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Effect of Seed Rate on Yield of Wheat (*Triticum aestivum*) under Front Line Demonstrations in Poonch

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Among several crop management factors sowing method, seeding rate and selection of appropriate genotype have prime roles in affecting wheat productivity. Most of the times, farmers are in practice of using excess seed rate to the tune of 160kg/ha against recommended 120 kg/ha. This affects crop production due to competition among plants resulting from higher plant density for available resources. Demonstration on farmer's field is a proven way to demonstrate the technology to increase the adoption rate among farmers. Krishi Vigyan Kendra, Poonch therefore conducted On-farm demonstrations to popularize the importance of optimum seed rate in wheat. The investigation was carried out in the Poonch Block in five village panchayats. Eighty front line demonstrations on wheat variety WH 1080 were laid using 120 kg seed per hectare. Seed rate of 120 kg/ha produced more numbers of grains per ear (52) and 1000 grain weight (38.48 g) and grain yield (33.8 quintals/ha); while for seed rate of 160 kg/ha less numbers of grains per ear (44) and 1000 grain weight (38.04 g) and grain yield (27.2 quintals/ha) were obtained. Optimum seed rate @ 120 kg/ha also gave highest net returns per hectare (Rs. 41,592) with benefit cost ratio (3.02); whereas, farmer's practice of broadcasting higher seed rate @ 160kg/ha recorded lower net returns (Rs. 28,448) and benefit cost ratio (2.32). It is, therefore, recommended that wheat should be sown with seed rate of 120 kg/ha for higher yield and net returns.

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1. INTRODUCTION

Wheat is an important staple food and is one of the most important *rabi* crops in India occupying an area of 31.0 million hectares with annual production of 108.75 million tonnes and with average productivity of 35.0 quintals during 2021 [1]. Wheat crop also ranks first in terms of area during *rabi* season in Poonch district, occupying an area of 15 thousand hectares with annual production of 22.7 thousand quintals. Agricultural productivity of wheat (15.15 quintals per hectare) is quite low in the district [2] due to non-availability of location specific varieties, poor soil conditions and lack of assured irrigation [3]. It has also been observed that wheat yield in farmers field is generally low compared to on-station trials. This might be due to the use of improper production technology including optimum seed rate by the farmers as depicted by reports of Chauhdary et al. [4]. Isidro-Sánchez et al. [5] that seeding rate and selection of appropriate genotype have prime role in affecting wheat productivity. Most of the times, farmers are in the practice of using excess seed rates which may affect yield [6]. Optimum seed rate is therefore vital to realize maximum crop yields. KVK Poonch conducted 80 front line demonstrations during *rabi* 2020-21 to demonstrate the effect of seed rate on wheat yield and economics on farmers field.

2. MATERIALS AND METHODS

The present investigation was carried out in the Poonch Block in five village panchayats. Poonch district of Jammu and Kashmir (India) located on the southern slopes of Pir Panjal range and lies between 33^0 25' to $34^0$10' north latitude and 73^0 58' to 74^0 35' east longitude. 80 front line demonstrations on wheat variety WH 1080 were laid using 120 kg seed per hectare. This variety is suitable for cultivation under rainfed conditions. Wheat was sown following kera method and sowing was completed from 14 to 20 November 2020 in 05 village panchayats and was compared with farmer's practice of broadcasting higher seed rate @ 160 kg/ha. The nutrient management (60:30:20) was practiced as per package of practices of SKUAST-J for rainfed areas. A total rainfall of 596 mm was received during the crop season between November 2020 and May 2021. Data on plant height, ear length, tillers/plant from 10 selected plants/locations was recorded while grains/ear from randomly selected 10 ears were counted and averaged. Data on 1000 grain weight was also recorded. Crop yield was determined by manually harvesting the produce at physiological maturity and expressed as quintals per hectare. Cost of production and monetary returns (gross and net returns) of demonstrated variety and check plots were calculated on the basis of the prevailing market prices.

Table 1. Particulars showing the detail of front line demonstrations on wheat

Parameters	Description
Crop	Wheat
Variety	WH1080
Condition	Rainfed
Blocks	Haveli Poonch
No. of FLDs	80
Area in hectares	13.0 ha
Date of sowing	14 to 20 November 2020
Seed rate	120 kg/ha (line sowing)
Check	(seed rate @160 kg/ha) broadcasting
Technique of Sowing	Line sowing (kera) 22.5 cm apart
Nutrient Management	60:30:20
Harvesting	Manually

3. RESULTS AND DISCUSSION

Data on yield attributes, yield and economics is presented in Table 2. Average plant height was 100.5 cm in plots with higher seed rate at 160 kg/ha as compared to 99.4 cm in plots with optimum seed rate of 120 kg/ha. Higher plant population using 160 kg/ha seed rate might have led to more competition for sunlight with resultant higher plant height under this treatment. Higher seed rate affected the tillering in wheat considerably as it recorded less tillers/plant (6.6) compared to the optimum seed rate (7.5). Optimum seed rate of 120 kg/ha produced more numbers of grains per ear (52) and 1000 grain weight (38.48 g) and grain yield (33.8 q/ha) as compared to 160 kg/ha which recorded less grains per ear (44), 1000 grain weight (38.04 g) and grain yield (27.2 q/ha). Kabir et al., [6] also observed that yield parameters and seed yield in wheat was significantly influenced by seed rate. Optimum plant population under 120 kg seed rate resulted in less intra-crop competition thereby recording better yield parameters and yield. Increase in plant population due to

Table 2. Effect of seed rate on yield and economics of wheat under front Line demonstrations in Poonch

Properties	Farmers' rate	On-station rate
Seed rate kg/ha	**160**	**120**
Plant height (cm)	100.5	99.4
Ear length (cm)	12.9	13.2
Number of tillers/plant	6.6	7.5
Grains/ ear	44	52
1000 grain weight	38.04	38.48
Grain yield	27.2	33.8
Cost of cultivation	21600	20600
Gross returns	50048	62192
Net returns (Rs./ha)	28448	41592
BC ratio	2.32	3.02

Sale rate: Rs. 1840/q

increase in seed rate resulting in decrease in number of grains per spike and grain weight due to competition among plants for available resources [5]. Economics of cultivation and gross returns, net returns and benefit cost ratio was also recorded. Seed rate at 120 kg/ha also gave highest net returns per hectare (Rs. 41,592) and benefit cost ratio (3.02) whereas higher seed rate at 160 kg/ha recorded lower net returns (Rs. 28,448) and benefit cost ratio (2.32). Higher net returns in this treatment was due to higher yield per hectare.

4. CONCLUSION

Yield parameters which includes ear length, number of tillers/plant, grains per ear, 1000 grain weight and grain yield were found to perform better under optimum seed rate compared to the higher seed rate due to less completion for available resources.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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