IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 18, Issue 9 Ser. 1 (September. 2025), Pp 61-69
www.iosrjournals.org

Influence of Farmyard manure and Vermi compost on the growth and yield of turnip (Brassica rapa L.)

Astha Sharma and Brijesh Kumar
Department of Horticulture, Faculty of Agriculture , Dr.Bhimrao Ambedkar University, Agra, Uttar Pradesh

Abstract
The present field experiment entitled "Effect of Farmyard manure and Vermicompost on the growth and yield of Turnip (Brassica rapa L.) cv. Purple Top White Globe" was conducted at Agricultural Research Farm, Department of Horticulture, Raja Balwant Singh College, Bichpuri, Agra during Rabi season of the year 2024-2025 .The result and the conclusion of experiment are briefly explain here. The experiment was laid out in a randomized block design with 3 replications 10 treatments viz., T0: Absolute Control ,T1: RDF (100%)+FYM (100%) , T2: RDF (75%)+FYM (25%), T3: RDF (50%)+ FYM (50%) , T4: RDF (25%)+ Vermicompost (75%), T5 : RDF (75%) + Vermicompost (25%), T6: RDF (50%) + Vermicompost (50%) , T7: FYM (25%)+Vermicompost (75%) , T8: FYM (50%) + Vermicompost (50%), T9:FYM(25%)+Vermicompost (75%). The data were recorded on days required for germination of seedlings, plant height (cm), number of leaves per plant, length of longest leaf(cm),width of longest leaf(cm) , length of root (cm), diameter of root (cm),root yield per plot (%), fresh weight of leaves(gm),fresh weight of roots (gm) ,fresh weight of whole plant (gm) ,dry matter content of leaves(%) ,dry matter content of roots(%). The early germination was recorded in T1: RDF (100%) + FYM(100%) and it was followed with T2 : RDF (75%)+ FYM (25%) . The highest plant height and number of leaves was recorded with T1: RDF (100%) + FYM (100%) which was followed with T2: RDF (75%) + FYM (25%). The length of longest leaf and width of longest leaf was recorded with T1: RDF (100%)+ FYM (100%) . The results of the present investigation revealed that the application of FYM and Vermicompost with recommended dose of NPK (60:40:50 kg/ha) which gives best results in T1: RDF (100%) + FYM (100%) is reported higher plant growth, root yield, NPK uptake, maximum net returns whereas application of T9: FYM (25%) + Vermicompost (75%) recorded better quality of turnip.

Keywords: *Turnip, Farmyard manure, Vermicompost, Growth, Yield.*

I. Introduction

Turnip (2n=20) (Brassica rapa L, syn. Brassica campestris variety, rapa) is a quick growing root vegetable and one of the most important member of the family Crucifereae. Brassica rapa commonly known as field mustard or turnip mustard cultivated in temperate climates worldwide as leaf vegetable, a root vegetable and an oil seed. It is herbaceous biennial for seed production and an annual for use as a vegetable. It is believed that turnip is originated from Europe and West Asian countries, and domestication of this vegetable was took place in those regions (Zohary and Hopf,2000). It requires moderately deep fertile well drained soil is ideal for turnip vastly light clay soil or very sandy soil should be avoided and except those grown in moist soil. Turnip is best adopted cool and favorable climate. It is a hardly resistant crop against frost, fog and mildly freezing temperature and high temperature is adverse climatic conditions. It is commonly grown in temperate climates. It is mainly cultivated for the sake of its storage organ, the hypocotyls and the swollen upper part of the root and lower part of the stem. Skin colour of turnip varies from white to yellow, purple, red and occasionally green. Root shape vary from flat to round, spindle and long with white, creamy or yellow flesh. It has crisp flesh and a zesty mustard-like flavor and a rapidly maturing crop. The turnip greens are rarely used as vegetable, as well as green fodder for cattle. The young tops are rich in minerals i.e calcium ,88, vitamin-A, the other vitamins such as B and C are also found in appreciable quantities. Greens have an intense aroma, the colour of the leaves and a salty taste, while the tops are unique for their colour, moistness, fibrosity in the mouth and bitter taste (Lim, 2015) . The young part of the plant i.e stem and leaves are consumed by humans. Turnip is grown for it's enlarged root as well as for it's foliage. Extra seedlings from the thinning are often used as greens. The fresh roots are consumed in salad or cooked as vegetable or used in pickles. Its root called underground modified root which is in napiform shape (Langer and Hill, 1983). The stem is short at vegetative state but elongated at the reproductive stage. According to the National Institute of Nutrition, Hyderabad, the daily requirement of nutrients like proteins, vitamins, minerals, etc.If an individual takes 280gm of vegetables per day. This should include 110gm of leafy vegetables, 85gm of root and tuber vegetable and 85gm of other vegetables.

North India is the biggest producer of turnip, basically for its swollen root. Turnip has tremendous potential as a short duration, high yielding fodder. It's fodder rich in readily available carbohydrates and protein as well as it is highly palatable, succulent and easily digestible.

Turnip is grown under organic treatments (FYM + vermicompost) had higher nutritional content (vitamin C and minerals) and longer shelf life than those grown with chemical inputs.(Patidar and Mali, 2020).

Integrated use of FYM and vermicompost with or without chemical fertilizers results in better growth and higher yields than when used alone. This also helps in maintaining soil health and reducing dependency on chemical fertilizers in sustainable agriculture systems.(Sharma and Verma ,2021).

II. Materials And Methods

The experiment was performed during winter season of 2024-2025 at Agricultural Research Farm ,Raja Balwant Singh College, Bichpuri, Agra (Uttarpradesh). The field experiment was carried out with 10 treatments and 3 replications laid out in Randomized Block Design consisting treatment combinations as T0: Absolute Control, T1: RDF(60:40:50 kg/ha) + FYM (25 tonnes/ha), T2: RDF (75%) + FYM (25%) , T3: RDF (50%) +FYM (50%) , T4 : RDF (25%)+ FYM (75%) , T5: RDF (75%)+V.C (25%), T6 : RDF (50%) + V.C (50%) ,T7: RDF (25%)+V.C (75%) ,T8: FYM (50%)+ V.C (50%) ,T9: FYM (25%) + V.C (75%) and these treatments were applied to Purple Top White Globe variety of turnip. Turnip was sown on 18th November, 2024 with a spacing of 40 cm×10 cm and harvested on 30th January, 2025.Each plot was given manures as per treatments. Organic manures were thoroughly mixed with soil at the time of land preparation. Irrigation, weeding and other intercultural operations were given as per requirement. Thinning was done at 15 days after sowing to maintain plant population as per spacing. Growth parameters were recorded at various stages which was starting from 30

DAS, 45 DAS, 60 DAS and at the time of harvesting. The growth parameters like plant height, number of leaves plant^{1}, length of longest leaf and width of longest leaf . Similarly, all yield parameters like root length, root diameter, root yield (Kg plot^{1}) and root yield (q ha^{1}) were recorded. Economics parameters of different treatments were also analyzed.

III. Results and Discussion

Growth parameters and attributes

The growth parameters such as plant height, number of leaves plant^{1}, leaf length and leaf width was significantly influenced by 'T' treatment and the research Indicates that applying 100% Recommended Dose of Fertilizers (RDF) alongside Farmyard Manure (FYM) at 25 tons per hectare significantly boosts various growth parameters in the final stage of plant development. Specifically, plants treated this way showed notably higher plant height (55.98 cm), a higher number of leaves (14.86), and with a length of longest leaf (41.86 cm) and width of longest leaf (14.52 cm) in treatment (T1): RDF (60:40:50 kg/ha) + FYM (25 tonnes/ha) at the time of harvesting which gave the highest values in all growth parameters. The application of RDF, Vermicompost and farmyard manure 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.

Height of plant (cm)

Across all recorded growth stages (30, 45, 60 Days After Sowing, and At Harvest), Treatment T1 (100% Recommended Dose of Fertilizer at 60:40:50 kg/ha along with 25 tonnes/ha Farmyard Manure) consistently resulted in the greatest plant height, proving to be significantly superior to other treatments. At 30 DAS, T1 recorded a maximum height of 15.82 cm. While T2 (19.75 cm), T5 (18.63 cm), T6 (18.23 cm), and T3 (18.19 cm) showed minor significant differences among themselves, the absolute control (T0) had the lowest height at 10.50 cm, at 45 DAS, T1 maintained its lead with a plant height of 39.67 cm. Treatments T2 (38.21 cm), T5 (37.21 cm), and T6 (37.02 cm) exhibited minor differences, while T0 remained the lowest at 20.97 cm, at 60 DAS, T1's dominance continued with a height of 42.73 cm. Treatments T2 (42.52 cm), T5 (41.61 cm), and T6 (40.65 cm) again showed only minor significant differences from each other. The control group (T0) registered the minimum height of 26.15 cm. Finally, at Harvest, T1 achieved the maximum plant height of 55.98 cm. Similar to earlier stages, T2 (52.07 cm), T5 (51.88 cm), and T6 (50.21 cm) showed minor significant differences. The absolute control (T0) consistently recorded the lowest plant height, reaching 31.69 cm at harvest.

Number of leaves

Throughout the plant's growth, from 30 days after sowing (DAS) up to harvest, treatment T1 (100% of 60:40:50 kg/ha NPK + 25 tonnes/ha FYM) consistently resulted in the highest number of leaves plant^{1} significantly outperforming all other treatments. At 30 DAS, T1 recorded 10.76 leaves plant^{1}, increasing to 13.29 at 45 DAS,

16.29 at 60 DAS, and finally 17.39 leaves plant[1] at harvest. While T2, T5, and T6 showed consistently similar and slightly lower leaf counts compared to T1 at each stage, the absolute control (T0) consistently yielded the fewest leaves, starting at 8.12 leaves plant[1] at 30 DAS and reaching 14.50 leaves plant[1] at harvest. This data highlights the superior efficacy of treatment T1 in promoting leaf development.

Length of longest leaf (cm)

Among all successive stages (30, 45, 60, and at harvest Days After Sowing – DAS), Treatment T1, which involved 100% (60:40:50 kg/ha) fertilizer along with 25 tonnes/ha of Farmyard Manure (FYM), consistently resulted in the longest plant leaves, proving to be significantly superior to all other treatments. While treatments T2, T5, T6, and T3 showed minor significant differences among themselves, they generally performed well, yielding longer leaves compared to the control. In contrast, Treatment T0 (Absolute Control) consistently recorded the shortest plant leaves at every measurement point. This suggests that the combination of optimal fertilization and FYM in Treatment T1 provided the most favorable conditions for leaf growth throughout the plant's development.

Width of longest leaf (cm)

From all treatments, Treatment T1, consisting of 100% (60:40:50 kg/ha) nutrient application and 25 tonnes/ha Farm Yard Manure (FYM), consistently resulted in the greatest leaf width, proving to be the most effective treatment. At 30 DAS, T1 showed a leaf width of 8.96 cm.This increased to 12.36 cm at 45 DAS. By 60 DAS, T1 recorded 13.52 cm and at Harvest DAS, the leaf width under T1 reached 14.52 cm. Treatments T2, T5, T6, and T3 showed minor significant differences among themselves but generally yielded lower leaf widths compared to T1. In contrast, the absolute control group (T0) consistently exhibited the minimum leaf width at all stages, starting at 5.98 cm at 30 DAS and reaching 10.97 cm at harvest. This data highlights the significant positive influence of Treatment T1 on leaf development throughout the plant's growth cycle.

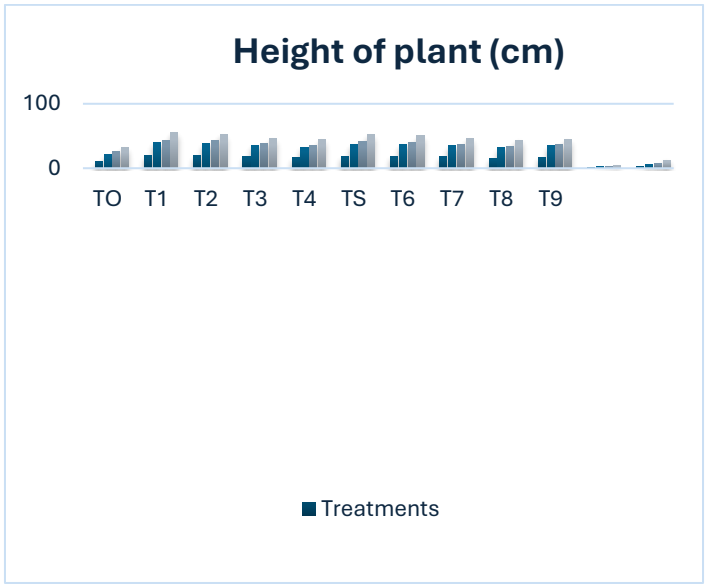
These findings align with and reinforce the work of numerous other researchers, including Vrkoc and Suskevic (2010), Kirad et al. (2010), and Bodkhe, V.A. and Moharkor (2010), who have mentioned beneficial effect of combination of organic manure with the recommended doses of NPK through inorganic fertilizers on various root crops.

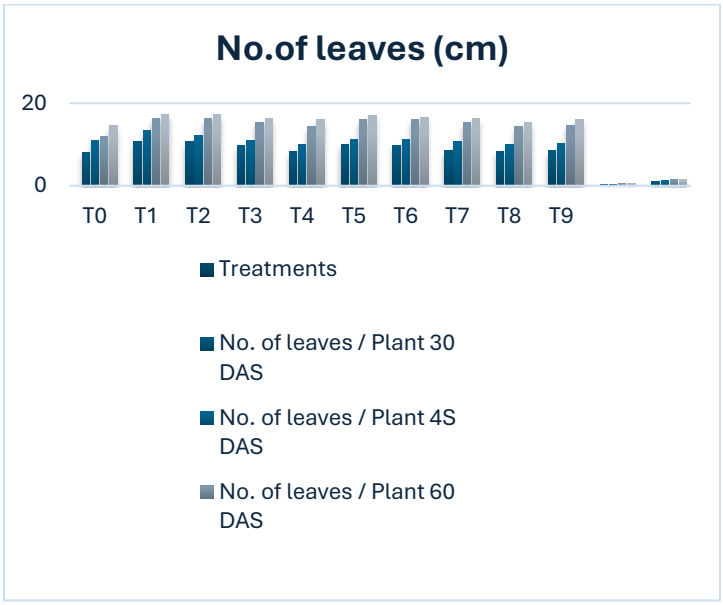
Yield parameters

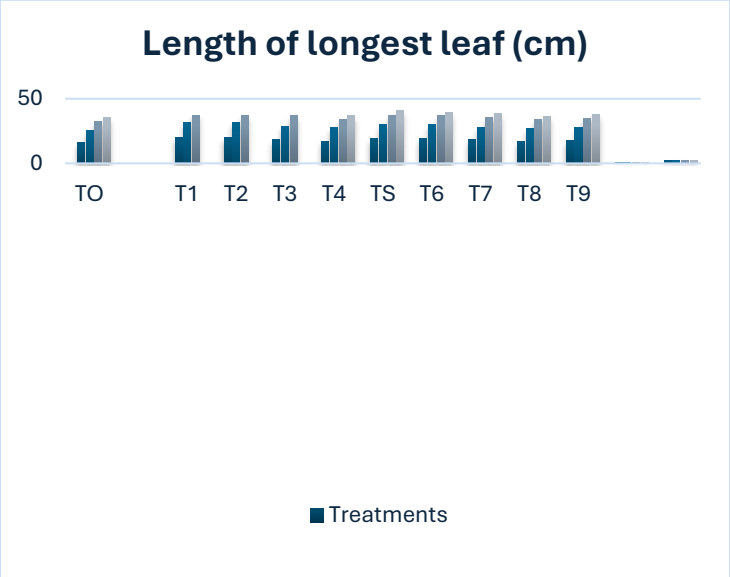
The combination of 100% Recommended Dose of Fertilizers (RDF) and 25 tonnes /ha of Farmyard Manure (FYM) significantly influenced yield parameters. Specifically, this application led to a fresh weight of leaves was (94.35 gm) , fresh weight of root was (96.25 gm), dry matter content of root was (7.08%), and dry matter content of leaf was (10.65%). These results are consistent with the findings reported by Kirad et al. (2010), Kumar et al. (2012), Mehedi et al. (2012), Vithwel and Kanaujia (2013), Bodkhe and Mohorkar (2010), Khalid et al. (2015), and Filintseva (2017).

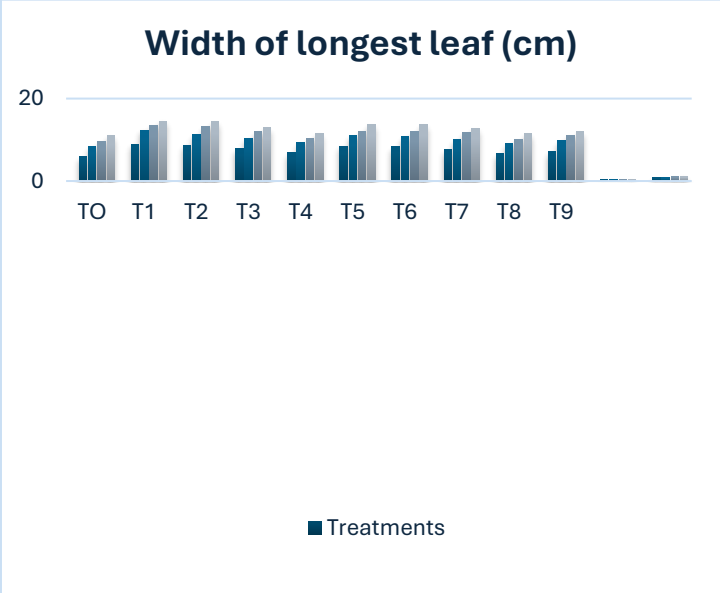
Table-01:- Effect of Farmyard manure and Vermicompost on the growth parameters like height of plant(cm),number of leaves, length of longest leaf (cm) and width of longest leaf (cm)

Treatment	Plant Height (cm)	No. of Leaves	Length of Longest Leaf (cm)	Width of Longest Leaf (cm)
T0	31.69	14.5	35.29	10.97
T1	55.98	17.39	41.22	14.52
T2	52.07	17.26	41.46	14.32
T3	45.76	16.3	39.34	12.97
T4	43.81	15.96	36.96	11.62
T5	51.88	15.96	40.93	13.78
T6	50.21	16.6	39.67	13.76
T7	45.64	16.28	38.76	12.97
T8	43.63	15.92	36.4	11.53
T9	44.83	15.67	37.51	12.05
SEM+	4.26	1.55	0.83	0.41
CD (5%)	12.67	2.48	1.22	1.02


Height of plant (cm)
100
0
TO T1 T2 T3 T4 TS T6 T7 T8 T9
Treatments


No.of leaves (cm)
20
0
T0 T1 T2 T3 T4 T5 T6 T7 T8 T9
Treatments
No. of leaves / Plant 30 DAS
No. of leaves / Plant 4S DAS
No. of leaves / Plant 60 DAS





Fresh weight of leaves (gm)

At 30 DAS, T1 showed a fresh weight of 6.91 gm. This significantly outperformed other treatments, with T2, T5, T6, and T3 showing minor differences among themselves (6.12 gm, 5.99 gm, 5.63 gm, and 5.08 gm, respectively). The absolute control (T0) recorded the lowest fresh weight at 3.17 gm.This trend continued at 45 DAS, where T1 yielded 18.75 gm, again proving to be the best. T2, T5, T6, and T3 followed with 17.96 gm, 17.28 gm, 15.86 gm, and 15.64 gm, respectively, while T0 had a minimum of 10.39 gm.By 60 DAS, T1 maintained its superiority with a fresh weight of 74.74 gm. T2, T5, T6, and T3 displayed minor variations (72.39 gm, 71.46 gm, 71.07 gm, and 67.19 gm), and T0 remained the lowest at 49.5 gm.Finally, at harvest, T1's fresh leaf weight reached 94.35 gm, solidifying its position as the most effective treatment. T2, T5, T6, and T showed fresh weights of 93.09 gm, 87.28 gm, 85.87 gm, and 83.93 gm, respectively, with the absolute control (T0) recording the lowest at 63.08 gm. These findings strongly indicate that the combined application of 100% recommended nutrients and 25 tonnes/ha FYM (Treatment T1) is crucial for maximizing leaf fresh weight.

Fresh weight of root (gm)

In all successive stages (30, 45, 60 Days After Sowing, and at Harvest), Treatment T1 (100% NPK at 60:40:50 kg/ha with 25 tonnes/ha Farm Yard Manure) consistently resulted in the highest fresh root weight, proving significantly superior to all other treatments.

At 30 DAS, T1 recorded 0.39 gm. Other treatments like T2 (0.35 gm), T5 (0.33 gm), T6 (0.31 gm), and T3 (0.30 gm) showed minor differences, while the absolute control (T0) had the lowest at 0.19 gm. By 45 DAS, T1's lead

became more pronounced with 36.08 gm. T2 (34.60 gm), T5 (33.46 gm), T6 (33.09 gm), and T3 (32.60 gm) maintained minor differences among themselves, and T0 remained the lowest at 25.17 gm. At 60 DAS, T1 continued its strong performance with 79.36 gm. T2 (77.02 gm), T5 (74.19 gm), and T6 (71.29 gm) exhibited minor differences, with T0 at 46.34 gm.Finally, at Harvest, T1 maintained its significance with 96.25 gm. T2 (94.36 gm), T5 (94.18 gm), and T6 (93.86 gm) showed only minor variations from each other, while T0 recorded the minimum fresh root weight at 70.32 gm. These findings strongly suggest that the combination of 100% NPK and 25 tonnes/ha FYM (Treatment T1) is the most effective for promoting root growth and fresh weight in the plant at all stages of development.

Dry matter content of root and leaves (gm)

Treatments significantly impacted the dry matter content of both roots and leaves. Treatment T1 (100% Recommended Dose of Fertilizer – RDF with 25 tonnes/hectare Farmyard Manure – FYM) resulted in the highest root dry matter content (7.01%). This was a significant improvement compared to all other treatments and the control (T0), which had the lowest root dry matter (5.88%). While other treatments showed some variation, their impact on root dry matter wasn't statistically significant. Similarly, Treatment T1 also led to the maximum leaf dry matter content (10.65%). This was significantly higher than most other treatments, with the exceptions of T2 (75% RDF + 25% FYM) and T5 (75% RDF + 25% Vermicompost), which had comparable effects. The control group (T0) again showed the lowest leaf dry matter (8.43%), and differences among several other treatments (T6, T3, T7, T9, T4, and T8) were not statistically significant.

Root diameter (cm)

Root diameter measurements at various growth stages (30, 45, 60 days after sowing, and at harvest) consistently showed that Treatment T1 (100% NPK at 60:40:50 kg/ha along with 25 tonnes/ha Farm Yard Manure) resulted in significantly larger root diameters compared to all other treatments. For instance, at 30 DAS, T1's root diameter was 0.51 cm, increasing to 10.02 cm by harvest. While treatments T2, T5, and T6 showed minor differences among themselves, they generally exhibited the next best root diameters after T1. In contrast, the absolute control (T0) consistently recorded the smallest root diameters throughout the observations, measuring as low as 0.35 cm at 30 DAS and 5.91 cm at harvest.

Table-02:- Effect of Farmyard manure and Vermicompost on the yield parameters like fresh weight of leaves (gm),fresh weight of root (gm),dry matter content of leaves and roots(%),length of root (cm) and the diameter of the root (cm)

Treatment	Fresh Weight of Leaves (g)	Fresh Weight of Root (g)	Diameter of Root (cm)	Length of Root (cm)
T0	63.08	76.32	5.91	14.71
T1	94.35	96.25	10.02	22.65
T2	93.09	94.36	9.22	20.62
T3	83.93	81.49	7.55	18.37
T4	81.84	94.18	9.05	16.05
T5	87.28	93.86	7.7	20.6
T6	85.07	86.25	7.38	19.14
T7	90.96	80.7	6.57	17.05
T8	75.49	83.53	7.19	15.06
T9	77.92	77.92	6.6	16.91
SEM+	2.14	1.99	0.6	1.43
CD (5%)	6.37	5.91	1.8	4.25

Length of root (cm)

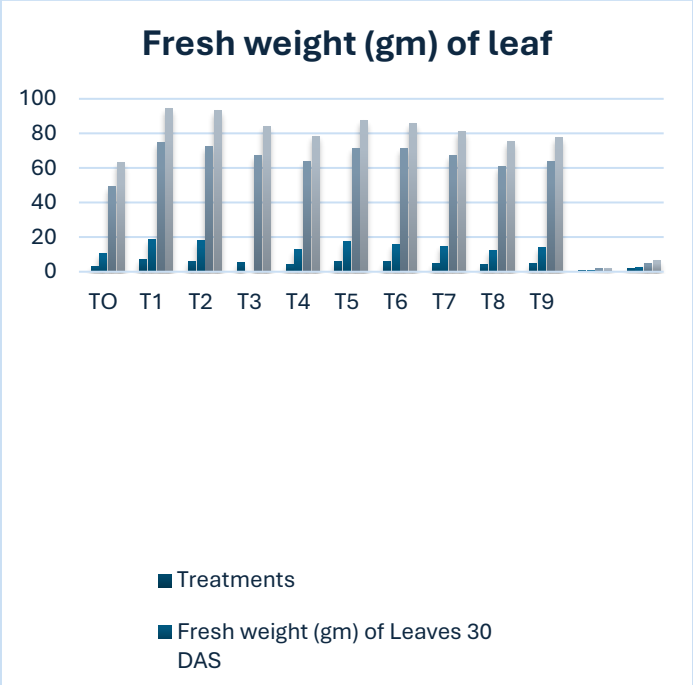
This study investigated the effect of different treatments on root length at various stages of plant growth (30, 45, 60 days after sowing, and at harvest). Treatment T1, consisting of 100% of the recommended fertilizer dose (60:40:50 kg/ha) combined with 25 tonnes/ha of farmyard manure (FYM), consistently resulted in the greatest root length at all observed stages.

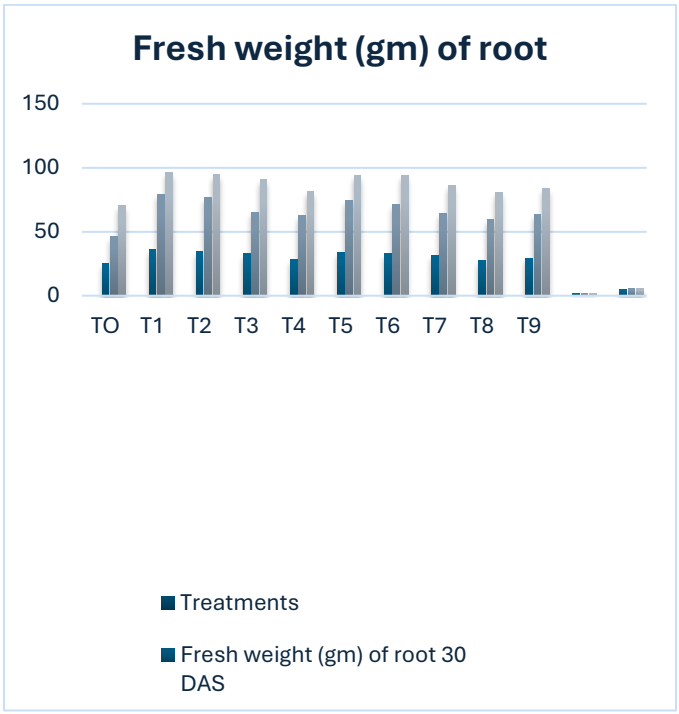
Specifically, T1 showed root lengths of 8.01 cm at 30 DAS, 16.59 cm at 45 DAS, 19.61 cm at 60 DAS, and 22.65 cm at harvest. Treatments T2, T5, and T6 also showed good root development, though with slightly lower values compared to T1, indicating a minor significant difference among them. In contrast, the absolute control (T0) consistently recorded the minimum root length at all growth stages, with values of 4.85 cm (30

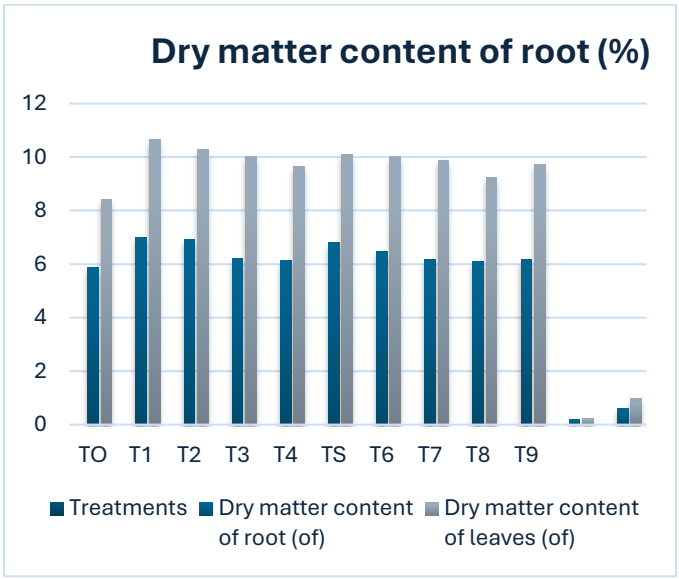
DAS), 8.36 cm (45 DAS), 11.82 cm (60 DAS), and 14.71 cm (harvest). These findings highlight the significant positive impact of Treatment T1 on root growth.

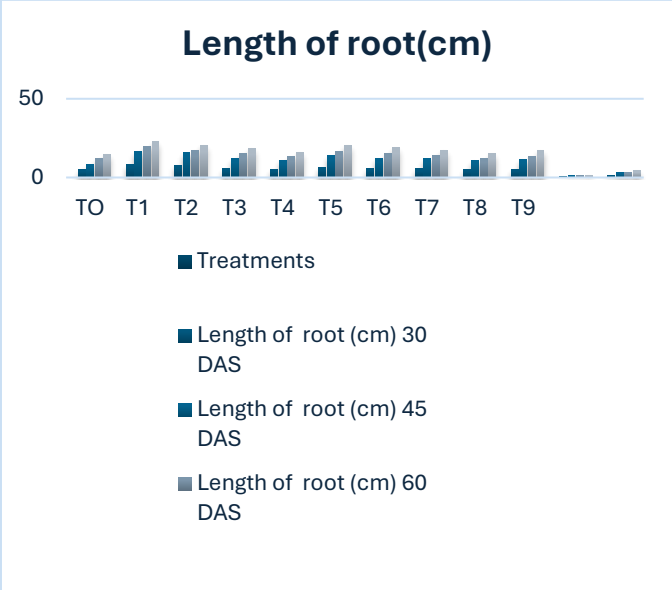
The maximum root length (22.65 cm), root diameter (10.02 cm), root yield (88.42 kg plot') and root yield (652.77 q ha^{1}) at harvest were observed in treatment (T1) 100% RDF + 100% FYM . The minimum values of all yield parameters were recorded in treatment (T0) control. It was observed that the root yield was influenced with every nutrient source applied i.e. RDF, vermicompost and farm yard manure improved the soil physical conditions which helped in more nutrients uptake by plant and increased the vegetative growth of turnip. By increasing the vegetative growth of plant, it ultimately supports to increase the yield parameters.

The application of RDF, FYM and Vermicompost helped to granular the soil which assist the roots to easily penetrate into soil and increased the root length, root diameter and root yield. Similar results are stated by Kumar and Devi (2014) in radish to find out that the organic manures more beneficial than the inorganic fertilizers and shows significant effect on root length. By the accordance of Khede et al. (2019) and Suman et al. (2019) in Turnip which revealed the same results with the current work by using the combination of different organic manures.




Fresh weight (gm) of root
150
100
50
0
TO T1 T2 T3 T4 T5 T6 T7 T8 T9
Treatments
Fresh weight (gm) of root 30 DAS


Dry matter content of root (%)
12
10
8
6
4
2
0
TO T1 T2 T3 T4 TS T6 T7 T8 T9
Treatments
Dry matter content of root (of)
Dry matter content of leaves (of)



IV. Conclusion

From the above research findings it was concluded that among all the treatment combinations, the application of RDF and FYM proved to be the most superior. Specifically, the treatment involving the application of FYM at (25 t ha-¹) combined with 100% (60:40:50 kg/ha) of the Recommended Dose of Fertilizers (RDF) resulted in the most significant treatment combination. Besides from the root yield, it also produced turnip with better growth parameters. This (T1) treatment recorded the maximum plant height, number of leaves, root diameter, root length, and ultimately, the highest fresh root yield (t ha-1). This also improves the physical condition and water holding capacity of soil and nutrients as well as it reduces economic pressure on farmers.

References

[1]. Sneha, M. S., Deepanshu, and Reenu Noushad. 2023. "Influence of Organic Manures and Inorganic Fertilizers on Growth, Yield and Quality of Turnip (Brassica Rapa L.)". International Journal of Environment and Climate Change 13 (9):3038-45.
[2]. Kiran, M. (2023). IMPACT OF DIFFERENT ORGANIC MANURES AND NPK APPLICATION ON THE GROWTH AND YIELD OF TURNIP (BRASSICA RAPA L). Pakistan Journal of Science, 69(2). (This study compared FYM with other organic manures and NPK).
[3]. Pamula, S. G., & Kerketta, A. (2021). Effect of Organic Manures and Inorganic Fertilizers on Growth and Yield of Turnip (Brassica rapa L.) in Prayagraj Region. International Journal of Current Microbiology and Applied Sciences, 10(01), 560-564.
[4]. Sharma, P., & Verma, S. (2021). Integrated nutrient management in root vegetables: A review. Agricultural Reviews, 42(1), 55-61.
[5]. Yadav, C.; Mishra, S.; Singh, M.; Roy, S. and Tiwari, P. (2021). Effect of integrated nutrient management on growth, yield and quality of turnip (Brassica rapa L.) cv. Purple top white. The Pharma Innovation Journal. 10 (2): 100-103.
[6]. Patidar, M., & Mali, A.L. (2020). Comparative study of organic and inorganic fertilization on quality parameters of turnip. Vegetable Science, 47(1), 110-114.
[7]. Suman, Singh Y.; Singh, G. and Singh, S. (2019). Effect of integrated nutrient management on vegetative growth and yield of turnip (Brassica rapa L.) cv. Pusa sweti. Remarking An Analisation. 3 (11): 410-412.
[8]. Khede, K.; Kumawat, A. and Tembare, D. (2019). Effect of organic manures, fertilizer and their combinations on growth, yield and quality of turnip. International Journal of Current Microbiology and Applied Sciences. 8 (3): 423-425.
[9]. Kumar, S. (2018). Effect of organic and inorganic fertilizers on growth and yield of turnip (Brassica rapa L.). M.Sc. Thesis, Department of Agronomy.
[10]. Kumar, R., et al. (2014). Effect of farmyard manure on growth and yield of turnip (Brassica rapa). Journal of Root Crops, 40(2), 102-106.
[11]. Vithwel and Kanaujia, S. P. (2013). Integrated nutrient management on productivity of carrot and fertility of soil. SAARC Agricultural Information Centre (SAIC), Dhaka, Bangladesh, SAARC Journal of Agriculture, 11 (2):173-181.
[12]. Bodkhe, V.A. and Mahorkar, V.K. (2010). Effect of various organic manures on growth, yield and quality of Radish, Faculty of Agriculture, Water and Land Management Institute, (WALMI), Kanchanwadi, Aurangabad (M.S.) India. International Journal of Agricultural Sciences, 6 (1):72-73.