International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Effect of Organic Manures on Quality of Kasthuri Turmeric *Curcuma aromatica* Salisb of High Cosmeitc Value

Nirmalatha. J. D[1], Sulekha. G, R[2]

Department of Plantation Crops and Spices, College of Agriculture, Vellayani, India

Abstract: ***Studies on "Standardization of organic manures on quality of kasthuri turmeric (Curcuma aromatica Salisb) was carried out at the Department of Plantation Crops and Spices, College of Agriculture, Vellayani, Thiruvananthapuram. The objective of the study was to standardize an optimum dose of organic manure on quality of kasthuri turmeric Curcuma aromatica of high cosmetic value. Kasthuri turmeric (Curcuma aromatica salisb) is a medicinal and aromatic plant with multiple uses. Skin care is the major domain of application of this aromatic plant. It is also used in medicines as a stomachic, carminative and emmenogogue and recently as a health food in Japan (Kojima et al., 1998). Organic farming is the fastest growing agricultural production system in the world addressing ecological conservation, self reliance in food production, rural development, biodiversity conservation and health protection. The field experiments were conducted at the Instructional Farm, College of Agriculture, Vellayani, Thiruvananthapuram, Kerala. The planting material used was kasthuri turmeric, IISR accession collected from healthy rhizome bits of disease free plants with at least one bud weighing 15-20 g. The design was RBD. The sources of organic manures were FYM,. Vermicompost,. Coirpith compost.. Neemcake and 3 levels of organic manures.1. FYM-F_1 – 20.0 t ha^{-1} ,F_2 – 30.0 t ha^{-1},F_3 – 40.0 t ha^{-1},2. Vermicompost, V_1.– 15.0 t ha^{-1}, V_2 – 20.0 t ha^{-1}, V3 – 25.0 t ha^{-1}, 3. Coirpith compost- C_1 – 20.0 t ha^{-1}, C_2 – 30.0 t ha^{-1}, C_3 – 40.0 t ha^{-} and 4. NeemcakeN_1 – 3.0 t ha^{-1}, N_2 – 4.5 t ha^{-1}, N_3 – 6.0 t ha^{-1} and absolute control with no organic manures. The quality analysis was done at 4 MAP and 8 MAP .The quality parameters analyzed were Curcumin content, Volatile oil, Non volatile ether extract,. Crude fibre, starch, Total carbohydrate, Protein , chlorophyll a, chlorophyll b and total chlorophyll. The biochemical analysis showed that curcumin content, volatile oil, non volatile ether extract (NVEE), crude fibre, starch, total carbohydrates and protein content were significantly influenced by the application of organic manures and vermicompost 25.0 t ha^{-1} was found to be superior to all other treatments.***

Keywords: MAP- Months after planting, NVEE-Non volatile ether extract, RBD- Randomized Block Design

1. Introduction

Kasthuri turmeric (*Curcuma aromatica* salisb) is a medicinal and aromatic plant with multiple uses. Skin care is the major domain of application of this aromatic plant. It is also used in medicines as a stomachic, carminative and emmenogogue and recently as a health food in Japan (Kojima *et al*., 1998). As far as the medicinal and cosmetic plants are concerned, the active principles of the plants are generally secondary metabolites and their biosynthesis, though controlled genetically is strongly affected by environment and cultural factors. It is therefore advised not to use chemical fertilizers, insecticides and pesticides in cultivation of these crops. Hence organic cultivation is more reliable in this crop The on-farm recycling of organic wastes and the application of bulky organic manures such as FYM and compost are adopted to sustain good soil health. Apart from these manures, other organic sources like vermicompost, neemcake, coirpith compost and bio inoculants as well as biofertilizers are also used.

Vermicompost is a potential organic source due to presence of readily available plant nutrients, growth enhancing substances, beneficial microbes like nitrogen fixing, P solubilising and cellulose decomposing organisms, Neemcake is rich in plant nutrients, alkaloids like nimbin and nimbidin and certain sulphur compounds inhibit nitrification process (Reddy and Prasad 1975, Rajkumar and Sekhon, 1981). As a result it acts like a slow releasing nitrogen fertilizer by inhibiting nitrification process. Neemcake increases the agronomic use efficiency and nutrient use efficiency and insect repellent action (Nihad, 2005). Neemcake is rich in plant nutrients, alkaloids like nimbin and nimbidin and certain sulphur compounds inhibit nitrification process (Reddy and Prasad 1975, Rajkumar and Sekhon, 1981). As a result it acts like a slow releasing nitrogen fertilizer by inhibiting nitrification process. Neemcake increases the agronomic use efficiency and nutrient use efficiency and insect repellent action (Nihad, 2005). FYM provides nutrients and enhances the aeration and microbial activities of soil. It serves as good sources of almost all plant nutrients. Coirpith compost increases the water holding capacity of soil and it is rich in potassium which is made available for plants over years. .

2. Materials and Methods

The field experiments were conducted at the Instructional Farm, College of Agriculture, Vellayani, Thiruvananthapuram, Kerala. The planting material used was kasthuri turmeric, IISR accession collected from healthy rhizome bits of disease free plants with at least one bud weighing 15-20 g. The design was RBD. The sources of organic manures were FYM,. Vermicompost, Coirpith compost. Neemcake and 3 levels of organic manures.1. FYM-F_1 – 20.0 t ha^{-1} ,F_2 – 30.0 t ha^{-1},F_3 – 40.0 t ha^{-1},2. Vermicompost, V_1.– 15.0 t ha^{-1}, V_2 – 20.0 t ha^{-1}, V3 – 25.0 t ha^{-1}, **3.** Coirpith compost- C_1 – 20.0 t ha^{-1}, C_2 – 30.0 t ha^{-1}, C_3 – 40.0 t ha^{-} and 4. NeemcakeN_1 – 3.0 t ha^{-1}, N_2 – 4.5 t ha^{-1}, N_3 – 6.0 t ha^{-1} and absolute control with no organic manures. The quality analysis was done at 4 MAP and 8 MAP .The quality parameters analyzed were Curcumin

content, Volatile oil, Non volatile ether extract, Crude fibre, starch, Total carbohydrate, Protein, chlorophyll **a,** chlorophyll b and total chlorophyll**.** The experiment was replicated thrice. The bed size was 1.2 x 3 m (2 beds consist of 1 plot and no of plots were -39. These observations were taken at two months interval starting from second to eighth month after planting.

3. Results and Discussion

Consumer satisfaction is directly related to product quality. Manojkumar and Sivaraman, (2002) defines the term quality as the degree of excellence of a product or its suitability for a particular use. The quality of produce encompasses sensory properties (appearance, texture, taste and aroma) nutritive values, chemical constituents, mechanical properties and functional properties. With the global food including increasingly turning towards oils, and oleoresins the scope of India to earn enormous foreign exchange of organic spices through aggressive marketing of these value added spices is indeed bright.

Table 1 represents the effect of organic manures on curcumin content (pooled mean)at 120 and 240 DAP for both years. Curcumin content was found significant at 120 and 240 DAP during both the years of experimentation. During first year at 120 DAP V_3 was significantly superior and recorded maximum curcumin content of 0.065 per cent. At second year the same trend was followed where V_3 was significantly superior and recorded the highest curcumin content of 0.076 per cent. Table 2 depicts the effect of different organic manures on volatile oil at 120 and 240 DAP during both years of experimentation.. This finding is in accordance with Rakhee (2002) who reported that when vermicompost was applied to turmeric the volatile oil content was 4.30 per cent and curcumin content was 4.89 percentthe. During second year at the same stage V_3 was significantly superior and the volatile cent content was maximum and recorded a value of 6.73 percent. The control recorded least volatile oil content throughout the growth stages. The pooled mean of V_3 recorded the maximum volatile oil content. The pooled mean was 6.0 %. .Vermicompost is rich in minerals and growth hormones so this increases the oil content and curcumin content. There was significant difference in NVEE pooled data. The pooled mean of NVEE in V_3 treatment 6.44 per cent. The pooled mean data for crude fibre was statistically significant. The pooled mean of V_3 treatment recorded the least crude fibre (2.33 %) and was superior. The control recorded highest value of crude fibre (3.09%). There was significant influence in pooled mean of starch content. The pooled mean of V_3 recorded the maximum starch content 22.13 per cent which was superior but on par with N_3 (22.03 %) The starch, crude fibre, total carbohydrate content and protein content showed maximum values for V_3 treated plants at 240 DAP during both the years. The increase in DMP due to application of vermicompost and neem cake might have increased the starch and total carbohydrate content. Application of vermicompost exerted significant influence on protein content. This might be due to the favourble effect of nitrogen involved in protein synthesis. The positive influence of vermicompost in increasing starch content was reported by Suresh Kumar (19980 in sweet potato and Sreekala (2004) in ginger. The total carbohydrates content in crops was also found to be increased by the application of vermicompost which was supported by Pushpa (1996) in tomato and Athani *et al*., (2005) in guava. Similar findings were reported by Sheeba (2004) in amaranthus, where the crude fibre content was influenced by the application of vermicompost. There was significant influence in total carbohydrates. The pooled mean for V_3 recorded maximum total carbohydrates 1.77 per cent and was superior. The pooled mean for protein was found significantly superior. The pooled mean in V_3 was 6.40 per cent protein which recorded the maximum value. Chlorophyll content in leaves varied significantly with different levels of organic manures. Plants which received V_3 treatment was found significantly superior and produced maximum chlorophyll ‘a’ content during both the years of experiment. The value recorded at 120 DAP was 0.458 mg g^{-1} and 0.467 mg g^{-1} during first and second year of experimentation, respectively. The leaves of V_3 treated plants gave significantly superior chlorophyll 'a' content of 0.486 mg g^{-1} and 0.496 mg g^{-1} during first and second year, respectively. It was observed that V_3 was significantly superior and recorded a chlorophyll ‘b’ content of 0.612 mg g^{-1} during first year 0.627 mg g^{-1} during second year At 120 DAP, the total chlorophyll was maximum in V_3 treated plants recording a value of 1.137 and 1.094 mg g^{-1}, in the first and second year, respectively. N_3 which succeeded V_3, recorded a value of 1.050 mg g^{-1}during first year and 1.076 mg g^{-1} during second year. The same effect was observed at 180 DAP also, the values being 0.247 and 0.266 mg g^{-1} during first and second year of study, respectively. Chlorophyll 'a', 'b' and total chlorophyll content in leaves was significantly influenced and V_3 treated plants gave maximum chlorophyll content at 120 and 180 DAP during both the years. The application of vermicompost produced healthy plants, with healthy green leaves which might have increased the chlorophyll content in these plants. This is in accordance with the findings of Nihad (2005) in *Plumbago rosea* and Arumugham Shakila and Prabu (2007) in mint.

Table 1: Effect of organic manures on curcumin content (%) in *Curcuma aromatica* Salisb. during first and second year of study

Treatments (t ha^{-1})	120 DAP		240 DAP		Pooled mean
	Ist Year	IInd Year	Ist Year	IInd Year	
F_1-20.0	0.039	0.046	0.049	0.056	0.048
F_2-30.0	0.046	0.057	0.052	0.059	0.054
F_3-40.0	0.057	0.064	0.064	0.069	0.062
V_1-15.0	0.040	0.061	0.052	0.063	0.054
V_2-20.0	0.048	0.062	0.057	0.064	0.062
V_3-25.0	0.065	0.076	0.083	0.092	0.079
C_1-20.0	0.038	0.056	0.048	0.060	0.048
C_2-30.0	0.041	0.057	0.051	0.062	0.052
C_3-40.0	0.051	0.059	0.053	0.067	0.058
N_1-3.00	0.039	0.047	0.051	0.062	0.049
N_2-4.50	0.049	0.063	0.052	0.060	0.052
N_3-6.00	0.061	0.071	0.067	0.089	0.075
Control	0.031	0.041	0.048	0.049	0.043
CD	0.001	0.002	0.002	0.002	0.002
SE	0.017	0.047	0.547	0.044	0.047

CD Significant at 1% level

Table 2: Effect of organic manures on volatile oil (v/w) in *Curcuma aromatica* Salisb. during first and second year of study

Treatments ($t\ ha^{-1}$)	120 DAP		240 DAP		Pooled mean
	Ist Year	IInd Year	Ist Year	IInd Year	
F_1-20.0	5.00	5.07	5.26	5.29	5.16
F_2-30.0	5.04	5.11	5.69	5.76	5.40
F_3-40.0	5.14	5.22	6.04	6.15	5.64
V_1-15.0	4.97	5.12	5.51	5.67	5.32
V_2-20.0	5.07	5.16	5.88	5.92	5.49
V_3-25.0	5.25	5.44	6.58	6.73	6.00
C_1-20.0	4.96	5.06	5.06	6.18	5.05
C_2-30.0	5.01	5.09	5.56	5.65	5.33
C_3-40.0	5.12	5.20	5.99	6.14	5.49
N_1-3.00	5.00	5.12	5.49	5.66	5.36
N_2-4.50	5.05	5.21	5.75	5.84	5.44
N_3-6.00	5.13	5.32	6.12	6.27	5.69
Control	4.88	4.90	4.98	5.04	4.94
CD	0.030	0.080	0.026	0.063	0.070
SE	0.032	0.031	0.026	0.026	0.026

CD Significant at 1% level

The pooled data for volatile oil

References

[1] Athani, S.I., Praburaj, H.S., Ustad, A.I., Gorabal, K.R., Swamy, G.S.K., Kottikal, Y.K. and Patil P.B.(2006). Influence of vermicompost on vegetative growth, yield and quality of Sardar guava. P .23 *National seminar on convergence of technologies for organic Horticulture.* July p20-21 (2006)

[2] Arumugam Shakila and Prabu, M. (2007.). Response of Mint (*Mentha arvensis*) to organic nutrient. Advances in plant sciences volume 20 (2) p. 13-15

[3] Kojima, H.T., Yanai, T. and Toyota, A., (1998.) Essential oil constituents from Japanese and Indian *Curcuma aromatica* rhizomes *Planta Medica*. 64: p380-381

[4] Manojkumar, K. and Sivaraman, K. 2002. Export prospects of spice oils and oleoresins. Indian Spices-production and Utilization (eds. Singh, H.P., Sivaraman, K. and Tamilselvan, M.). Coconut Development Board, Ministry of Agriculture, Cochin, p360-363

[5] Nihad, K., (2005). Organic Nutrient Management in Chethikkoduveli (*Plumbago rosea* L.), M.Sc.(Hort.) thesis, Kerala Agricultural Univesity, Trhrissur, p 102.

[6] Pushpa, S., (1996). Effect of vermicompost on the yield and quality of Tomato (*Lycopersicon esculentum* Mill.), M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur, p 90.

[7] Rajkumar and Sekhon, G.S. (1981). Nutrification inhibitors for low land rice. Fert. News 26(1):13

[8] Rakhee, C.K., (2002.). Nutrient management in Turmeric (*Curcuma longa* L.) through organic manures. M.Sc.(Hort.) thesis, College of Agriculture, Vellayani p.195

[9] Reddy, R.N.S. and Prasad, R. (1975.). Studies on the mineralization of urea, coated urea and nitrification inhibitors treated urea in soil. J. Soil Sci. no 26 p304

[10] Sheeba, P.S. (2004.) Vermicompost enriched with organic additives for sustainable soil health. Sheeba, P.S. 2004. College of Agriculture, Vellayani p. 128

[11] Sreekala, G.S. (2004). Effects of organic manures and microbial inoculants on growth, yield and quality of Ginger (*Zingerber officinale*) Ph.D. thesis, College of Agriculture, Vellayani,p. 296

[12] Sureshkumar, S.N. (1996). Vermicompost as a potential organic source and partial substitute for inorganic fertilizers in sweet potato. M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur,p. 117 .