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Effect of spacing and different sowing methods on yield of wheat (*Triticum aestivum* L.) crop

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Abstract

The Experiment was carried out at the field of S.Boota Singh at village Midda Tehsil Malout and District Shri Muktsar Sahib. The crop was grown in Rabi season of 2017-18 to study the effect of different sowing methods on yield of wheat crop. The crop was sown on November 20, 2017. The following treatments are T₁ (HD-3086 Broadcast sowing), T₂ (HD-3086 Bi-directional sowing at 22.5 cm spacing), T₃ (HD-3086 Direction sowing at 15 cm spacing), T₄ (PBW-725 Broadcast sowing), T₅ (PBW-725 Bi-directional sowing at 22.5 cm spacing), T₆ (PBW-725 Bi-directional sowing at 15 cm spacing) treatment. The experiment concluded that among the treatments T₆ has performed better in parameters like plant height (107.2 cm), dry matter accumulation (21.6g), 1000 grain weight (42.3g), yield per acre (27.2q) and harvesting index (45.94%). It is concluded from the experiment that higher yield can be obtained by bi-direction method of sowing at 15 cm spacing.

Keywords: Spacing, Broadcast, Bi-directional, Spacing, Wheat

Introduction

Wheat (*Triticum* species) is a crop of global significance. It is grown in diversified environments. It is a staple food of millions of people. Approximately one-sixth of the total arable land in the world is cultivated with wheat. *Triticum aestivum* is cultivated in all the regions of the country while durum is cultivated in Punjab and Central India in Karnataka. Wheat contains carbohydrates (70%), protein (12%), lipid (2%), vitamins and minerals (2%) and crude fiber (2%). (www.agropedia.ac.in) [1] India is the world's second largest Wheat producer succeeding China and also being the second-largest consumer of wheat. India's share in global wheat production was recorded at 11.78 percent in the year 2015-16. In 2015-16, India's major export destinations were Bangladesh, Nepal, UAE and Taiwan. (www.agricoop.gov.in) [2] Drill sowing is recommended method because of its uniform seed distribution at desired depth, which usually results in higher germination and uniform stands. Due to better crop stand establishment, wheat grain yield was significantly affected by different sowing method including broadcast and line sowing methods. (Singh *et al.* 1994) [3]

Materials and Methods

The Experiment was carried out at the field of S.Boota Singh at village Midda Tehsil Malout, district Shri Muktsar Sahib. The crop was grown in Rabi season of 2017-18. The experiment was conducted in six plots with each plot having dimensions of 5m x 5m, length and breadth respectively. The crop was sown on November 20, 2017. Wheat variety HD 3086 was sown at the rate of 45 kg/acre with spacing of 30 cm at a depth of 4-5 cm. Each row measured about 4 meters in length per plot. Sowing was done using Singlehand seed drill on November 20, 2017. Plant heights were measured with the help of measuring tape from the soil surface to the highest leaf of the plant. One plant was selected from each plot randomly and then, those plants were kept in oven for oven drying for 72 hours at temperature of 60°C at an interval of 30 days. As for the calculation of 1000 grain weight, 1000 seeds were collected from each plot after threshing and were weighed with the help of weighing machine. After harvesting, grains were separated from spikes by threshing. The weight of grains was recorded. The grain yield was computed and expressed as quintals per acre. Harvesting index was calculated by using

formula- Economic yield (seeds) / Biological yield (seeds + plant straw) $\times 100$.

Treatments

- T₁ - HD-3086 Broadcast sowing.
 T₂ - HD-3086 Bi-directional sowing at 22.5 cm spacing.
 T₃ - HD-3086 Sowing at 15 cm spacing.
 T₄ - PBW-725 Broadcast sowing.
 T₅ - PBW-725 Bi-directional sowing at 22.5 cm spacing.
 T₆ - PBW-725 Sowing at 15 cm spacing.

Results and Discussions

Plant height (cm)

Due to effect of spacing and different sowing method on plant heights of wheat in T₁, T₂, T₃, T₄, T₅ and T₆ treatment were observed 25.32cm, 26.14cm, 28.06cm, 24.52cm, 26.04cm and 26.54cm respectively after 30 days of sowing. Same trend has been observed for all the other readings. At time harvesting the plant height of wheat in T₁, T₂, T₃, T₄, T₅ and T₆ were 98.15cm, 100.2cm, 104.3cm, 103.7cm, 105.3cm and 107.2cm respectively. Similarly Abbas *et al.* (2009) [4] also revealed that maximum plant height of 104.7 cm was produced when wheat was sown in 30 cm spaced.

Dry matter accumulation (g)

As from the experiment, Due to effect spacing and different sowing method on dry matter accumulation of wheat in T₁, T₂, T₃, T₄, T₅ and T₆ were observed values 0.38g, 0.39g, 0.41g, 0.44g, 0.45g and 0.49g respectively after 30 days of sowing. The maximum dry matter was produced in T₆ treatment (21.6 g) and minimum dry matter weight was produced in T₁ treatment (18.73 g) at 120 days after sowing. Sharma *et al.* (2018) [5] also showed the similar results that maximum dry matter accumulation was recorded at 19.5 cm spacing at 90 DAS and minimum dry matter accumulation was recorded at spacing of 15.5 cm. Rezaeian *et al.* (2014) [6] also revealed the similar results that maximum dry matter accumulation was recorded at spacing of 65cm and minimum dry matter accumulation was recorded at spacing of 85 cm.

1000 Grain weight (g)

It has been observed that 1000 grain of wheat was more in T₆ than T₂, T₃, T₄, T₅ treatments and minimum in T₁. Hussain *et al.* (2003) [7] showed the similar results that maximum 1000 grain weight (48.70g) was observed in 60 cm row spacing and minimum 1000 grain weight was observed in 8cm row spacing that is 43.20g. Bakht *et al.* (2007) [8] revealed the similar results that maximum 1000 grain weight (45.28g) was produced by those plots which were sown with row spacing of 30cm while maximum 1000 grain weight in row spacing of 50 cm.

Yield per acre (q)

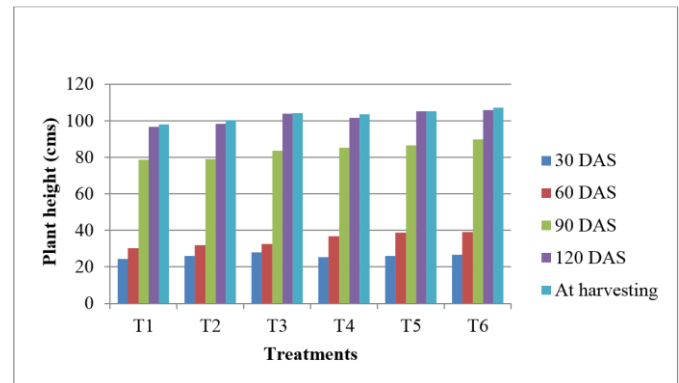
It was observed that the wheat grain yield was maximum 27.2q in T₆ treatment and minimum in T₅ treatment that is 23.2q. Chhokar *et al.* (2017) [9] showed the similar result that maximum yield per hectare was 57.56q at 17.5cm spacing and minimum yield per hectare was 55.18q at 22.5cm row spacing. Jan *et al.* (2011) [10] revealed the similar result that maximum yield was 2230kg/ha-1 in line sowing method and minimum yield was 2025kg/ha-1 in broadcasting method.

Harvesting index (%)

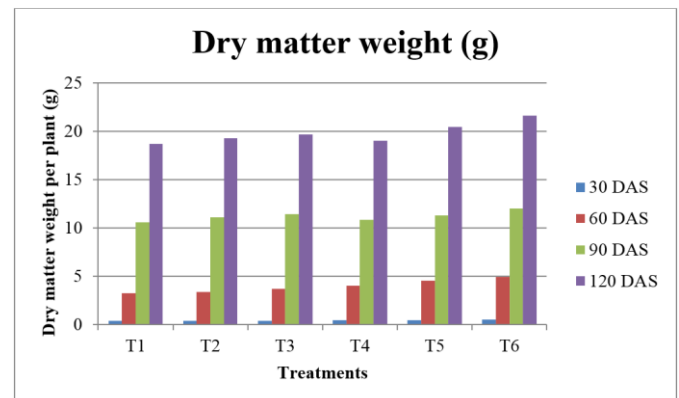
It was observed that maximum harvesting index was observed

in T₆ treatment that is 45.94% and minimum harvesting index was observed in T₄ treatment that is 40.84%. Hussain *et al.* (2003) [11] showed the similar results that maximum harvesting index was (46.5%) in 45cm row spacing and minimum harvesting index value was recorded in 60cm row spacing. Pandey *et al.* (2013) [12] revealed the similar results that wheat sown at the widest row spacing (25cm) had significantly higher ($p < 0.05$) harvest index than that of narrow row spacing.

Observations and Tables



Graph 1: Effect of spacing and different sowing methods on plant height of wheat crop.



Graph 2: Effect of spacing and different sowing methods on dry matter weight per plant (g) of wheat crop.

Table 1: Effect of spacing and different sowing methods on 1000 grain weight of wheat crop.

| Treatments | 1000 Grain weight |
|----------------|-------------------|
| T ₁ | 38.8 |
| T ₂ | 40.1 |
| T ₃ | 40.8 |
| T ₄ | 39.7 |
| T ₅ | 41.6 |
| T ₆ | 42.3 |

Table 2: Effect of spacing and different sowing methods on yield per acre (q) of wheat crop.

| Treatments | Yield per acre (q) |
|----------------|--------------------|
| T ₁ | 24.8 |
| T ₂ | 26.4 |
| T ₃ | 24.0 |
| T ₄ | 25.6 |
| T ₅ | 23.2 |
| T ₆ | 27.2 |

Table 3: Effect of spacing and different sowing methods on harvesting index (%) of wheat crop.

| Treatments | Harvesting index (%) |
|----------------|----------------------|
| T ₁ | 42.85 |
| T ₂ | 44.92 |
| T ₃ | 41.77 |
| T ₄ | 40.84 |
| T ₅ | 43.24 |
| T ₆ | 45.94 |

cultivated in Western Chitwan, Nepal, *Agrisci*. 2013; 4(7):309-316.

Conclusion

The present investigation was carried out to study the effect of spacing and different sowing methods on wheat yield. The following treatments are T₁ (HD-3086 Broadcast sowing), T₂ (HD-3086 Bi-directional sowing at 22.5 cm spacing), T₃ (HD-3086 Directional sowing at 15 cm spacing), T₄ (PBW-725 Broadcast sowing), T₅ (PBW-725 Bi-directional sowing at 22.5 cm spacing), T₆ (PBW-725 Directional sowing at 15 cm spacing) treatment. The experiment concluded that among the treatments T₆ has performed better in parameters like plant height(107.2), dry matter accumulation(21.6g), number of tillers per plant (10.6), number of spikes per plant (10.6), grains per spike (61.4), 1000 grain weight (42.3g), yield per acre (27.2q) and harvesting index (45.94%). It is concluded from the experiment that higher yield can be obtained by bi-direction method of sowing at 22.5cm spacing.

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