0-2.5 per-cent cellulose, 1.5-2.5 per-cent fat, 1.5-2.0 per-cent minerals and 62-71 per-cent carbohydrate. All wheat whether wild or cultivated belongs to the genus triticum of the family Poaceae. The cultivated wheat (*Triticum aestivum* L.) is hexaploid (2n = 42). In India, wheat is the second most important cereal crop after rice covering an area of 29.58 million hectares and the total production of 99.70 million tonnes with the productivity of 3371 kg/hectare during 2017-2018 (Agricultural statistics at a glance 2018). India is the second largest wheat producer and consumer after China.

In India UP, Punjab, Bihar, Rajasthan, Gujrat and Haryana are the most popular wheat growing states which solve the domestic need of Indian population. UP is one the important wheat growing state in the India with an area about 9.75 million hectare with the production of 31.88 million tonnes and productivity 3269 kgha^{-1} during 2017-2018 (Agricultural statistics at a glance 2018). The area under wheat in Bundelkhand region is 3.38 lakh hectares with the production of 7.49 lakh metric tonnes and productivity 22.10 quintal ha^{-1} (Director Agriculture Statistics and Phasal Bima, Agriculture Bhawan Lucknow).

There are a number of constraints in increasing the production of wheat like suitable variety according to agro climatic zones, quality seeds, recommended dose of nutrients, timely sowing, timely irrigation, adjustment of plant population by suitable method of sowing and weed control. As a result of extensive efforts, the area under high yielding varieties were found to increase from 1.89 million hectares in 1966-67 to 27.36 million hectares in 1998-99. Various cropping sequences like late rice-wheat, early pigeon pea-wheat, sugarcane-wheat, maize-wheat, rice-toria-wheat have pushed wheat sowing in December and January.

Although a number of wheat verities, have been developed for timely and late sowing but scientists continue working to develop newer varieties having good yield potential and better disease resistance than the old ones. Various genotypes are also developed to suit different crop sequences under different agro climatic conditions. At present a number of new genotypes have been developed by wheat scientists, therefore, it is essential to test their performance under normal and last sowing. In future population will across the billion rank and population pressure on agricultural land will increase just double. Hence to solve the above problem it is essential to increase the yield by "vertical" means (yield/unit areas/unit time). The production and productivity both will increase by adopting agro-techniques and by using high yielding improved varieties with proper management of fertilizer and irrigation to augment by increasing agricultural production under marginal and sub marginal lands by using best resources of cultivation of crops in per unit area and per unit time.

II. Materials and Method

The experiment was conducted at the Brahmanand Mahavidyalaya, Agricultural Research Farm, Post-Rath, District Hamirpur, Uttar Pradesh (India) during the winter (rabi) season of 2018-19. The soil of experimental field was 'parwa' (A category of red soil) with slightly alkaline in reaction (pH 7.6) which was low in available nitrogen (200.83 N_2O kg ha^{-1}), medium in available phosphorus (29.28 P_2O_5 kg ha^{-1}) and high in available potassium (474.16 K_2O kg ha^{-1}) and ranging 0.56% organic carbon content (Jackson, 1973). The trial was laid out in factorial randomized block design with three replications having 16 treatment combinations of four varieties i.e. HUW 234, HI 1544, WH 147, PBW 154 and four irrigation method i.e. control, check basin irrigation, flood irrigation and border strip irrigation. Nitrogen, phosphorus and Potassium were applied by urea, SSP and Muriate of Potash @ 120, 60 and 40 kg/ha. The half dose of Urea and full dose of SSP and MOP were applied at the time of sowing in furrows as basal dose and remaining half dose of nitrogen was applied after first irrigation.

III. Results and Discussion

Table 1. Growth characters influenced by treatment.

Treatment	Height of Plant (cm) at 90 DAS	Fresh Weight/Plant (g) at 90 DAS	Dry Weight/ Plant at 90 DAS	Number of Functional Tillers/Plant
Varieties				
HUW 234	84.4	120.82	23.58	6.51
HI 1544	83.00	113.79	22.17	6.01
WH 147	82.22	112.72	21.97	5.96
PBW 154	81.20	111.35	21.69	5.88
S.E.(m) ± =	0.56	1.01	0.17	0.11
C.D.@ 5% =	1.62	2.92	0.49	0.34
Methods of irrigation				
Control	78.25	108.51	21.14	5.77

Treatment	Height of Plant (cm) at 90 DAS	Fresh Weight/Plant (g) at 90 DAS	Dry Weight/ Plant at 90 DAS	Number of Functional Tillers/Plant
Check basin	87.90	121.83	23.75	6.47
Flood irrigation	84.06	116.62	22.73	6.20
Border strip	80.64	111.71	21.80	5.93
S.E.(m) ± =	0.56	1.01	0.17	0.11
C.D.@5% =	1.62	2.92	0.49	0.34

Data embodied in table number 1 show that the growth characters such as height of main shoot, fresh and dry weight and number of functional tillers plant^{-1} were found highest with variety HUW 234 at 90 days stage of crop, which comes under vegetative growth phase after that slow increase were observed upto harvest stage, this may be due to the varietal characteristics under prevailing condition. The increase in above growth parameters were due to rapid multiplication of meristematic tissues which was favoured by essential plant nutrient, water and variety itself the similar results have also been reported by ABD et al. (2012). Aslam et al. (2014). In respect of irrigation method, increase in above parameters due to the water which helps in the growth of the plants by fulfilling the transpiration demand of the plant. The results are in conformity, with those of ABD et al. (2012).

Table 2. Yield attributes and yield influenced by treatment.

Treatment	Length of Ear (cm)	Number of Grains/Ear	Straw Yield (q/ha)	Grain Yield (q/ha)
Varieties				
HUW 234	9.98	50.96	83.03	50.96
HI 1544	9.62	49.13	79.05	49.13
WH 147	9.52	48.65	78.74	48.65
PBW 154	9.39	47.99	77.65	47.99
S.E.(m) ± =	0.03	0.43	0.57	0.43
C.D.@5% =	0.09	1.25	1.66	1.25
Methods of irrigations				
Control	9.12	46.49	75.42	46.49
Check basin	10.23	52.31	82.92	52.31
Flood irrigation	9.78	50.03	82.04	50.03
Border strip	9.38	47.89	78.08	47.89
S.E.(m) ± =	0.03	0.43	0.57	0.43
C.D.@5% =	0.09	1.25	1.66	1.25

Reference to table 2 show that the yield attributing characters i.e. length of ear (cm), number of grain ear per ear were found maximum with V_1 variety. (HUW-234) followed by HI 1544, WH 147 and PBW 154, respectively. It may be due to the varietal characteristics under prevailing condition as well as proper use of growth inputs in soil. The results are in conformity with the results of Mubeen (2013), and Bin (2014). It is clear from table 2 that each increase irrigation method. Increased the yield attributes such as number of ear, day to 50% flowering, length of ear (cm), No. of grain ear^{-1}, No. of spikelets ear^{-1} weight of ear, and Test weight were found maximum with variety (HUW-234) follow by V_2, V_3 and V_4 varieties respectively. Were found to increase with I_1 (Cheek Besin methods) followed I_2, I_3 and I_0 irrigation method. The increase in yield attributes may be due to facts that increase in growth characters with the increase utilization of water in cheek basin method. The results are in agreement with these of Muhammad Soni and Lehrea (2005). Sirpurkar et al. (2008). The reference to table 2 also indicate that the grain yield (q ha^{-1}) and straw yield (q ha^{-1}) were recorded highest with variety. HUW-234. The increase in total produce grain yield and straw yield are resultant of growth and attributing characters. Similar finding have also been reported by Naeem Sarwan et al. (2010).

Table 2 indicate that the highest grain yield (q ha^{-1}) and straw yield (q ha^{-1}) were recorded highest with check basin Irrigation. The above parameters were found to increased with effective has of irrigation methods. Increase in grain and straw yield may be due to the fact that with the application of irrigation water the growth and yield attributing characters increased resulting increase in yield. The similar results also been reported by Kanwar singh et al. (2010) Yadav et al. (2010).

III. Conclusion

On the basis of the experiment conducted at the research farm of Brahmanand Post Graduate College, Rath (Hamirpur) during the Rabi season of 2018-2019 the following main conclusion can be drawn. The HUW 234 variety was found most suitable for wheat crop under existing condition of Bundelkhand region U.P. The check basin irrigation method was found most suitable for wheat crop.

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