

## EFFECT OF ORGANIC AND INORGANIC FERTILIZERS ON YIELD AND QUALITY OF TURMERIC

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### Abstract

*In the modern agriculture, major inputs are- fertilizer, insecticide, pesticide and farm operation with heavy machinery developed by the middle of 20<sup>th</sup> century in Europe and USA. In India, it was on peak in late sixties or seventies with the green revolution. Ayurvedic ethical formulations contribute the remaining sum. Cosmetic industry as well as aroma therapy are two important areas where Indian medicinal plants and their extracts, essential oil can contribute globally. Medicinal and aromatic plants have a high market potential with the world demand of herbal products growing of the rate of 7 per cent annum. The yield parameters of ginger might improve significantly because of improved the physical, chemical and biological condition of the soil. The organic and bio-fertilizers provide better platform to grow the root properly. The yield may be increased due to provide phosphorous and other nutrients at root initiation in turmeric rhizome. Azospirillum might have enhanced the activity of growth promoting substance, jointly all have promoted better nutrient uptake and subsequently increase the rhizome yield of turmeric. The curcumin content increased in turmeric and were higher in T5 treatment because of enhancement the activity of microbes and other physical condition of soil. Similar results also found by Dash et-al 2008. The application of NPK positively impact the yield and nutrient value of turmeric because of supply of rich nutrient which desired for metabolism and bio chemical changes. The yield parameters of TURMERIC might improve significantly because of improved the physical, chemical and biological condition of the soil. The organic and bio-fertilizers provide better platform to grow the root properly.*

**Keywords:** Yield parameters, T5 treatment, Organic farming, Green manuring crops.



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### DISCUSSION AND RESULTS:

Organic farming, ecological farming and biodynamic farming are the components of natural way of farming. In the modern agriculture, major inputs are- fertilizer, insecticide, pesticide and farm operation with heavy machinery developed by the middle of 20<sup>th</sup> century in Europe and USA. In India, it was on peak in late sixties or seventies with the green revolution. The WHO has listed 21,000 plants that have reported medicinal uses around the world. India is a rich country in terms of medicinal plants flora of some 2500 species. Among them, 2000 to 2300 species are used in traditional medicines, while about 150 species are

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used commercially on a fairly large scale. India and Brazil are the largest exporters of medicinal plants in world market. Medicinal plants in India are estimated to be worth Rs. 550 crores. India has a wealth of 2500 aromatic plants among the 20,000 species occurring in the world (Rajeswara Rao and Rajput, 2005). Ayurvedic ethical formulations contribute the remaining sum. Cosmetic industry as well as aroma therapy are two important areas where Indian medicinal plants and their extracts, essential oil can contribute globally. Medicinal and aromatic plants have a high market potential with the world demand of herbal products growing of the rate of 7 per cent annum.

Green manuring crops are generally leguminous crops helps in accumulation of atmospheric nitrogen and restore nitrogen in soil and also enhance the availability of other nutrients. The nutrients lying beneath the surface soil are also come out on the surface and utilized by the crop. Most of the experiments conducted on different sources of organic manures are with integrated nutrient management in response to medicinal and aromatic plants. **Chandra et al., 2003** on Safed musli (*Chlorophytum borivilianum*) responded well with sole application of 10-15 t ha<sup>-1</sup> of FYM with respect to root yield. The macro and micro nutrients uptake by safed musli as well as soil properties also improved due to application of 10-15t FYM **Aishwath et al., 2003** and **Thimmarayappa et al. 2000** also obtained higher yield with farmyard manure alone or in combination with inorganic fertilizers in cardamom (*Elettaria cardamomum* Maton). The 30 to 50 per cent yield increased by crop of ambrette, bacopa, perivinkle, king of bitters, winter cherry with farm yard manure. **Prakasa Rao et al., 1988; Prakasa Rao et al., 2003; Rajeswara Rao et al., 2004; Rajeswara Rao and Rajput, 2005**. In Turmeric use of farmyard manure gave significant result with respect to growth and rhizome yield (**Balashanmugam et al., 1989; Gopalkrishna et al., 1997 and Gill et al., 1999**). Impact of FYM was additive when these applied with N, P and K fertilizers (**Shaha, 1988 and Vishwanath et al., 2004**). Application of distillery effluent @ 100 cubic meter ha<sup>-1</sup> encouraged the growth aonla budlings and improved properties of the soil (**Singh and Gaur, 2004**).

A field experiment was conducted during summer season at Narayan College of Science and Arts Alampur Hauz Etawah Uttar Pradesh during 2015-19 in randomized block design. The soil had sandy foam texture with ph 8, organic carbon 0.45 percent available N, P and S 192 10 and 16 kg/ha, respectively. Application of Nitrogen and phosphorus @ 30

and 60 kg/ha, respectively through diammonium phosphate was given uniformly at sowing time. Organic fertilizers given by different sources. The organic fertilizer sources were green manure, farm yard manure, city and farm waste vermin compost and vermin wash crop residues which apply @ 10 ton per hectare.

Plant samples were collected at the crop harvest, oven dried, ground and digested in HNO<sub>3</sub>, HClO<sub>4</sub>, diacid mixture (4:1) for the nutrients estimation. Total P & S was determined colorimetrically by vanadomolybdo phosphate yellow colour method (Jackson, 1973), turbidimetrically method (Chesnin and Yien, 1951) and thiocyanate method (Evans et al. 1962), respectively. Total Ca was estimated according to Versenate disodium dihydrogen ethylene diamine tetra acetic acid) titration method (Jackson, 1973). Plant nitrogen estimated by method (Jackson, 1973) micro-kjeldahl's Other quality constituents like sugar, methionine and cell content were determined by Johnson et al. (1966), Horn et al. (1946) and Van Soest and Wine (1967), respectively. Crude protein was worked out by multiplying the total nitrogen content with the factor 6.25. Oil content by Soxhalet's method Chopra and Kanwar 1986, essential oil (oleoresin) AOAC 1975, Curcumin Content by Sadasivam and manickam 1996.

There were 9 different treatments with control i.e.,

- T<sub>1</sub> -> FYM + Azospirillum + NPK (100%)
- T<sub>2</sub> -> FYM + Azospirillum + NPK (50%)
- T<sub>5</sub> -> FYM + NPK (100%)
- T<sub>6</sub> -> FYM + NPK (50%)
- T<sub>3</sub> -> Compost + Azospirillum + NPK (100%)
- T<sub>4</sub> -> Compost + Azospirillum + NPK (50%)
- T<sub>7</sub> -> Compost + NPK (100%)
- T<sub>8</sub> -> Compost + NPK (50%)
- T<sub>9</sub> -> Control

#### **Effect on yield and yield parameters on turmeric:**

Effect of organic and inorganic fertilizer on turmeric given in table 2f. It has been found that the application of FYM as organic fertilizer with bio fertilizer Azospirillum and 100 % NPK gave better response in term of growth parameters i.e., plant height leaf length, leaf width, and number of tillers per plant. All parameters measured at 120 days. All growth

parameters were highest at T1 treatment then other FYM combination plots. When we apply compost with azospirillum and 100% NPK, the response were very surprising. The yield and yield parameters were at the most when we apply compost with azospirillum and with 100% NPK over all treatments. The plant height, length of leaf, width of leaf and number of tillers per plant at 120 days were in the increasing manner  $T9 < T8 < T4 < T3 < T7 < T2 < T6 < T1 < T5$ .

Overall the highest yield of turmeric in term of number of tillers per plant recorded with compost with bio fertilizers and inorganic NPK 100%.

#### **Effect on quality parameters of Turmeric:**

It has been cleared from the table 2f that the number of primary fingers and secondary fingers and weight of rhizome per plant per gram, rhizome yield raw and rhizome yield dry (q / h) increased with fertilization in combination with organic fertilizers, bio fertilizers and inorganic NPK fertilizers. The highest yield were recorded in the treatment when compost added with azospirillum and NPK 100% over control. The FYM combined with Azospirillum and NPK 100% gave better response in all treatment over control among FYM treated plots.

The yield parameters of ginger might improve significantly because of improved the physical, chemical and biological condition of the soil. The organic and bio-fertilizers provide better platform to grow the root properly. The yield may be increased due to provide phosphorous and other nutrients at root initiation in turmeric rhizome. Azospirillum might have enhanced the activity of growth promoting substance, jointly all have promoted better nutrient uptake and subsequently increase the rhizome yield of turmeric. The curcumin content increased in turmeric and were higher in T5 treatment because of enhancement the activity of microbes and other physical condition of soil. Similar results also found by Dash et-al 2008. The application of NPK positively impact the yield and nutrient value of turmeric because of supply of rich nutrient which desired for metabolism and bio chemical changes. The improving quality and quality parameters of turmeric may be increased due to supply of all the plant nutrients to the crop at regular intervals. Upadhayay et-al 1999, also found increasing trend with all parameters with turmeric C.V. Roma. Velmurgan and Chezhan 2005 with turmeric by application of organic manure in combination with bio fertilizer also got similar response with growth yield and quality of

turmeric. Singh et-al 2016 also got the similar results in terms of yield and growth parameters and quality parameters of turmeric with application of organic fertilizers with combination of bio fertilizers and inorganic fertilizers. Jana et-al 2017 in turmeric crop also reported similar result in combined application of FYM, Azospirillum and NPK over yield attributing characters and quality parameters of turmeric. Rajesh Kishor Tripathi (1992) also got increasing trend in yield and yield parameters and quality parameters in Sunflower by the application of Inorganic fertilizer and Organic fertilizer application as Basel door.

### Effect of organic and inorganic fertilizers on Growth parameters of Turmeric

Treatment no.	Plant ht. (cm) 120 Days	Leaf length (cm) 120 Days	Leaf width (cm) 120 Days	No. of tillers/plant 120 Days	Days to 50% sprouting
T <sub>1</sub>	20.45	29.00	11.22	1.90	25.66
T <sub>2</sub>	19.56	28.45	11.20	1.87	25.66
T <sub>3</sub>	18.50	28.13	11.18	1.81	25.00
T <sub>4</sub>	18.00	27.50	10.57	1.70	25.00
T <sub>5</sub>	20.78	30.75	11.65	2.15	26.66
T <sub>6</sub>	20.33	30.20	11.62	2.15	26.56
T <sub>7</sub>	19.00	28.32	11.18	1.76	26.00
T <sub>8</sub>	18.73	27.50	11.19	1.76	25.89
T <sub>9</sub>	17.33	27.00	10.03	1.50	24.33
S. Ed.	0.04	0.05	0.03	0.07	0.41
C.D. (0.05)	0.08	0.10	0.09	0.14	0.871

### Reference

- Aishwath, O.P. (2005b). Coefficient of variation and correlation coefficient in underground water quality parameters in and adjoining municipal area of Boriavi, Gujarat. *Pollution Research* 24: 9-17.
- Aishwath, O.P., Chandra, R., Kumar, D. and Jha, B.K. (2005). Yield and uptake of macro-nutrients by isabgol (*Plantago ovata*) with N and P under medium soil fertility. *Journal of the Indian Society of Soil Science* 53: 410 – 412.
- Arumugam, T., Doraipandian, A., Premalakshmi, V. and Vijayakumar, M. (2001). Studies on the effect of biofertilizer on biomass production in senna (*Cassia angustifolia* Vahl.) Changing scenario in the production systems of horticultural crops. In: *Proc. Natal. Sem. held at Coimbatore, Tamil Nadu, India, (28-30 August 2001)*. *South-Indian- Hort.*, 2001, 49: 178-180.
- Chandra, R., Kumar, D., Aishwath, O. P. and Jha, B.K. (2003). Response of *Chlorophytum borivilianum* to organic manure. *Journal of Tropical Medicinal Plants* 4: 261-264.
- Botanical Publishers, India.
- Dash, D.K., Mishra, N.C. and Sahoo, B.K. 2008. Influence of nitrogen, Azospirillum sp and farm yard manure on yield, rhizome rot and quality of ginger (*Zingiber officinale* Rosc.). *J. Spices Aromatic Crops*, 15:115-117.
- Deshpandey, S.G., Nagasampangi, B.A. and Sharma, R.N. (1990). Synergetic oviposition deterrence activity of extracts of *Glycosmis pentaphyllum* (Rutaceae) and other plants for *Phthorimaea operculella* (Zell) control. *Current Science* 59: 932-933.

- Dhasade, K. K., A. A. Shaikh and A. D. Tambe (2010). *Integrated nutrient management in ginger*. *J. Maharashtra Agril. Univ.*, 35(1) : 154-156.
- Haseeb, A., Singh, B. Khan, A.M. and Saxena, S.K. (1978). *Evaluation of nematicidal properties in certain alkaloid bearing plants*. *Geobios* 5: 116-118.
- Jana J.C., Dutta S, Bhaisare P T and A Thapa (2017) , *Effect of Organic and inorganic source of nutrients and azospirillum on yield and quality of turmeric* : *Int J curr. Microbiol App Sci*. 2017 6(2): 966 970
- Jana, J. C. 2006. *Effect of Azospirillum and graded levels of nitrogenous fertilizer on growth, yield and quality of ginger (Zingiber officinale Rosc.)*. *Environment and Ecology*. 24S (Special 3): 551-553.
- Jena, M. K. and Das, P. K. 1997. *Influence of microbial inoculants on quality of turmeric*. *Indian Cocoa, Arecanut and Spices J.*, 21(2): 31-33.
- Kumar, S. and Prasad, G. (1992). *Efficacy of medicinal plants (Andrgrophis paniculata) extract on aflotoxin production and growth of Aspergillus flavus*. *Lett. Applied Microbiology* 15: 131-134.
- Malhotra, S.K., Vashishtha, B.B. and Appa Rao, V.V. 2006. *Influence of nitrogen, Azospirillum sp and farn yard manure on growth, yield and incidence of stem gall disease in coriander (Coriendrum sativum L.)*. *J. Spices Aromatic Crops*, 15: 115-117.
- Mishra, N.C. and Gopalkrishnan, P.C. 2006. *Production of organic turmeric and ginger in Orissa*. *Spice India*, 19(4): 21-23.