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Effect of the organic manure, inorganic fertilizers and their combination on growth, yield and quality of radish (*Raphanus sativus* L.) cv. R33

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Abstract

An experiment was conducted at the farm of Sr. Major Singh, Village Bhangala, Abohar, Disst. Fazilka (Punjab) during the year 2018-19 to study the effect of organic manures, inorganic fertilizers and their combinations on growth, yield and quality of radish (*Raphanus sativus* L.). The treatments were recommended dose of fertilizers, 100% Nitrogen through farm yard manure, 100% N through poultry manure, 75% NPK+25% N through farm yard manure, 75% NPK+25% through poultry manure, 50% NPK +50% N through farm yard manure and 50% NPK + 50% N through poultry manure. The effect of these factors on plant height, number of leaves per plant, length of leaf, root yield per plot, root weight, root length per plant, root diameter was observed. Out of these T₆ showed the highest growth, yield and quality parameters of radish. It is closely followed by treatments T₇ for the characters like growth yield and quality parameters of radish.

Keywords: organic manure, inorganic fertilizers, combination on growth, yield and quality of radish

Introduction

Radish (*Raphanus sativus* L.) originated in china and belongs to the family brassicaceae. The enlarged edible roots are fusiform and different in colour from white to red. The Asiatic varieties which are primarily for tropical climates produce edible roots in the first season and seed in the second season as a biennial crop. On the other hand the exotic or European varieties produce roots in the plains of tropical and subtropical climate and seeds in the hills of temperate climate. It attains best flavor, texture and size at 10 to 15°C. Long days as well as high temperature lead to bolting without adequate root formation (www.agropedia.iitk.as.in) [1]. Radish is a rich source of ascorbic and folic acid, potassium, vitamin B6, riboflavin, magnesium, copper and calcium. The root of radish is mostly eaten as a salad, but that is not the only way this vegetable can be eaten, leaves of radish can be eaten in potato soup or as a sautéed side dish (www.vegetablefacts.net) [2]. Farm yard manure and vermicompost are conspicuous organic manure of an integrated nutrient supply system, which improve soil health, water holding capacity, soil texture, organic matter and releases macro and micro nutrient. Integrated application of chemical fertilizers and organic fertilizer produce some growth promoting substances like IAA, gibberellins, cytokinin, vitamins, etc. which help in germination, root and shoot development, resulting enhancement in yield (Verma *et al.*) [3].

Material and Methods

The experiment was conducted at the farm of Sr. Major Singh, Village Bhangala, Abohar, Disst. Fazilka, Punjab, India. The crop was grown in *rabi* season of year 2018. The experiment was conducted in seven plots each having dimensions 5m ×5m. The treatments were recommended dose of fertilizers, 100% Nitrogen through farm yard manure, 100% N through poultry manure, 75% NPK+25% N through farm yard manure, 75% NPK+25% through poultry manure, 50% NPK +50% N through farm yard manure and 50% NPK + 50% N through poultry manure. The field was prepared with disc harrow followed by 2 ploughing

with cultivator and leveling was done with the help of plunger. The seeds were sown on 30th August 2018 @ 9-11 kg/hectare were used and the variety was R33 sown on ridges. Plant height was measured with the help of measuring tape at the interval of 15 days from selected plants from each plot. Number of leaves per plant were counted manually, leaf length, root length per plant, root width per plant were measured with the help of measuring tape and vernier caliper at an interval of 15 days. Weight of head of plants was taken after removing stem and leaves from the each plot and average weight of head per plant was calculated with the help of electronic weighing machine.

Treatments

- T₁ - Recommended dose of fertilizer
- T₂ - 100% N through FYM
- T₃ - 100% N through Poultry manure
- T₄ - 75% NPK + 25% N through FYM
- T₅ - 75% NPK + 25% N through Poultry manure
- T₆ - 50% NPK + 50% N through FYM
- T₇ - 50%NPK + 50% N through Poultry manure

Results and Discussions

Plant height (cm)

As from the experiment maximum plant height was obtained in the treatment T₆ i.e. 50% NPK + 50% N through Poultry manure and minimum plant height was obtained in T₂. So chapagain *et al.* [4] studied the comparison of commercial and local varieties of radish at different levels of manure and fertilizers and concluded that highest plant height was observed in T₇ (100:80:50 NPK + FYM 20 t/ha) i.e. 47.72 cm. Similarly Verma *et al.* [3] concluded that highest plant height was observed in T₁₀ (Vermicompost 30t/ha) i.e. 69.29 cm at 45 DAS and lowest plant height was observed in T₀ (control) i.e. 15.69 cm at 15 DAS.

Length of root (cm)

From the experiment, it was observed that length of root in radish was significantly affected with different treatments. Maximum length of root (19.97 cm) was observed under the treatment T₆. It was significantly superior over other treatments. It was followed by T₇ (18.30 cm), T₅ (17.83 cm), T₁ (17.07 cm), T₃ (16.97 cm) and T₄ (16.89 cm) in descending order at all the stages of growth. While minimum length of root i.e. 15.80 cm was observed under the treatment T₂ (15.80 cm) (100% N through FYM) after harvesting. So Pathak *et al.* [5] concluded that root length was higher in T₆ Safe production (FYM@ 20 tonne ha⁻¹+ IIHR microbial consortium @ 12.5 kg ha⁻¹) (PP with organic methods) i.e. 15.79cm. Similarly, Baloch *et al.* [6] observed the results that root length was higher in T₄ (150-75-100) i.e 31.07 cm.

Number of leaves per plant

As from the experiment number of leaves per plant was affected significantly with different treatments at all stages of growth under study. Treatment T₆ recorded significantly higher number of leaves per plant i.e. 6.53, 11.03 and 13.50 at 30 and 45 DAS and at harvesting stage, respectively as compared to other treatments. While minimum number of leaves i.e. 4.60, 7.87 and 10.83 per plant were observed under the treatment T₂ (100% N through FYM) at 30, 45 DAS and at harvesting stage. So Uddain *et al.* [7] studied the efficacy of different organic manure on growth and productivity of Radish (*Raphanus sativus* L.). The results showed that

maximum no. of leaves per plant (21.67) was observed in poultry manure at 75 DAS and minimum no. of leaves per plant (13.01) was observed in control treatment at 45 DAS. Similarly, Kumar *et al.* [8] observed that T₁₀ has highest no. of leaves per plant (51.05) at 75 DAP and T₁ has minimum no. of leaves per plant (36.21).

Diameter of root (cm)

It was observed that diameter of root in radish was significantly affected with different treatments. Maximum diameter of root (3.84cm) was observed under the treatment T₆. It was followed by T₇ (3.48), T₅ (3.11), T₁ (2.88), T₃ (2.81) and T₄ (2.80) in descending order at all the stages of growth. While minimum Diameter of root i.e. 2.74 cm was observed under the treatment T₂ (100% N through FYM) after harvesting. Minimum diameter of root (2.74 cm) was recorded under the treatment T₂ (100% N through FYM). So Yadav *et al.* [9] showed that highest root diameter was observed in T₁ (RDF (100:80:50 NPK kg/ha) i.e. 3.76 cm. Similarly, Pathak *et al.* [5] observed the result that root diameter was higher in T₇ Safe production (FYM@ 20 tonne ha⁻¹+ IIHR microbial consortium @ 12.5 kg ha⁻¹) (PP with organic methods) i.e 10.23cm.

Observations and Tables

Plant height

Table 1: Effect of organic manure, inorganic fertilizer and their combinations on plant height (cm) of radish

| Treatment | Plant height (cm) | | |
|----------------|-------------------|---------|----------------------|
| | 30 DAYS | 45 DAYS | At harvesting (DAYS) |
| T ₁ | 10.47 | 25.73 | 27.73 |
| T ₂ | 9.13 | 22.83 | 25.90 |
| T ₃ | 10.20 | 24.97 | 26.93 |
| T ₄ | 9.80 | 23.77 | 26.07 |
| T ₅ | 11.90 | 27.30 | 29.67 |
| T ₆ | 14.43 | 32.37 | 35.23 |
| T ₇ | 13.07 | 29.53 | 32.53 |

Length of roots

Table 2: Effect of organic manure, inorganic fertilizer and their combinations on Length of root (cm) of radish

| Treatment | Length of root (cm) |
|----------------|---------------------|
| T ₁ | 17.07 |
| T ₂ | 15.80 |
| T ₃ | 16.97 |
| T ₄ | 16.89 |
| T ₅ | 17.83 |
| T ₆ | 19.97 |
| T ₇ | 18.30 |

Number of leaves per plant

Table 3: Effect of organic manure, inorganic fertilizer and their combinations on Number of leaves per plant of radish

| Treatment | Number of leaves per plant | | |
|----------------|----------------------------|---------|----------------------|
| | 30 Days | 45 Days | At harvesting (Days) |
| T ₁ | 4.87 | 8.63 | 11.13 |
| T ₂ | 4.60 | 7.87 | 10.83 |
| T ₃ | 4.77 | 8.23 | 10.93 |
| T ₄ | 4.63 | 8.10 | 10.97 |
| T ₅ | 5.27 | 9.03 | 11.43 |
| T ₆ | 6.53 | 11.03 | 13.50 |
| T ₇ | 5.87 | 10.07 | 12.47 |

Diameter of roots

Table 4: Effect of organic manure, inorganic fertilizer and their combinations on Diameter of root (cm) of radish

| Treatment | Diameter of root (cm) |
|----------------|-----------------------|
| T ₁ | 2.88 |
| T ₂ | 2.74 |
| T ₃ | 2.81 |
| T ₄ | 2.80 |
| T ₅ | 3.11 |
| T ₆ | 3.84 |
| T ₇ | 3.48 |

Conclusion

It may be concluded from the finding of the present study that among the different treatments, T₆ showed in the highest growth, yield and quality parameters and yield of radish. Plant height, number of leaves per plant, length of roots and diameter of roots are observed maximum in T₆. It is closely followed by treatment T₇ for the characters like growth, yield and quality parameters and yield of radish.

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