



Research Article

YIELD AND YIELD ATTRIBUTES OF WHEAT AS INFLUENCED BY DIFFERENT SEED RATES AND GENOTYPES IN GARIYABAND DISTRICT OF CHHATTISGARH PLAINS

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Abstract- Field investigations were conducted during *Rabi* season of 2014 and 2015 to study the effect of different seeding rates on different genotypes of wheat crop when sown through seed cum fertilizer drill at farmer's field in tribal areas of Gariyaband District in Chhattisgarh. The experiment was laid out in split plot design with three replications. Three wheat varieties (HD-2864, HD-2932 and MP-3336) were tested at 5 seeding rates (100, 110, 120, 130 and 140 kg ha⁻¹). Seed rate significantly affected all the plant traits. The results revealed that wheat sown at the seed rate of 140 kg ha⁻¹ significantly showed promising results in terms of taller plants (70.89 cm & 71.41 cm), maximum number of effective tillers and m⁻² (372.33 & 376.44), grains spike⁻¹ (58.0 & 58.67), 1000 grain weight (39.64 g & 39.78 g) and grain yield (36.45 qha⁻¹ & 36.34 qha⁻¹) during both the years respectively, in comparison to the other lower seed rates. This increase in yield was associated with the progressive increase in all growth and yield components. Among the varieties evaluated HD-2864 was most efficient and recorded maximum values of all the growth, yield attributes and yield.

Keywords- Growth, Seed cum fertilizer drill, Seed rate, Varieties, Wheat, Yield

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Introduction

Wheat being the staple food of general populace plays a vital role in socio-economic system of our country. In Chhattisgarh, wheat is cultivated in 1.70 lakh ha area with production of 2.12 lakh tonnes and the productivity is 1250 kg/ha which is quite less than half of the national productivity [1] Agrawal and Pandey (2012). The main reasons of low productivity are cultivation of medium to long duration paddy and delayed sowing of wheat after paddy, lack of mechanization for harvesting of paddy followed by land preparation/sowing of wheat and late sowing of wheat with inadequate technical know-how of package and practices, including choice of varieties. The small and marginal farmers of Gariyaband district resort to planting of wheat through broadcasting resulting in uneven plant population, poor control over depth of seed placement, poor emergence due to placement of seed at uneven depth. On the other hand use of efficient and time saving machine, seed cum fertilizer drill saves in cost of operation time, labour and energy by placing the seed accurately and uniformly at desired depth in the soil. Besides the method of sowing, several other factors are responsible for low yield. Among the agronomic factors seed rate is an important production factor, which determines the crop vigour and ultimate yield [8] Kores and Williams (2002). Optimum seeding rate is considered an important management factor for improving yield of wheat. It is of particular importance in wheat production because it is under the farmer's control in most cropping systems [13] Slafer and Satorre (1999). Higher wheat grain yield with better quality requires appropriate seeding rate for different cultivars. If less seed rate is used yield will be less due to lesser no. of plants unit area⁻¹ [4] Hamid et al., (2002). [7] Khan et al., (2002) reported that percentage of effective tillers increased with highest sowing rate due to which grain yield also increased. Higher seeding rates compensate for reduced

tiller development and promote more main stem spikes which can be favorable, especially for cultivars that tend to produce fewer tillers [3],[14] Coventry et al.,(1993) and Staggenborg et al.,(2003). Besides seed rate, choice of variety is also an important factor affecting crop yield. Chhattisgarh plain zone has short winters (80 to 90 days) and normally the day temperatures starts rising from third week of January and reaches higher rate of increasing trend from last week of February [2] Agrawal et al., (2014). Since the wheat crop requires favorable winter for about 100-110 days for producing its potential yields heat tolerant wheat varieties suitable for late sown irrigated conditions like HD-2864, HD-2932 and MP-3336 were selected for this present investigation. Although effect of seeding rate on performance of genotypes has been studied widely on conventional planting method, but little work has been published on seeding rate effect under planting through seed cum fertilizer drill. Keeping in view the importance of seed rate this study was designed to determine the best seed rate for ultimate wheat production through sowing by seed cum fertilizer drill.

Materials and Methods

Field investigations were carried out during 2014-15 and 2015-16 growing season at Krishi Vigyan Kendra, Gariyaband. Three wheat varieties (HD-2864, HD-2932 and MP-3336) were sown at different planting densities (100, 110, 120, 130 & 140 kg ha⁻¹). The experiment was laid out in split plot design and replicated by three times in 10 farmers field spread over an area of 4.5 ha with each plot of 0.1 ha area. The varieties were allotted to the main plot and seeding rate to sub plots. The soil of the experimental field was sandy clay loam in texture with pH 5.6 and Ec (0.26 dS m⁻¹) with medium availability of Nitrogen (276 kg ha⁻¹), medium in phosphorus

(11.4 kg ha⁻¹) and high in potassium status (417 kg ha⁻¹). Sowing was done on 20th of December in 2014 and 18th of December in 2015. The climatic conditions were favourable till the last week of January with mean temperature ranging from 23°C to 27°C and thereafter there was a rise in temperature which remained higher till crop maturity. Sowing was done with seed cum fertilizer. The seed cum fertilizer drill machine was calibrated for the desired seed rate. The crop was sown under irrigated conditions. All agronomic practices were followed as per recommendations. Fertilizer dose of N-P₂O₅-K₂O at the rate of 100:60:40 Kg ha⁻¹ was applied to all the plots in the form of urea, di-ammonium phosphate and muriate of potash respectively. All P₂O₅, K₂O and half N were applied at the time of sowing. The second half N was split applied in two equal parts at the time of 1st and 2nd irrigation. First irrigation was applied 21 days after sowing. The crop was subsequently irrigated as per need of the crop and soil during growth and development. Weed management practices were done manually for reducing weed-crop competition once before the canopy closure. The crop was ready for harvesting by 4th week of April and harvesting was done from 20th -25th of April during both the years. Data on growth and yield components were collected using standard procedures and were analyzed statistically as per the procedure given by [10] Panse and Sukhatme (1967).

Results and Discussion

Effect of Varieties

The different varieties significantly affected the plant height, number of tillers m⁻², grains spike⁻¹, 1000 grain weight and grain yield except the plant population m⁻² which was not significantly influenced by the different varieties [Table-1]. Among the three varieties, HD-2864 recorded significantly higher plant height, number of tillers m⁻², grains spike⁻¹ than HD-2932 and MP-3336. The table also reveals that the difference in 1000 - grain weight related to the cultivars were significant during both the years. HD-2864 gave significantly higher 1000 grain weight in comparison to HD-2932 and MP-3336. The difference in 1000- grain weight among the wheat cultivars maybe attributed to their variable inherent potential. Of the three varieties, HD-2864 gave the highest yield and MP-3336 recorded the lowest yield. HD-2864 yielded better by 9.18% and 8.42% over HD-2932 and 14.16% and 12.69% over MP-3336 during both the years respectively. More number of tillers m⁻², number of grains spike⁻¹ and higher test weight might have contributed to higher leaf area which could be responsible for more photosynthesis [15] Tomar et al., (2014) and hence resulted in superior yield performance in HD-2864 in comparison to HD-2932 and MP-3336.

Table-1 Growth, yield attributes and yields of wheat as influenced by different varieties and seed rate of wheat

	Plant Population m ² at 21 DAS		Plant height (cm)		No. of effective tillers m ²		Grains spike ⁻¹		1000 grain weight(g)		Grain yield (tonnes ha ⁻¹)	
	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
Varieties												
HD-2864	231.9	233.1	74.37	74.54	374.73	379.07	57.00	56.47	38.44	38.51	3.73	3.72
HD-2932	231.1	231.9	65.70	66.27	356.20	358.07	49.60	48.00	37.47	37.70	3.42	3.43
MP-3336	232.5	232.3	63.37	64.07	330.87	333.07	41.60	43.40	37.03	37.19	3.27	3.30
SEm±	0.47	0.47	0.15	0.15	0.45	0.42	0.18	0.39	0.06	0.10	0.12	0.07
CD (P=0.05)	NS	NS	0.58	0.59	1.78	1.66	0.69	1.51	0.22	0.39	0.49	0.28
Seedrate (kg ha ⁻¹)												
S1- 100	210.8	207.6	64.66	65.48	336.56	335.44	41.67	38.44	35.66	35.81	3.27	3.28
S2- 110	221.9	220.7	66.53	66.98	344.00	347.56	44.67	45.33	36.69	36.82	3.38	3.42
S3- 120	234.3	235.4	67.82	68.20	352.67	356.78	49.33	49.00	37.57	37.75	3.48	3.50
S4- 130	240.2	242.2	69.17	69.40	364.11	367.44	53.33	55.00	38.66	38.85	3.59	3.59
S5- 140	252.0	256.1	70.89	71.41	372.33	376.44	58.00	58.67	39.64	39.78	3.65	3.63
SEm±	0.80	0.64	0.17	0.15	0.26	0.86	0.32	0.50	0.10	0.10	0.12	0.18
CD (P=0.05)	2.34	1.87	0.50	0.45	0.75	2.51	0.94	1.45	0.29	0.30	0.36	0.54

Effect of Seeding Rates

The seeding rates had a significant impact on the growth, yield and yield components of different varieties of wheat. Seed rate had significant effect on plant emergence. Data pertaining to plant population at 21 DAS shows higher number of wheat plants m⁻² with seed rate of 140 kg ha⁻¹. The variations in plant height in response to the different seeding rates were statistically significant [Table-1]. Wheat sown at higher seed rate 140 kg ha⁻¹ produced taller plants up to 70.89 and 71.47 cm followed by wheat sown with 130 kg ha⁻¹. These results are in agreement with the findings of [5] Hattab et al., (1970). Perusal of data in [Table-1] clearly indicates that seeding rate also had significant effect on no. of tillers m⁻², grains spike⁻¹ and 1000 grain weight. Seed rate of 140 kg ha⁻¹ gave more effective tillers m⁻² in comparison to rest of seed rates. An increase of 10.62 % in tillering was observed under seed rate of 140 kg ha⁻¹ in comparison to 100 kg ha⁻¹. Increased number of effective tillers m⁻² could be ascribed to the increased plant population m⁻² at seed rate of 140 kg ha⁻¹. Similar findings of increased number of effective tillers by increasing the sowing rate were also reported by [6] Hazar and Ceylon (1985) and [12] Sadiq and Lalah (1986). The number of filled grains spike⁻¹ which is an important yield component was also remarkably influenced by different seed rates. Seed rate of 140 kg ha⁻¹ produced the maximum no. of filled grains spike⁻¹ which was statistically superior to the rest of the seed rates. Seed rates also had a significant impact on 1000-grain weight in both 2014-15 and 2015-16. Among the seed rates, the maximum 1000- grain weight was recorded with 140 kg ha⁻¹ while the minimum was recorded with 100 kg ha⁻¹ in both the years. The

data also depicts that seeding rate had significant effect on the grain yield [Table-1] Maximum grain yield (36.45 & 36.34 q ha⁻¹) was obtained with seed rate of 140 kg ha⁻¹. The minimum yield was produced at 100kg ha⁻¹. The results are in conformity with the findings of [9], [11] Kumar et al., (2006) and Otteson et al., (2007) who reported that increasing sowing rates with optimum fertilizer application resulted in increased spike number, grains spike⁻¹ and grain yield.

Conclusion

In the light of aforementioned results, it can be safely concluded that wheat sown at seed rate of 140 kg ha⁻¹ through seed cum fertilizer drill showed superior yield performance over the rest of the seed rates. Also variety HD-2864 indicated wider yield stability in yield performance compared to HD-2932 and MP-3336.

Conflict of Interest: None declared

References

- [1] Agrawal A.P. and Dinesh P. (2012) Review Report AICRP on Wheat and Barley Improvement Project, Bilaspur Centre, p2.
- [2] Agrawal A.P., Pandey D. and Pandey D. (2014) *Journal of Wheat Research*, 6(1), 37-40.
- [3] Coventry D.R., Reeves T.G., Brooke H.D. and Cann. D.K. (1993) *Aust. J. Exp. Agric.*, 33, 751-757.

- [4] Hamid E., Taj F.H., Bakht J., Shah A.W. and Shad A.A. (2002) *Asian J. Plant Sci.*, 1, 502-506.
- [5] Hattab E.H.S., Kamal M.S. and Galil A.A. (1970) *Field Crop Abst.*, 26(4), 474.
- [6] Hazar N. and Ceylon A. (1985) *Field Crop Abst.*, 41,888.
- [7] Khan A.I., Bakht J., Shah A.W., Khan N.M. and Ullah I. (2002) *Asian J. Plant Sci.*, 1, 513-515.
- [8] Korres N.E. and Froud-Williams R.J. (2002) *Weed Res.*, 42(6), 417.
- [9] Kumar R., Nanwal R.K. and Agarwal S.K. (2006) *Haryana Agric. Univ. J. Res.*, 36 (2), 93-96.
- [10] Panse V.G. and Sukhatme P.V. (1967) Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi, 2nd ed, xvi, 381.
- [11] Otteson B.N., Mergoum M. and Ransom J.K. (2007) *Agron. J.*, 99, 1615–1621.
- [12] Sadiq M. and Lalah R.A. (1986) *Wheat, Barley and Triticale Abst.*, 7, 30.
- [13] Slafer, G.A. and Satorre E.H. (1999) Satorre, E.H. and G.A. Slafer (Eds.). The Haworth Press, New York, 3-12.
- [14] Staggenborg, S.A., Whitney D.A., Fjell D.L. and Shroyer J.P. (2003) *Agron. J.*, 95, 253–259.
- [15] Tomar,S.P.S., Tomar S.S. and Srivastava S.C. (2014) *International J. Of Farm Sciences*, 4 (2), 1-6.