**Effect of organic manure and organic foliar spray on the growth of turmeric (Curcuma longa L.) cv. Konkan Halad-1 raised by protray seedling method**

**Abstract:** The present investigation was conducted at 4 No. Nursery, College of Horticulture, Dapoli. Dist. Ratnagiri (M.S.) during the academic year 2024-25. The treatment has sixteen combinations and two replications. These combinations include four organic levels viz. M0- Control (RDF- 200:50:150 kg/ha) M1-Vermicompost @ 10t/ha, M2-FYM @ 20t/ha, M3-Neem cake @ 2t/ha and four organic foliar spray viz. S0-No spray, S1-Jeevamrut @ 10%, S2-Cattle urine @ 10% and S3-Vermiwash @ 10%. The treatment of vermicompost @ 10 t/ha recorded superior over the other manures in respect of all growth parameters *viz.* plant height (150.82 cm), number of tillers (3.27), leaf length (68.38 cm), leaf width (20.11 cm) and number of leaves (14.69). The treatment of cattle urine @ 10% recorded superior over the other organic foliar spray in respect of all growth parameters *viz.* plant height (149.84 cm), number of tillers (3.27), leaf length (67.63 cm), leaf width (20.06 cm) and number of leaves(14.67). The treatment combination of vermicompost @ 10 t/ha along with cattle urine @ 10% recorded significant superiority over the other combinations in respect of all growth parameters *viz*. plant height (166.99 cm), number of tillers (3.52), leaf length (72.26 cm), leaf width (21.56 cm) and number of leaves (15.08).

Keyword: Vermicompost, Cattle Urine, Konkan Halad-1, Organic, Turmeric

**Introduction:**

Turmeric (*Curcuma longa* L.), commonly called the golden spice, is a triploid rhizomatous herb belonging to the Zingiberaceae family, with a chromosome number of 2n = 63. It is cultivated for its underground rhizomes, which are brown and scaly externally but reveal a vibrant orange interior. Known as the “Kitchen Queen,” turmeric is widely used in traditional medicine to treat ailments such as biliary disorders, anorexia, cough, diabetic wounds, hepatic conditions, rheumatism and sinusitis. In veterinary medicine, it helps heal animal wounds and ulcers. Additionally, turmeric powder is employed as a natural insect repellent by sprinkling it around containers.

Turmeric finds culinary applications in various forms, including fresh turmeric pickle, particularly popular in Far Eastern cuisine. As a food additive, it is designated as E100 and serves to protect food from sunlight. In South Asian and Middle Eastern cooking, turmeric is a staple spice. Although it is an erect perennial plant, it is generally cultivated as an annual crop. For successful germination, temperatures between 30–35°C are required, while rhizome formation is optimal at 20–25°C. A well-distributed annual rainfall of 1200–1400 mm over 100–120 rainy days supports its growth.

Turmeric thrives in diverse soil types, yet well-drained loamy or alluvial soil enriched with organic matter is considered ideal. The recommended pH range for its cultivation is 5.0–7.5. However, it is highly sensitive to waterlogging. Traditionally acknowledged as a shade-tolerant crop, turmeric is sometimes grown in homesteads, hilly regions, and forested areas under shaded conditions. India dominates global turmeric production, making it a valuable export crop with significant contributions to the agricultural economy.

Turmeric’s vibrant yellow-orange hue comes from curcuminoids, including curcumin, demethoxy curcumin and bisdemethoxy curcumin, which serve as its key bioactive compounds. As a spice crop, turmeric is often cultivated using organic manures and biofertilizers, offering an eco-friendly alternative to chemical fertilizers. These organic nutrient sources are recommended to sustain soil fertility, reduce reliance on synthetic inputs, improve overall soil health and limit environmental pollution.

Furthermore, organic manures significantly enhance soil microbial biomass and activity, fostering a thriving ecosystem within the soil. The use of organic foliar sprays further supports plant growth by optimizing nutrient absorption, strengthening immunity and stimulating beneficial microbial processes. These organic inputs contribute to healthier soil conditions by promoting microbial diversity and facilitating efficient nutrient cycling.

**Material and Method:**

The field trial was carried out at the 4 No. Nursery, College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, from April 2024 to February 2025. The field experiment was laid out in a factorial randomized block design with sixteen treatment combinations including four organic manure levels *viz*. M0 -200:50:150 NPK kg/ha (RDF), M1 -Vermicompost @ 10t/ha, M2 – FYM @ 20t/ha, M3 – Neem cake @ 2t/ha and four organic foliar spray levels. S0 – No spray, S1 – Jeevamrut @ 10 %, S2 – Cattle urine @ 10% and S3 – Vermiwash @ 10%. Also, Biofertilizers were commonly applied to all the seedlings at the time of planting (Priming). The treatments were replicated twice. The raised beds of 3 m X 1 m were prepared and seedlings of turmeric were transplanted at 30 cm X 30 cm spacing. The recommended cultural practices (earthing up, irrigation and weeding, etc.) were followed uniformly to experimental plots. Ten plants were selected randomly from each block for recording growth attributing characters. Average of ten observations recorded at appropriate times throughout the experimental periods from ten randomly selected plants. The data obtained during investigation was statistically analysed as per the procedure and design.

**Results and Discussion**

**Plant Height (cm):** Effect of different organic manure and organic foliar spray on the growth of turmeric (C*urcuma longa* L.) cv. Konkan Halad-1 raised by protray seedling method and the results of experiment are presented in Table.1. In the present experiment, the plant height at 150 days after transplanting (DAP) was significantly superior with application of organic manure and organic foliar spray in turmeric. Organic manure significantly influenced the plant height (Table.1). Vermicompost @ 10t/ha (M1) has significantly the highest plant height (150.82 cm) whereas; the minimum plant height (134.19 cm) was recorded in the RDF (Control) treatment (M0). Vermicompost is recognized for its ability to stimulate plant growth, boost microbial activity and minimize nitrogen loss through leaching. Unlike most bulky organic manures, it offers a more efficient nutrient release, which likely contributes to increased plant height. Organic foliar spray (Table.1) Cattle urine @ 10% (S2) has significantly the highest plant height (149.84 cm) whereas; the minimum plant height (131.33 cm) was recorded in the no spray treatment (S0). Cattle urine is a nutrient-rich liquid that contains nitrogen, phosphorus, potassium and beneficial microbes, making it valuable in organic farming. It enhances soil fertility, promotes plant growth and acts as a natural pest repellent. The interaction effect of organic manure and organic foliar spray had a significant effect on plant height (Table 1). The maximum plant height (166.99 cm) was recorded from the treatment combination of vermicompost @10 t/ha with cattle urine @ 10% (M1S2) whereas, the minimum plant height (127.25 cm) was recorded with treatment combination of M0-RDF (Control) with S0-no spray (M0S0).

**Number of Tillers Per Plant:** The application of different organic manure and organic foliar spray had a significant impact on the number of tillers in turmeric plants at 150 days after transplanting (DAT). Organic manures significantly influenced the number of tillers per plant (Table 1). Vermicompost @ 10t/ha (M1) has recorded significantly the maximum number of tillers per plant (3.27) whereas; the minimum number of tillers (2.86) was recorded in the RDF (200:50:150 kg/ha) control treatment (M0). The release of nutrients from the added vermicompost is greater than that of the other organic manures, which may account for the higher tillers per plant. Organic foliar spray (Table.1) Cattle urine @ 10% (S2) has significantly the highest number of tillers per plant (3.27) whereas; the minimum number of tillers per plant (2.78) was recorded in the no spray treatment (S0). Because cattle urine, rich in nitrogen and other nutrients, can stimulate vegetative growth in turmeric plants. Its application may increase the number of tillers per plant by enhancing cell division and root development. Regular and appropriate use improves overall plant vigor and tillering capacity. The interaction effect of organic manures and organic foliar spray had a significant effect on the number of tillers per plant (Table 1). The maximum number of tillers (3.52) was recorded from the treatment combination of Vermicompost @10t/ha with cattle urine @ 10% (M1S2) whereas, the minimum number of tillers per plant (2.63) was recorded with treatment combination of M0-RDF (Control) with S0-no spray (M0S0).

**Table.1** Effect of organic manures and organic foliar spray on plant height and number of tillers per plant of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

|  |  |
| --- | --- |
| **Plant Height (cm)** | **Number of Tillers Per Plant** |
| **Treat** | **S0** | **S1** | **S2** | **S3** | **Mean** | **S0** | **S1** | **S2** | **S3** | **Mean** |
| **M0** |  127.25 | 131.64 | 139.99 | 137.89 | 134.19 | 2.63 | 2.80 | 3.06 | 2.97 | 2.86 |
| **M1** |  135.90 | 146.68 | **166.99** | 153.74 | **150.82** | 2.88 | 3.31 | **3.52** | 3.39 | **3.27** |
| **M2** |  134.66 | 146.73 | 148.90 | 146.62 | 144.23 | 2.87 | 3.33 | 3.34 | 3.23 | 3.19 |
| **M3** |  127.50 | 140.95 | 143.50 | 140.46 | 138.10 | 2.75 | 3.13 | 3.16 | 3.14 | 3.04 |
| **Mean** |  131.33 | 141.50 | **149.84** | 144.67 |  | 2.78 | 3.14 | **3.27** | 3.18 |  |
|  | **S.Em. (±)** | **CD at 5%** | **Result** | **S.Em. (±)** | **CD at 5%** | **Result** |
| **M** | 0.47 | 1.41 | SIG | 0.01 | 0.02 | SIG |
| **S** | 0.47 | 1.41 | SIG | 0.01 | 0.02 | SIG |
| **M\*S** | 0.94 | 2.83 | SIG | 0.02 | 0.05 | SIG |

**Leaf Length (cm):** The application of different organic manure and organic foliar spray had a significant impact on the leaf length of turmeric plants at 150 days after transplanting (DAT). Organic manures significantly influenced the leaf length of the plant (Table 2). Vermicompost @ 10t/ha (M1) has recorded significantly the maximum leaf length (68.38 cm) whereas; the minimum leaf length (61.38 cm) was recorded in the RDF (200:50:150 kg/ha) control treatment (M0). The increased nutrient uptake from the treatment significantly contributed to the enhancement of leaf length of the plant. Organic foliar spray (Table.2) Cattle urine @ 10% (S2) has significantly the highest leaf length (67.63 cm) whereas; the minimum leaf length (60.74 cm) was recorded in the no spray treatment (S0). Foliar application of cattle urine provides essential nutrients directly to turmeric leaves, promoting better growth. This results in increased leaf length due to improved nutrient absorption and metabolic activity. The interaction effect of organic manures and organic foliar spray had a significant effect on leaf length of plant (Table.2). The maximum leaf length (72.26 cm) was recorded from the treatment combination of Vermicompost @10t/ha with cattle urine @ 10% (M1S2) whereas, the minimum leaf length (54.43 cm) was recorded with treatment combination of M0-RDF (Control) with S0-no spray (M0S0).

**Leaf Width (cm):** The application of different organic manure and organic foliar spray had a significant impact on the leaf width of turmeric plants at 150 days after transplanting (DAT). Organic manures significantly influenced the leaf width of the plant (Table 2). Vermicompost @ 10t/ha (M1) has recorded significantly the maximum leaf width (20.11 cm) whereas; the minimum leaf width (17.96 cm) was recorded in the RDF (200:50:150 kg/ha) control treatment (M0). The increased nutrient uptake from the treatment significantly contributed to the enhancement of leaf width of the plant. Organic foliar spray (Table.2) Cattle urine @ 10% (S2) has significantly the highest leaf width (20.06 cm) whereas; the minimum leaf width (17.83 cm) was recorded in the no spray treatment (S0). Foliar application of cattle urine provides essential nutrients directly to turmeric leaves, promoting better growth. This results in increased leaf width due to improved nutrient absorption and metabolic activity. The interaction effect of organic manures and organic foliar spray had a significant effect on leaf width of plants (Table.2). The maximum leaf width (21.56 cm) was recorded from the treatment combination of Vermicompost @10t/ha with cattle urine @ 10% (M1S2) whereas, the minimum leaf width (15.80 cm) was recorded with treatment combination of M0-RDF (Control) with S0-no spray (M0S0).

**Table.2** Effect of organic manures and organic foliar spray on leaf length and leaf width of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

|  |  |
| --- | --- |
| **Leaf Length (cm)** | **Leaf Width (cm)** |
| **Treat** | **S0** | **S1** | **S2** | **S3** | **Mean** | **S0** | **S1** | **S2** | **S3** | **Mean** |
| **M0** | 54.43 | 63.31 | 64.76 | 64.21 | 61.68 | 15.80 | 17.86 | 19.12 | 19.06 | 17.96 |
| **M1** | 63.86 | 67.19 | **72.26** | 70.20 | **68.38** | 18.96 | 19.57 | **21.56** | 20.34 | **20.11** |
| **M2** | 63.63 | 67.50 | 67.56 | 66.70 | 66.35 | 18.80 | 19.71 | 20.05 | 19.55 | 19.53 |
| **M3** | 61.04 | 65.58 | 65.96 | 64.95 | 64.38 | 17.77 | 19.34 | 19.53 | 19.24 | 18.97 |
| **Mean** | 60.74 | 65.89 | **67.63** | 66.51 |  | 17.83 | 19.12 | **20.06** | 19.55 |  |
|  | **S.Em. (±)** | **CD at 5%** | **Result** | **S.Em. (±)** | **CD at 5%** | **Result** |
| **M** | 0.48 | 1.44 | SIG | 0.16 | 0.47 | SIG |
| **S** | 0.48 | 1.44 | SIG | 0.16 | 0.47 | SIG |
| **M\*S** | 0.96 | 2.88 | SIG | 0.31 | 0.95 | SIG |

**Number of leaves:** The application of different organic manure and organic foliar spray had a significant impact on the number of leaves of turmeric plants at 150 days after transplanting (DAT). Organic manures significantly influenced the leaf width of the plant (Table 3). Vermicompost @ 10t/ha (M1) has recorded significantly the maximum number of leaves (14.69) whereas; the minimum number of leaves (13.90) was recorded in the RDF (200:50:150 kg/ha) control treatment (M0). Organic manure improves soil fertility and boosts nutrient availability, leading to increased leaf growth in turmeric plants.
It enhances root development and overall plant vigor, resulting in a higher number of leaves. Organic foliar spray (Table.3) Cattle urine @ 10% (S2) has significantly the highest number of leaves (14.67) whereas; the minimum number of leaves (13.79) was recorded in the no spray treatment (S0). Foliar spray of cattle urine supplies nitrogen and micronutrients directly to turmeric leaves, enhancing leaf growth. It stimulates photosynthesis and plant metabolism, resulting in an increased number of leaves. The interaction effect of organic manures and organic foliar spray had a significant effect on the number of leaves of plant (Table.3). The maximum number of leaves (15.08) was recorded from the treatment combination of Vermicompost @10t/ha with cattle urine @ 10% (M1S2) whereas, the minimum number of leaves (13.47) was recorded with treatment combination of M0-RDF (Control) with S0-no spray (M0S0).

**Table.3** Effect of organic manures and organic foliar spray on the number of leaves of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

|  |
| --- |
| **Number of Leaves** |
| **Treat** | **S0** | **S1** | **S2** | **S3** | **Mean** |
| **M0** | 13.47 | 13.87 | 14.17 | 14.11 | 13.90 |
| **M****1** | 14.01 | 14.69 | **15.08** | 15.00 | **14.69** |
| **M2** | 13.91 | 14.80 | 14.95 | 14.56 | 14.55 |
| **M3** | 13.77 | 14.36 | 14.50 | 14.32 | 14.24 |
| **Mean** | 13.79 | 14.43 | **14.67** | 14.49 |  |
|  | **S.Em. (±)** | **CD at 5%** | **Result** |
| **M** | 0.02 | 0.05 | SIG |
| **S** | 0.02 | 0.05 | SIG |
| **M\*S** | 0.04 | 0.11 | SIG |

**Fig.1** Effect of organic manure on growth attributes of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

**Fig.2** Effect of organic foliar spray on growth attributes of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

**Fig.3** Interaction effect of organic manure and organic foliar spray on growth attributes of turmeric (cv. Konkan Halad-1) raised by protray seedling method.

**Conclusion:**  From the present investigation it may be concluded that organic manures and organic foliar spray showed significant effect on growth and development of turmeric. It is concluded that Vermicompost @10t/ha performed better than other organic manures in all growth parameters i.e. plant height, number of tillers per plant, leaf length, leaf width and number of leaves. Organic foliar spray was found significantly superior in respect of all growth parameters i.e. plant height, number of tillers per plant, leaf length, leaf width and number of leaves. With regards to interaction effect, Vermicompost @10t/ha with combination of cattle urine @ 10% found significantly superior and recorded the highest plant height, number of tillers per plant, leaf length, leaf width and number of leaves.

**Disclaimer (Artificial Intelligence)**

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOYT, etc.) and text-to-image generators have been used during writing or editing of manuscripts.

**References:**

Biradar, N., Murali, K., Devakumar, N. and Lavanya, G. 2017. Influence of organic liquid formulations on soil beneficial microbial population of organic french beans (*Phaseolus vulgaris* L.). In: Proceedings of Scientific Track “*Innovative Research for Organic Agriculture 3.0”,* 19th Organic World Congress, November 9-11, New Delhi India. **24**(1): 467-471.

Boraiah, B., Devakumar, N., Shubha, S. & Palanna, K. B. (2017). Effect of Panchagavya, Jeevamrutha and cow urine on beneficial microorganisms and yield of capsicum (*Capsicum annuum* L. var. grossum). *Int. J. Curr. Microbiol. App. Sci.,***6**(9): 3226-3234.

Detpiratmorkol, S., Ubolkerd, T., Yoosukyingsatapron, S. and Phakamas, N. (2009). Effects of organic manures on growth and yield of turmeric. *Proceedings of the 47th Kasetsart University Annual Conference*, Kasetsart. 17-20 March, 473-480.

Devan, E., Kunyil, P., Fathima, M. and Hemavathi, M. (2013). Influence of vermiwash and plant growth regulators on the exo morphological characters of *Abelmoschus esculentus* (Linn.). *African Journal Basic and Applied Science,* **5**(2): 82-90.

Hossain, M. A. and Ishimine, Y. (2007). Effects of farmyard manure on growth and yield of turmeric (*Curcuma longa* L.) cultivated in dark red soil, red soil and gray soil in Okinawa, Japan. *Plant Production Science*, **10**(1): 146-150.

Kamal, M. Z. U. and Yousuf, M. N. (2012). Effect of organic manures on growth, rhizome yield and quality attributes of turmeric (*Curcuma longa* L.). *The Agriculturists,***10**(1): 16-22.

Manjunath Gowda, B., Venkatesh, J. and Bhagavantagoud, K. H. (2002). Studies on plant density and levels of NPK on growth, yield and quality of turmeric cv. Bangalore Local. *Mysore J. Agri. Sci*.,**36**(1): 31-35.

Mannikeri, I. M., Dharmatti, P. R. and Shashidhar, T. R. (2010). Growth and yield of turmeric (*Curcuma longa* L.) as influenced by different organic manures. *Journal of Ecobiology*, **26(**3/4): 273-279.

Panse, V. G. and Sukhatme, P. V. (1995). Statistical methods for agricultural workers. ICAR publications, New Delhi.

Parikh, R. P., Bhalerao, P. P. and Patil, S. J. (2023). Effect of foliar application of organic liquids on yield and quality of turmeric (*Curcuma longa* L*.*). *Current Horticulture,* **11**(1): 30–32.

Saharan, B. S., Tyagi, S., Kumar, R., Vijay, Om, H., Mandal, B. S., & Duhan, J. S. (2023). Application of Jeevamrut improves soil properties in zero budget natural farming fields. *Agriculture*, **13**(1): 196-198.

Sarma, I., Phukon, M. and Borgohain, R. (2015). Effect of organic manure, vermicompost and neem cake on growth, yield and profitability of turmeric (*Curcuma longa* L.) variety- Megha Turmeric-1. *Asian J. Bio. Sci.,* **10**(2): 133-137.

Solanki, S.P., Telkar, S. G., Hota, D., Kant, K. and Dey, J. K. (2015). Folk Liquid Manure for Sustainable Horticulture. A Review Article. *International Journal of Economic Plants*, **2**(4): 175-177.

Singh, R. P. (2013). Effect of bio-fertilizers and organic manures on growth and yield of turmeric (*Curcuma longa* L.). *M.Sc. (Agri.) Thesis*, J. N. K. V. V, Jabalpur.

Somdutt, K. B., Rathore, R. S., & Shekhawat, P. S. (2021). Jeevamrut and panchagavya consequences on growth, quality and productivity of organically grown crops: A review*. Agricultural Review*, (2021).

Vadiraj, B. A., Siddagangaiah, R., and Rao, N. (1998). Effect of vermicompost on the growth and yield of turmeric. *S. Indian Hort*., **46**(3/6): 176-179.

Velmurugan, M., Chezhiyan, N. and Jawaharlal, M. (2009). Influence of organic manures and inorganic fertilizers on cured rhizome yield and quality of turmeric (*Curcuma longa* L.) cv. BSR-2. *International Journal of Agricultural Sciences*, **4**(1): 142-145.