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Effect of different organic, inorganic and bio-fertilizer on the yield and yield components of wheat

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Abstract

The experiment was carried out at the field of S. Gurcharan Singh at village Bare wala, tehsil Jalalabad west and District Fazilka. The crop was grown in rabi season of 2017-18 to study the effect of different Organic, Inorganic and bio-fertilizer on the yield and yield components of Wheat. The crop was sown on November 26, 2017. The following treatments are T₁ RDF (Recommended dose of fertilizer) i.e. (NPK-50:25:12), T₂ FYM (Farm yard manure) + (4 tonne/acre), T₃ FYM + *Azotobacter* (4 tonnes/acre + 250 ml per kg of seed), T₄ PM (Poultry manure) + (3.2 tonne/acre), T₅ PM + *Azotobacter* (3.2 tonne/acre + 250 ml per kg of seed). The experiment concluded that among the treatments T₄ (Poultry manure) has better performed in parameter like plant height (101.70cm) and number of spikes/plant (7.4). T₃ (FYM + *Azotobacter*) has better performed in parameter like dry matter (27.90g) and number of tillers/plant (7.6). T₅ (Poultry manure + *Azotobacter*) has better performed in parameter like grain/spike (52.0), 1000 grain weight (40.1g) and harvest index(53.8%). It is concluded from the experiment that higher yield (21.7Qt/acre) can be obtained by T₅ (Poultry manure + *Azotobacter*).

Keywords: FYM, Poultry manure, *Azotobacter*, 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. Optimum temperature required for sowing ideally should be the winter temperature of 10 °C-15 °C and summer temperature of 21 °C-26 °C. The temperature at sowing needs to be low while at the harvesting time, higher temperatures are necessary for the proper ripening of Wheat. India is the world's second largest wheat producer succeeding china. India's major export destinations were Bangladesh, Nepal, UAE and Taiwan (agricoop.gov.in). The productivity of a crop is controlled by many factors of which the mineral nutrition specially of nitrogen is by and large. It must be stressed that the value of FYM, vermin-compost, poultry manure and green leaf manure in soil improvement is due to their nutrient content, in view of this the present investigation was carried out to know the effect of organic manure on seed yield and quality of wheat (Channabasanagowda *et al.* 2008).

Material and Methods

The experiment was carried out at the field of S.Gurcharan Singh at village bare wala, Tehsil Jalalabad west and District Fazilka. The crop was grown in rabi season of 2017-18. The experiment was conducted in five plots with each plot having dimensions of 4m x 3m, length and breadth respectively. The crop was sown on November 26, 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 metres in length per plot. Seeds for treatment (T₃) and (T₅) were inoculated with *Azotobacter chroococcum*. Wheat seed was inoculated with 250 ml of *Azotobacter chroococcum* in small tub before sowing in plot no. 3 and plot no. 5. Plant height 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 plants were kept in oven for oven

drying for 72 hours at temperature of 60°C. At the time of test 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) × 100.

Treatments

T₁ - RDF (Recommended dose of fertilizer) i.e. (NPK-50:25:12)

T₂ - FYM (Farm yard manure) + (4 tonne/acre)

T₃ - FYM + Azotobacter (4 tonnes/acre + 250 ml per kg of seed)

T₄ - PM (Poultry manure) + (3.2 tonne/acre)

T₅ - PM + Azotobacter (3.2 tonne/acre + 250 ml per kg of seed)

Result and Discussions

Plant height (cm)

Due to effect of spacing and different Organic, Inorganic and bio-fertilizer on plant height of wheat in T₁, T₂, T₃, T₄ and T₅ treatments were observed 16.26cm, 15.54cm, 15.94cm, 17.36cm and 17.88cm 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 and T₅ treatment were 90.84cm, 91.15cm, 95.94cm, 101.70cm and 96.74cm respectively. Singh and Prasad (2011) [3] study the efficacy of bio-fertilizers on growth and productivity of wheat (*Triticum aestivum*). Combined application of bio-fertilizers caused considerable increase in plant height over all the treatments.

Dry matter accumulation (g)

As from the experiment, Due to effect of spacing and different Organic, Inorganic and bio-fertilizer on of wheat in dry matter accumulation T₁, T₂, T₃, T₄ and T₅ treatments were observed values 0.27g, 0.20g, 0.14g, 0.11g and 0.22g respectively after 30 days of sowing. Maximum dry matter accumulation was observed in T₃ (27.9g) followed by T₄, T₅, T₂ are (25.50g), (22.23g), (21.60g) respectively and minimum was observed in T₁ (19.2g). Nehra *et al.* (2001) [4] was studied the maximum dry weight was recorded (350.03g/m) in vermicompost at 15

tonnes/ha. The minimum dry weight was recorded (280.49) in treatment where no fertilizers are used.

1000 Grain weight

1000 grain weight (Test weight) is a good measure of knowing yield of any crop as it gives a of crop yield before weighing the whole crop. Highest test weight was observed in T₅ (40.1) followed by T₄, T₃, T₂ are (39.2), (38.5), (37.4) respectively and lowest in T₁ (37.2). Jala-Abadi *et al.* (2012) [9] a field experiment the maximum 1000 grain weight (50.63g) was produced from S₃ (chicken manure). The minimum 1000 grain weight (48.16) was produced from S₂ control.

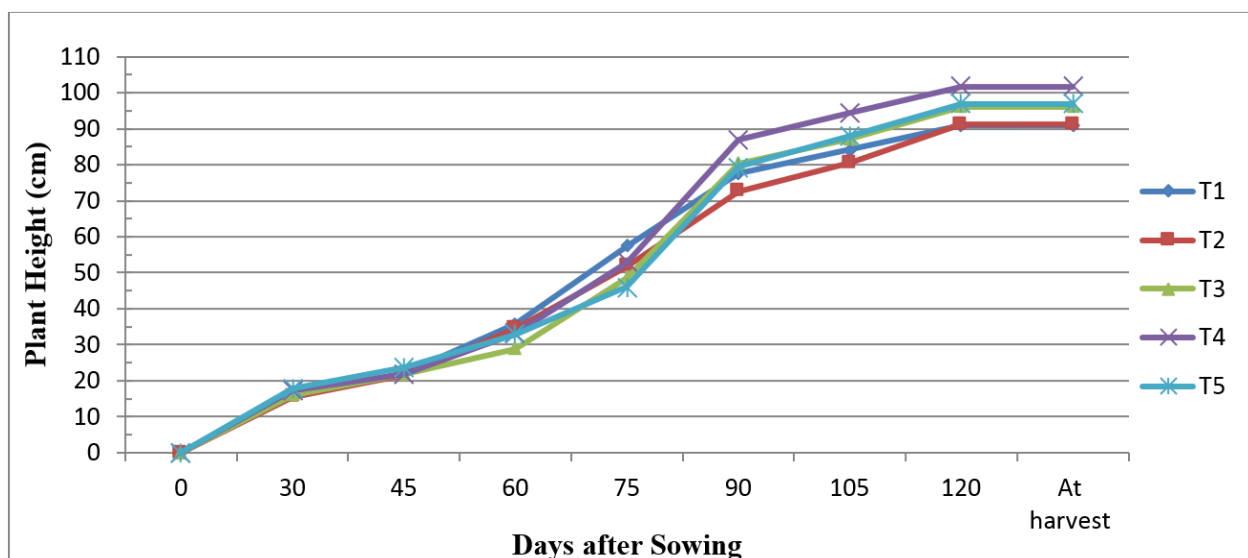
Yield per acre (q)

It was observed that the T₅ gave the maximum yield (21.7 qt/acre) followed by T₁ (20.6), T₂ (19.7), T₄ (19.0) quintals per acre respectively and T₃ (18.7qt/acre) gave least yield of all the treatments. El-Lattief (2014) [10] conducted a field experiment at the Experimental Farm of the Faculty of Agriculture, South Valley University at Qena on sandy soil to study the effect of integrated nutrient management (INM) on productivity and grain protein content of wheat. The maximum grain (2356tha⁻¹) yields were recorded with T6 (half of the recommended NPK+ 10 tons FYM +bio-fertilizer). The minimum grain yield (1270 t/ ha⁻¹) were recorded with T7 (Control).

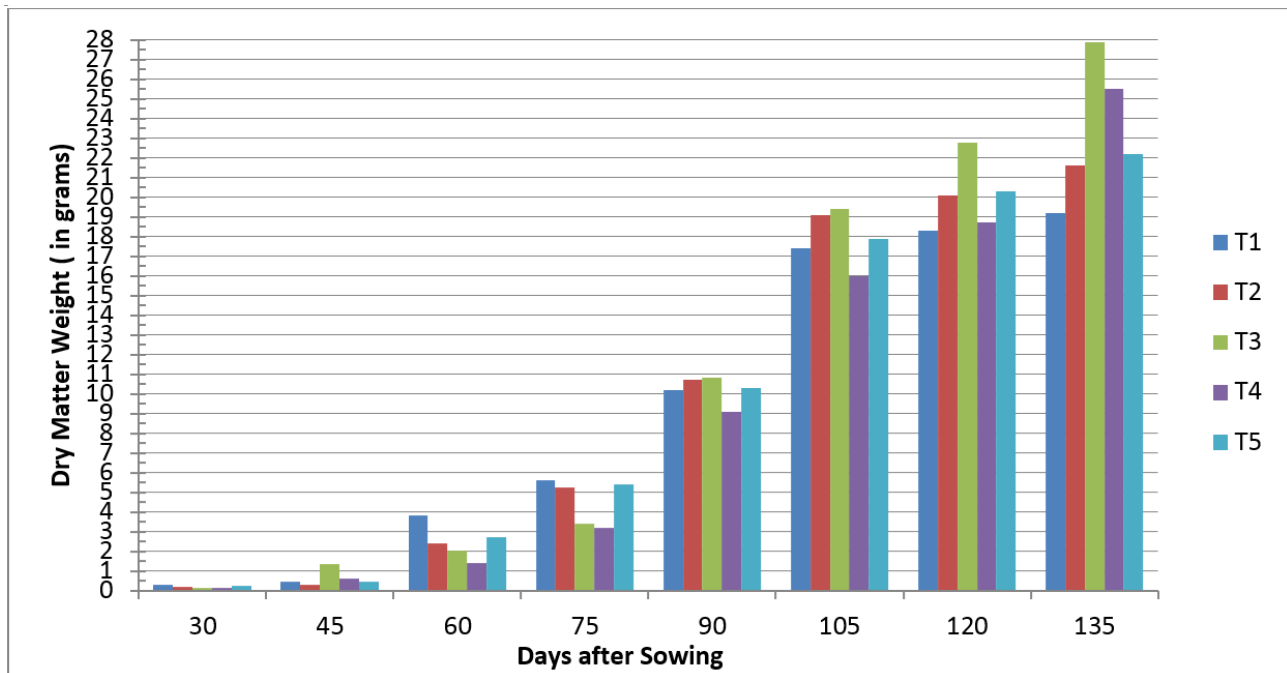
Harvest index (%)

There was slight difference among the Harvest Index of T₃ and T₅ treatments of which T₅ (53.8%) had the highest harvest index and least harvest index in T₂ (42.3%). Rasul *et al.* (2015) [11] conducted a field experiment at Bakrajow Agricultural Research farm which lies between 35°32 36.8" north latitude and 45°21 09.6" east - longitude, under rain-fed condition during winter growing season of 2013-2014 to study the influence of different manures on some vegetative growth of wheat variety Semito. The treatments including T₁ = control, T₂ = 20 t ha⁻¹ sheep manure, T₃ = 20 t ha⁻¹ cow manure and T₄ = 20 t ha⁻¹ poultry manure. The highest value of harvest index was 49.3% from T₁ and the lowest value was 43.1% from T₄.

Observations and Tables



Graph 1: Comparison between plant heights of 5 treatments T₁, T₂, T₃, T₄ and T₅



Graph 2: Comparison between dry matter of 5 treatments T₁, T₂, T₃, T₄ and T₅.

Table 1: Comparison between test weight of 5 treatments T₁, T₂, T₃, T₄ and T₅.

Treatments	1000 grain weight
T ₁	37.2
T ₂	37.4
T ₃	38.5
T ₄	39.2
T ₅	40.1

Table 2: Comparison between Yield of 5 treatments T₁, T₂, T₃, T₄ and T₅.

Treatments	Yield (Qt./acre)
T ₁	20.6
T ₂	19.7
T ₃	18.7
T ₄	19.0
T ₅	21.7

Table 3: Comparison between Harvest index of 5 treatments T₁, T₂, T₃, T₄ and T₅.

Treatments	Harvest index
T ₁	44.7
T ₂	42.3
T ₃	53.5
T ₄	49.2
T ₅	53.8

Conclusion

The present experiment was carried out to study the effect of different organic, inorganic and bio-fertilizer on the yield and yield components of Wheat (*Triticum aestivum* L.). The experiment concluded that among the treatments T₄ (Poultry manure) has better performed in parameter like plant height (101.70cm) and number of spikes/plant (7.4). T₃ (FYM + *Azotobacter*) has better performed in parameter like dry matter (27.90g) and number of tillers/plant (7.6). T₅ (Poultry manure + *Azotobacter*) has better performed in parameter like grain/spike (52.0), 1000 grain weight (40.1g), yield (21.7qt/acre), and harvest index (53.8%). So, it can be concluded that inoculation with *Azotobacter chroococcum* in

combination with organic manure (poultry manure) gave better yield in comparison to other treatments.

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