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Effect of different sowing methods and seed rate on growth and yield of wheat (*Triticum aestivum*)

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Abstract
A field experiment was conducted during *Rabi* 2019 at Crop Research Center of Chandigarh. University, Gharuan (Mohali) to study the effect of different sowing methods and seed rate on the growth and yield of.wheat. There were total six treatments comprising of wheat with treatment details were M1: FIRB (Furrow Irrigated Raised Bed), M2: Seed drill, S1: 120 kg/ha seed rate, S2: 100 kg/ha seed rate, S3: 90 kg/ha seed rate, S4: 80 kg/ha seed rate. The experiment was laid down in split plot design with three replications with different sowing methods as main plots and seed rate as sub plot treatments. Growth parameters i.e. plant height (69.53 cm) at harvesting in treatment S2 followed by treatment M2 (67.47 cm), number of effective tillers at harvesting in treatment S2 (4.18) followed by treatment M2 (4.05), dry matter accumulation at harvesting in treatment S2 (115.13) followed by treatment M2 (113.39), yield attributes, grain yield highest in treatment S2.(42.83 kg/ha) followed by treatment M2 (37.70 kg/ha) and straw yield recorded highest in treatment S2 (50.62 kg/ha) followed by treatment M2 (47.76 kg/ha). Which were more in case of treatment of seed rate was S2: (100 kg/ha). And among different sowing methods, M2: (seed drill) gave the best results. Highest net returns ₹ 45086 and net returns per rupee invested of ₹ 2.20 was recorded in treatment S2 followed by treatment M2 in which net returns ₹ 36275 and net returns per rupee invested of ₹ 1.99.

Keywords: sowing methods, seed rate, growth, and yield

Introduction

Wheat is a main staple food crop. Globally. In its various food forms, it provides a huge amount of the world's nourishment compared to nourishment from other cereal. Grains. Wheat provides 28% of the world's edible dry matter and up to 60% on daily basis calories in developing countries. (Cakmak 2020). Food consumption is expected to double by 2050, in addition to the growing demand for high quality healthy. Food; the rapid increase in demand for wheat products is also predicted. Worldwide. The composition and nutritional superiority of the wheat grain have a significant impact on human health and well-being, mainly in developing. Countries. Therefore, factors disturbing not only wheat yield, but also wheat quality, require more attention (Wang *et al.* 2011) [9]. Seed rate is a conservative management aspect that affects the agronomic and end-use excellence traits of wheat; Therefore, it should be studied carefully to obtain higher grain yields with better end-user. Superiority. Previous studies reported that a dense wheat population resulted in competition between plants that induced self-regulation (Costa *et al.* 2015) [10]. Intra-specific competition between individuals and populations can be controlled by optimum planting. Density, through the establishment of an appropriate population. Patterns. Environmental wealth, such as light. Water, and nutrients during crop growth, are powerfully governed by seed rate. A high seed rate causes more water consumption before anthesis and, consequently, a decline in the grain yield and grain per spike (Chengappa *et al.* 2007) [11]. Results from other studies found no substantial effect of seed rate on grain. Quality. However. Previous studies only implicated a relatively high range of seed rates and plant.populations. Reducing sowing density through the scattering of seeds is one of the techniques where grain quality might be affected. Significantly, as crops sown widely apart often mature slowly compared to a dense. Population. To achieve a advantageous yield for the farmers, not only is the optimum seed rate required, but suitable methods of sowing should additionally be put into consideration (Mollah *et al.* 2009) [12].

Proper methods of sowing improve resource. Accessibility, such as sunlight capture, moisture, and nutrient. Accessibility, leading to the proper root system development from the early stage of crop. Growth. Sowing methods guarantee proper crop establishment and most favorable plant population in the field, as well as facilitating plants to utilize the land and other resources more proficiently and decisively toward growth and development *(Singh et al. 2019)* [3, 13]. Unproductive crops can be caused by insufficient sowing. Methods.

Materials and methods

This experiment was conducted during the 2019-2020 *Rabi* season at University farm, University Institute of Agricultural Sciences, Chandigarh University, Gharuan (Punjab) to study the effect of different sowing methods and seed rate on growth and yield of wheat.(*Triticum aestivum*). The experiment was laid out in a split plot design with three replications having a plot size of 5m x 2m. Row spacing of 20 cm was maintained. Wheat variety PBW-343 was sown at the different seed rate on 14-12-2019.

During this study two different sowing methods i.e. (M1) FIRB (furrow irrigated raised bed) and (M2) seed drill in main plot and four different seed rate i.e. (S1) 120 kg/ha, (S2) 100 kg/ha (S3) 90 kg/ha, (S4) 80 kg/ha seed rate were evaluated. Data was analyzed for growth and yield attributing characters like plant height (cm), dry matter accumulation (m^2), leaf area index, number of effective

tillers (m²), number of spikelets/spikes, test weight and grain yield were recorded. The data recorded on different aspects in the present study was subjected to the statistical analysis using analysis of variance as per procedure recommended by Gomez and Gomez (1984).

Results and Discussion

Effect of different sowing methods and seed rate on growth parameters (plant height, leaf area index, and dry matter accumulation), yield (grain) and yield attributes (number of effective tillers, test weight, number of spikelets/spike).

Plant Height

The increase in plant height (table 1) was reported maximum between 60 to 90 DAS and thereafter it was only marginal to.harvest. The highest plant height was observed in treatment (100 kg/ha) with 9.07cm, 53.32cm, 66.93cm, and 69.53cm plant height at 30, 60, 90 DAS and at harvest, respectively. It was significantly superior to other treatments at all the recorded observations. Among the sowing method, maximum plant height was recorded in treatment (seed drill) with 8.53cm, 52.66cm, 65.22cm and 67.47cm at 30, 60, 90 DAS and at harvest respectively. It was significantly superior to other treatments at all the recorded observations. This might be due to the effect of seed rate of the wheat crop. Similar results were also obtained by Borse *et al.* (2019) [7].

Table 1: Effect of irrigation scheduling and organic nutrient sources on plant height, dry matter accumulation, and leaf area index.

Treatments	Plant height (Harvesting)	Dry matter accumulation (Harvesting)	Leaf area index (90 DAS)
Sowing methods			
FIRB (furrow irrigated raised bed)	63.82	113.08	2
Seed drill	67.47	113.39	2.26
CD (P=0.05)	3.44	0.32	0.14
Seed rate			
120 kg/ha	62.17	111.92	1.98
100 kg/ha	69.53	115.13	2.39
90 kg/ha	66.67	112.42	2.09
80 kg/ha	66.20	113.45	2.06
CD (P=0.05)	1.79	0.94	0.05

Dry matter accumulation

The data (table 1) depicted that dry matter accumulation increased progressively with the advancement of crop growth up to harvest, the maximum increase being recorded between 90 DAS and harvest. The results revealed that the highest dry matter accumulation was recorded in seed rate treatment (100 kg/ha) from 30 DAS till harvest (37.15gm/m^2) to (115.13g/m^2), which was significantly superior to all the treatments. Among the sowing method treatment (seed drill) recorded highest dry matter accumulation at 30, 60, 90 DAS and at harvest (36.05g/m^2, 183.58g/m^2, 71.46g/m^2, and 113.39g/m^2), which was significantly superior to all the other treatments. Increased seed rate resulted in increase in more dry matter accumulation throughout the crop season. Similar results were also reported by said and amen (2016).

Leaf area index (LAI)

The data (table 1) depicted that the LAI increased with the advancement of crop stages reaching peak value at 90 DAS. At 90 DAS highest LAI was calculated in treatment (100 kg/ha) is 2.39, which was significantly superior to all the treatments, whereas the lowest was recorded under treatment 120 kg/ha with value of LAI is (1.98). Among the sowing method, maximum LAI was recorded in treatment (seed drill) with 1.70, 2.13 and 2.26 at 30, 60, 90 DAS and at harvest respectively, which was statistically significant to all treatments. These results might be due to the impact of sowing method of wheat. These results were also found by Anbessie *et al.* (2020) [6].

Table 2. Effect of irrigation scheduling and organic nutrient sources on number of effective tillers, number of spikelets/spike, test weight, and grain yield.

Treatments	Number of effective tillers	Number of spikelets/spike	Test weight	Grain yield
Sowing methods				
FIRB (furrow irrigated raised bed)	393.92	15.33	36.65	34.91
Seed drill	400.50	18.18	38.92	37.70
CD (P=0.05)	6.46	0.87	0.83	0.67
Seed rate				
120 kg/ ha	393.33	15.35	37.26	31.69
100 kg/ha	405.17	18.37	39.95	42.83
90 kg/ha	395.33	16.55	38.56	33.89
80 kg/ha	395	16.75	35.37	30.81
CD (P=0.05)	4.06	0.82	1.55	1.36

Number of effective tillers

Critical analysis of data (table 2) revealed that effective tillers markedly increased with irrigation application by various days. The maximum number of effective tillers was recorded in treatment (100 kg/ha) that is (405.17 per m^2), which was significantly superior to all the treatments. Among the sowing method, the treatment (seed drill) recorded maximum number of tillers (400.50 per m^2) which was statistically superior to all other treatment and followed by treatment (FIRB) that is (393.92 per m^2). The number of effective tillers per meter square was significantly different for all the respective treatments. Number of effective tillers might be affected by different sowing methods. These similar findings were also observed by Matsuyana *et al.* (2019) [4].

Number of spikelets/spike

The data (table 2) of number spikelets/spike was significantly affected by irrigation and organic sources of nutrient of wheat crop. The maximum number spikelets/spike was recorded in the treatment of seed rate (100 kg/ha) that is (18.37) spikelets/spikes, which was the superior in all the treatments, whereas the lowest was recorded in the 120 kg/ha that is (15.35) spikelets/spikes. Among the sowing method the highest number of spikes was recorded in treatment.(seed drill) that is (18) spikelets/spike. These similar findings were also observed by Raghuvanshi *et al.* (2020) [3]. This might be due to the fact that the seed rate affected the number of spikelets/spike.

Test weight

The given data. (Table 2) revealed that the highest test weight. (1000 grain weight) was recorded in treatment (100

kg/ha) that is 39.95 g, which was significantly superior to other treatments, whereas the lowest test weight was recorded in the 80 kg/ha (35.37 g). Among the sowing method the highest grain weight was recorded in treatment (seed drill) that is 38.92g. This might be due to the different seed rates. These similar findings were also observed by Chen *et al.* (2008) [2].

Grain yield

A perusal of the data.(table 2) revealed that highest grain yield was recorded in treatment.(100 kg/ha) with 42.83 q/ha, which was significantly higher than other treatments, whereas the lowest grain yield was produced in 80 kg/ha (30.81 q/ha). Among sowing methods, the treatment (seed drill) recorded highest grain yield (37.70 q/ha), which was significantly superior over the treatment FIRB, that is (31.91 q/ha). Grain yield of wheat, as influenced by sowing methods and seed rate in wheat shows significant results. These results are in conformity with those of Hasan *et al.* (2010) [1].

Conclusion

It was concluded that the treatment (100 kg/ha) seed rate has given superior results in different seed rate. Among the different sowing methods seed drill has given the higher yield and superior results. And also the net returns and B: C ratio was recorded highest in treatment S2 in seed rate and M2 amongst the different sowing methods.

References

1. Hasan, kilic, songul gursoy. Effect of seeding rate on yield and yield components of durum wheat cultivars in cotton-wheat cropping.system. Scientific Research and Essays,2010:5:(15).
2. Chen, Chengci, Neill, Karnes, Wichman, Dave, Westcott *et al.* Hard Red Spring Wheat Response to Row Spacing, Seeding Rate, and Nitrogen. *Agronomy Journal* 100. 10.2134/agronj, 2008, 0198.
3. Raghuvanshi, Nikhil, Singh BN. Impact of sowing method and nitrogen management on growth of wheat. (Triticum aestivum L.). International Journal of Chemical Studies,2020:8:2771-2775.
4. Matsuyama, hiromi, taiichiro ookawa. The effects of seeding rate on.yield, lodging resistance and culm strength in wheat. Plant production science,2019:(23):322-332.
5. Said Mohamed, Ameen F. Effect of Sowing Methods and Micro elements Foliar Application on Bread Wheat Productivity and their Economical.Feasibility. Egyption Journal of Agronomy,2016:38:225-240.
6. Anbessie Debebe Abboye, Abebe Megersa, Dechassa Hirpa. Effect of Plant Population on Growth, Yields & Quality of Bread Wheat.(Triticum Aestivum L.) Varieties at Kulumsa in Arsi Zone, South-Eastern Ethiopia. International Journal of Research Studies in Agricultural Science,2020:6(2):32-53.
7. Borse DK, Usadadia VP, Thorave DS. Nutrient Management in Wheat.(Triticum aestivum L.) under Partially Reclaimed Coastal Salt Affected Soil of South Gujarat. International Journal of Current Microbiology and Applied Sciences,2019:8(5):1590-1599.
8. Cakmak, I. Enrichment of cereal grains with zinc: Agronomic or genetic biofortification? Plant Soil,2008:302:1-17.
9. Wang S, Yin L, Tanaka H, Tanaka K, Tsujimoto H. Wheat-Aegilops chromosome addition lines showing high iron and zinc contents in grains. Breed. Sci,2011:61:189-195.
10. Costa LOd, Rizzardi MA. Competitive ability of wheat in association with biotypes of Raphanus raphanistrum L. resistant and susceptible to ALS-inhibitor herbicides. Ciência e Agrotecnologia,2015:39:121-130.
11. Chengappa P, Nagaraj N, Kanwar R. Challenges to Sustainable Agri-Food Systems; IK International Publishing House: New Delhi, India, 2007.
12. Mollah M, Bhuiya M, Kabir M. Bed Planting A New Crop Establishment Method for Wheat in Rice-Wheat Cropping System. J. Agric. R. Dev,2009:7:23-31.
13. Singh K, Sharma R. Effect of different methods of sowing and row orientation on growth, yield and quality of wheat (Triticum aestivum L.). Agric. Sci. Dig. Res. J,2019:39:51-54.