

Effect of Organic Nutrient Management through Biomanuring on Length of Rhizomes in Turmeric

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ABSTRACT: A field experiment conducted on “Effect of nutrient management through bio-manuring on rhizome length of turmeric” was conducted at Certified Organic Farm, Centre of Organic Agriculture Research and Training (COART), Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during 2020-21 and 2021-22. The length of rhizomes influenced the yield of turmeric so the application of biomanuring helpful for getting the maximum yield. The experimental results revealed that, application of 100% N through integration of organic manures as 50% Vermicompost + 50% Neemcake + Biofertilizers registered significantly the highest length (cm) of mother rhizome, primary rhizome and secondary rhizome than other treatments of nutrient management through bio-manuring in both year of experiment.

Keywords: Length of rhizome, biomanuring, turmeric.

INTRODUCTION

Turmeric (*Curcuma longa* L.), a herbaceous perennial medicinal plant belonging to family Zingiberaceae is one of the most valuable spices all over the world and is cultivated in the country since ancient times. It is also one of the second most important spice crops after chilli. India is the largest producer of turmeric in the world accounts for 75 per cent in world production and 60 per cent in world export share (Anonymous, 2021). The turmeric is native of South-East Asia, cultivated extensively in India, Myanmar, Nigeria, Pakistan, Sri Lanka, Indonesia, Bangladesh, Taiwan and China. Curumin (diferuloylmethene) is responsible for the yellow colour and its comprised of curcumin I (94%) and curcumin II (6%) and curcumin III (0.3%) (Ruby *et al.*, 1995). Major turmeric producing states in India are Telangana, Andhra Pradesh, Tamil Nadu and Karnataka, Orissa, West Bengal and Maharashtra.

The important uses of the turmeric as due to its medicinal value, food value and industrial value. Turmeric has been used as an ingredient in Ayurvedic and Unani system of medicine in India from ancient times. It is claimed to be a stomach tonic, blood purifier, antihistamine, antacid, antiperiodic and carminative. The medicinal properties of turmeric have been known to people for a long time. It is used both internally and externally in acute and chronic skin diseases. With boiled milk, it is used for the treatment of sore throat and common colds. It is also claimed to have curative properties of afflictions of the liver and gall bladder. In small doses it functions as an antacid, while in large doses it acts as an antispasmodic. Considering the economic importance of turmeric and environmental problems caused by chemicals

application, it is important to cultivate turmeric organically. Different organic manures influence differently in terms of yield and quality of turmeric. The commonly used organic manures are farm yard manure, vermicompost, different concentrated non-edible oil cakes, biofertilizers etc. Hence, it is necessary to know the best source of organic manure which could help in increasing the yield of rhizomes and quality of turmeric. In view of this background, this study is aimed to evaluate the effect of organic nutrient management on length of fresh rhizomes, essential oil content of leaves, processed finger yield and economics of cultivation in turmeric.

METHODOLOGY

A field experiment was conducted in vertisols of Vidarbha region of central India. The experiment for the period of two years was carried out during the monsoon and post-monsoon period of 2020-21 and 2021-22 in plot No. 67(B) at the Certified Organic Farm, Centre of Organic Agriculture Research and Training (COART), Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra). The quantity of biomanures applied was calculated on the basis of nutrient content in various inputs to gross plot basis. The biomanures applied in three split doses in equal amount at 30DAP, 60DAP and 90DAP. The biomanures as per treatments were applied at the spot of plant in ring method and thoroughly cover by pushing soil in it. The length of fresh rhizomes (mother, primary and secondary) of sampled plants was recorded individually in cm at harvest. The mean length of fresh rhizome for each treatment was worked out.

RESULT AND DISCUSSION

The data pertaining to the effect of nutrient management application through bio-manuring on length of mother rhizomes, primary rhizomes and secondary rhizomes plant⁻¹ (cm) of turmeric are presented in Table 1. The mean length of mother rhizomes plant⁻¹ were 4.84, 5.46 and 5.15cm during the year 2020-21, 2021-22 and in pooled analysis, respectively. The results regarding to length of mother rhizomes revealed that the differences among the various combination of nutrient management found to be significant in the year 2020-21, 2021-22 and in pooled analysis, respectively. In the year 2020-21, the 100% N through combined application of bio-manuring of 50% Vermicompost + 50% Neemcake + Biofertilizers registered significantly maximum length of mother rhizome (5.33 cm) than other application of bio-manuring. The combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers found comparable with application of 50% Vermicompost + 50% FYM + Biofertilizers and 100% Vermicompost. In the year 2021-22, the results revealed that the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers (6.27 cm) noted significantly maximum length of mother rhizomes than other application of bio-manuring. The combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers found at par with application of 50% Vermicompost + 50% FYM + Biofertilizers and 100% Vermicompost. From pooled analysis, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers noted significantly supreme number of mother rhizomes than other application of bio-manuring and comparable with 50% Vermicompost + 50% FYM + Biofertilizers. The increase in length of mother rhizome due to various application of organic manures may be attributed to increase in nutrient availability of macro and micro nutrients throughout the crop growth period. Also, the weather condition favorable for availability of macro and micro nutrients to crop. So, the treatment 50% Vermicompost + 50% Neemcake + Biofertilizers results in better performance. The results are in line with Bondre *et al.* (2019); Kadam and Kamble (2020); Lohar and Hase (2021).

The mean length of primary rhizomes plant⁻¹ were 8.39, 8.93 and 8.66 cm during the year 2020-21, 2021-22 and in pooled analysis, respectively. The results regarding to length of primary rhizomes revealed that the differences among the various combination of nutrient management found to be significant in the year 2020-21, 2021-22 and in pooled analysis, respectively. In the year 2020-21, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers registered significantly maximum length of primary rhizome (9.00 cm) than other application of bio-manuring. The combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers found comparable with application of 50% Vermicompost + 50% FYM + Biofertilizers (8.83). The combined

application of 50% Vermicompost + 50% Neemcake + Biofertilizers (10.63 cm) noted significantly maximum length of primary rhizomes than other application of bio-manuring. The combined application of 50% Vermicompost + 50% FYM + Biofertilizers (9.50 cm) found at par with application of sole application of 100% Vermicompost (9.27) in the year 2021-22. In pooled analysis, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers (9.17 cm) noted significantly supreme number of primary rhizomes than other application of bio-manuring. Increase in primary rhizome length might be due to fact that, organic manure and biofertilizers enhances the nutrient availability by enhancing the capability of plant to better solute uptake from rhizosphere, also these nitrogen fixers are known for accumulation of dry matters and their translocation as well as favors synthesis of different growth regulators. The results are in agreement with Kamal and Yusuf (2012); Kumar *et al.* (2013); Sarma *et al.* (2015); Datta *et al.* (2017); Amala *et al.* (2019); Bondre (2019); Kadam and Kamble (2020); Lohar and Hase (2021) in turmeric.

The mean length of secondary rhizomes plant⁻¹ were 6.23, 6.87 and 6.55 cm during the year 2020-21, 2021-22 and in pooled analysis, respectively. The results regarding to length of secondary rhizomes revealed that the differences among the various combination of nutrient management found to be significant in the year 2020-21, 2021-22 and in pooled analysis, respectively. In the year 2020-21, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers registered significantly maximum length of secondary rhizome (6.73 cm) than other application of bio-manuring. The combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers found comparable with application of 50% Vermicompost + 50% FYM + Biofertilizers and 100% Vermicompost. In the year 2021-22, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers (7.70 cm) noted significantly maximum length of secondary rhizomes than other application of bio-manuring. The combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers found at par with application of 50% Vermicompost + 50% FYM + Biofertilizers and 100% Vermicompost. In pooled analysis, the combined application of 50% Vermicompost + 50% Neemcake + Biofertilizers (7.22 cm) noted significantly supreme number of secondary rhizomes than other application of bio-manuring and comparable with 50% Vermicompost + 50% FYM + Biofertilizers. Increase in primary rhizome length might be due to fact that, organic manure and biofertilizers enhances the nutrient availability by enhancing the capability of plant to better solute uptake from rhizosphere, also these nitrogen fixers are known for accumulation of dry matters and their translocation as well as favours synthesis of different growth regulators. The results are in agreement with Kamal and Yusuf (2013); Kumar *et al.* (2013); Bondre (2019) in turmeric.

Table 1: Mean length of mother, primary and secondary rhizomes (cm) as influenced by organic nutrient management through biomanuring in turmeric.

Treatments	Mother Rhizome(cm)			Primary Rhizome(cm)			Secondary Rhizome(cm)		
	2020-21	2021-22	Pooled	2020-21	2021-22	Pooled	2020-21	2021-22	Pooled
T ₁ - Absolute control	4.23	3.90	4.07	7.50	7.43	7.47	5.61	6.01	5.81
T ₂ -25% Neemcake + 25% Cowdung slurry + Biofertilizers	4.63	5.20	4.92	8.00	8.43	8.22	5.80	6.20	6.00
T ₃ - 25% Vermicompost + 25% Biogas slurry + Green manure at 60 DAS	4.67	5.40	5.03	8.23	8.47	8.35	6.29	6.61	6.45
T ₄ - 25% Vermicompost + 25% Jeevamrut + Biofertilizers + Green manure at 60DAS	4.73	5.77	5.25	8.33	9.30	8.82	5.83	7.13	6.48
T ₅ - 25% Vermicompost + 25% Neemcake + 25% Biogas slurry	4.77	5.43	5.10	8.50	8.53	8.52	6.30	6.70	6.50
T ₆ - 25% Vermicompost + 25% Neemcake + 25% Jeevamrut	4.81	5.36	5.09	8.70	8.83	8.77	6.30	6.73	6.52
T ₇ - 50% Vermicompost + 50% Neemcake + Biofertilizers	5.33	6.27	5.80	9.00	10.63	9.82	6.73	7.70	7.22
T ₈ - 50% Vermicompost + 50% FYM + Biofertilizers	5.17	6.00	5.58	8.83	9.50	9.17	6.63	7.47	7.05
T ₉ - 100% Vermicompost	5.17	5.80	5.49	8.37	9.27	8.82	6.60	7.27	6.93
S.E.(m)±	0.11	0.18	0.10	0.16	0.19	0.19	0.13	0.15	0.09
CD at 5%	0.32	0.53	0.29	0.48	0.58	0.56	0.38	0.46	0.28
GM	4.84	5.46	5.15	8.39	8.93	8.66	6.23	6.87	6.55

CONCLUSION

From the results it is clear that the turmeric with application of 50% Vermicompost + 50% Neemcake + Biofertilizers found to be superior in recording length of rhizomes than other organic sources. Also, the treatment with application of 50% Vermicompost + 50% FYM + Biofertilizers and 100% Vermicompost found beneficial than other organic sources. Hence, the combined application of manures is most beneficial to organic turmeric growers.

FUTURE SCOPE

From the present study, the following the thrust areas for further research to strengthen the recommendations of organic turmeric production under rainfed conditions in which location specific organic agriculture studies for each crop and studies regarding to nutrient dynamics and irrigation management

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Conflict of Interest. None.

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