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Effect of farm yard manure on yield related attributes of turnip (*Brassica rapa* subsp. *rapa*) under semi-controlled polyhouse

F.A. PARRY[1*], A. MASOOD[2], R. ANAYAT[2] AND N. SINGH[1]

[1]*Faculty of Horticulture, Sher-e-Kashmir University of Agricultural Sciences & Technology, Shalimar, Srinagar-190025, Jammu & Kashmir, India*

[2]*Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences & Technology, Wadura, Sopore-193201, Jammu & Kashmir, India*

[*]*parrayferoz786@gmail.com*

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ABSTRACT

An experiment was conducted under semi-controlled poly house with four treatments (0, 5, 10 and 15 tonnes of Farm yard manure per hectre) at Mountain Agriculture Research and Extension Station, Gurez, SKUAST-K (J&K) during *Rabi* -2022 to find out the optimum dose of FYM for improving yield related attributes of turnip under protected condition. Among the treatments studied, significantly highest root weight (145 g), weight of leaves (65.66 g), root diameter (24.66 cm), early maturity (35 days after sowing) and total yield (348 q ha^{-1}) were obtained with the application of 15 tonnes of FYM per hectre.

Key words: FYM, organic manure, poly-house, turnip

INTRODUCTION

Turnip (*Brassica rapa* subsp. *rapa*) is a member of the cruciferous family. Turnip, also known as field mustard or turnip mustard is a plant widely cultivated as a leafy vegetable, a root vegetable and an oilseed. It is cultivated as an annual crop, but grows best in cool weather because hot temperatures cause the roots to become woody and bad-tasting (Pamula and Kerketta, 2021). In Gurez (J&K), turnip is mainly grown as off-season vegetable due to high altitude conditions and its sowing is done during end of May in open condition and farmers are used un-decomposed cow dung for its fertilization. It is mainly grown for its enlarged flashy roots which develop from primary root and the hypocotyl. The thinned seedlings are also used as greens. The fresh roots are used in salads, consumed as cooked vegetable and used in pickles. The young leaves are rich source of minerals, calcium, iron and vitamin A and C (Ali et al., 2018). Turnip has enormous prospective as a short duration, high yielding fodder crop. Its fodder is rich in readily available carbohydrate and crude protein as well as it is highly palatable, succulent and easily digestible (Yadav et al., 2021). Vegetable cultivation under protected structures is feasible and economical in places where open cultivation is not possible. Keeping the importance of turnip as nutritional security root vegetable, an investigation has been carried out to find out the suitable level of Farm Yard Manure (FYM) on yield attributes of turnip under semi-controlled poly-house.

MATERIALS AND METHODS

The experiment was conducted at Mountain Agriculture Research and Extension Station, Gurez, Bandipora. Gurez is an area located at an altitude of (8000 ft above msl) in the northern areas of Jammu and Kashmir Union Territory. The experiment was conducted under semi-controlled conditions in poly house during *Rabi* - 2022. The experiment was managed at four levels of farm yard manure (0, 5, 10 and 15 t ha^{-1}) replicated five times. Each treatment was arranged as 0, 1.1 kg, 2.25 kg, 3.3 kg m^{-2}

as T_1, T_2, T_3, and T_4, respectively. The site was cleared manually, ploughed and weeded before seedbeds were marked. There were twenty seed beds each measuring 1.0 × 1.0 m and was separated by a buffer of 0.25 m. farm yard manure was applied to the seed beds and mixed with soil per treatment. The row to row spacing of 30 cm and plant to plant spacing of 15 has been adapted. 15 days after germination, the thinning has been done.

Data collection and analysis

At the time of harvesting, all the measurements were observed and recorded using standard procedures and the data was analyzed using OPSTAT.

Root weight

The leaves of the selected plants were removed and after that the weight of roots was recorded in each treatment and replication and average root weight was calculated.

Root diameter

The diameter of the selected plants was measure with the help of Vernier caliper and average root diameter was calculated.

Leaf weight

The number of leaves of selected plants were counted and the average was calculated at harvesting stage.

No. of maturity days

Number of days was counted from sowing to marketable maturity.

Yield ha^{-1}

The root yield in tonnes per hectare was calculated as per marketable root yield per plot under each treatment and total weight of roots was calculated by multiplying with factor.

RESULTS AND DISCUSSION

Effect of FYM application on different components

Root weight

Variation between the rates of application of FYM with each of other treatment was observed after the experiment has been done. Among the treatments given, T_4 (15 t ha^{-1}) registered maximum root weight of 145 g per plant followed by T_3 (10 t ha^{-1}) and was statistically significant with rest of treatments. These findings are in agreement with Kumar et al. (2018) and Umar et al. (2019).

Leaf weight

Fresh weight of leaves was recorded at the marketable maturity stage. The data presented in Table 1 showed that significant effect of different levels of FYM on fresh weight of leaves. Maximum fresh weight of leaves 65.66 g per plant) was recorded in treatment T_4 (15 t ha^{-1}) and was most significant difference at 0.05 probability level followed treatment T_3 (10 t ha^{-1}) with leaves weight of 60.42 g per plant. These findings are in agreement with Kumar et al. (2018) and Umar et al. (2019).

Root diameter

Among the treatments given to the tests of effects FYM application rate on root diameter of turnip, T_4 -15 t ha^{-1} was recorded with the maximum root diameter (24.66 cm) which was statistically significant with rest of treatments followed by T_3. Similar results have been reported by Eric Randy (2016) and Rabbee et al. (2020).

Number of maturity days

The number of days taken for marketable maturity was recorded and presented in Table No. 1. The data showed that the minimum time (35 days) taken for marketable maturity was observed in T_4 -15 t ha^{-1} followed by T_3-10 t ha^{-1} (39 days), T_2 -5 t ha^{-1} (44 days) and maximum number of maturity days was with T_1 -0 t ha^{-1} (48 days). All the treatments showed significant difference. These observations are in conformity with the results of Eric Randy (2016).

Total yield

The total yield per hectare was calculated and has been presented in Table 1. The T_4 (15 t ha^{-1}) was significantly superior and recorded the maximum turnip yield (348 t ha^{-1}) followed by T_3 -10 t ha (334 t ha^{-1}) and T_2 - 5 t ha^{-1} (318.40 t ha^{-1}). However, the minimum yield was recorded in T_1-0 t ha^{-1}

(255.86 t ha^{-1}). Similar observations have been reported by Umar et al. (2019) and Satish (2016).

FYM improves the physical condition of the soil, including water retaining capacity, soil hydraulic conductivity, and accessibility of N, P, K, increasing the growth of micronutrients from the plant and soil bed side that serve as a plant nutrient store. It may be due to the action of polysaccharides and other organic compounds released by FYM during the decomposition of organic matter. This accelerated the growth of new tissues and the development of new shoots, which eventually increased the height of the plant and the accumulation of dry matter Lakshmipathi et al. (2012) and Thumar et al. (2016). The application of FYM contains higher percentage of macronutrients and micronutrients which supply the available nitrogen to plants. They also improved the water holding capacity, soil aeration, increased the porosity and increased the vegetative growth of plants Singh et al. (2009) and Aisha et al. (2014). The use of organic materials with better control results may be attributed to a balanced supply of major and micro nutrients and an improvement in soil water holding capacity was observed (Bana et al. 2016). Due to the maximum plant nutrients available under this procedure, the positive impact of FYM concentrations retained a stronger source-sink relationship. This means the quantity of dry matter or photosynthates provided by source organs that are transferred to sink organs (economic component) and the yield is increased. (Husain et al., 2017).

Table 1. Effect of farm yard manure application on different parameters

Treatments	Root weight (g per plant)	Weight of leaves (g per plant)	Root diameter (cm)	No. of maturity (Days)	Yield (q ha^{-1})
T_1 (0 t ha^{-1})	106.66	42.66	12.80	48.00	255.86
T_2 (5 t ha^{-1})	132.45	53.33	18.00	44.00	318.40
T_3(10 t ha^{-1})	138.40	60.42	21.33	39.00	334.00
T_4(15 t ha^{-1})	145.00	65.66	24.66	35.00	348.00
C.D (P≤0.05)	5.04	3.94	3.16	2.47	12.09

CONCLUSION

The research indicates that the application of 15 tonnes of farmyard manure (FYM) per hectare significantly improves turnip yields in protected cultivation, resulting in, the largest root weight of 145 g and a diameter of 24.66 cm, the highest leaf biomass of 65.66 g, early maturation, with crops ready for harvest 35 days after sowing (DAS) and a maximum output of 348 quintals per hectare. These findings emphasize the importance of using organic fertilization with FYM as an effective method for maximizing turnip growth, speeding up crop cycles, and increasing yields in semi-controlled environments. Farmers in comparable agro-climatic areas can implement this FYM application rate to enhance soil health and promote sustainable crop production.

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