



Evaluation of Performance of Turmeric (*Curcuma longa* L.) Varieties in Dharmapuri District of Tamil Nadu, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Turmeric is an important spice crop cultivated in various states of India and Tamil Nadu is one of the leading producers of Turmeric. The productivity of Turmeric in Tamil Nadu was 3.80 MT/ha (cured rhizome yield) which is lower than the national productivity. Though there are various factors affecting productivity, choice of varieties was one of the important factors among them. On farm trials were conducted to study the performance of Turmeric varieties viz. BSR 1, BSR 2, CO 2, Allepey Supreme, PTS 10 and Roma at Krishi Vigyan Kendra, Papparpatty of Dharmapuri district. The experiment was conducted in randomized block design with three replications. The crop management practices are carried out as per Crop Production Guide 2020 of Tamil Nadu Agricultural University, Coimbatore recommendation. The yield data revealed that there was

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significant variation among the turmeric varieties in various growth and yield determining parameters. Among the varieties CO 2 performed better than the other varieties with highest yield per plant (468.99 g), cured rhizome yield per hectare (6.82 tonnes/ha) followed by BSR 2. The results of the study show that CO 2 performed better in Dharmapuri district when compared to other varieties and hence can be preferably recommended to the farmers for better yield. The yield attributing factors viz. plant height, leaf size, weight of mother rhizome, weight and number of primary and secondary fingers are positively correlated with the yield per plant and hence can be used as criteria for varietal selection.

Keywords: *Curcuma longa*; cured rhizome; primary fingers; secondary fingers; turmeric; yield.

1. INTRODUCTION

Turmeric (*Curcuma longa* L.) belonging to the family Zingiberaceae is an important spice crop of India which is of immense horticultural, social, traditional and medicinal values throughout the history of India. It is a native of tropical South Asia and center of domestication in Indian subcontinent. Turmeric is an important spice crop which is indispensable in Indian kitchen. Apart from the culinary usage, turmeric is tremendously blooming as a source of medicinal principles of versatile native with proven scientific background. Traditionally it has been used for ages in alternative medicine. Turmeric powder is very frequently used in curries in Indian dishes [1]. It is used in digestion enhancement, as an anthelmintic, for menstrual problems, arthritis, blood purification, local application for wounds. Bhowmik et al, [1] Turmeric is proven to be an efficient antimicrobial agent from time immemorial and has lot of scientific proof [2] [3] and Jehan Bohht [4]. The other *Curcuma* species are recognized for their health benefits (Hewlings and Kalman, 2017).

The countries involved in turmeric cultivation other than India are Bangladesh, Pakistan, Sri Lanka, Taiwan, China, Myanmar, Nigeria, Indonesia [5] India is the major producer of turmeric globally and 80% of its production consumed domestically. It is also being produced in Latin American countries like Jamaica, Peru and Brazil [6]. India ranks first globally with an export quality of 1.37 tonnes turmeric worth 1,28,690.53 lakh rupees (Spice board 2021). In India, Karnataka, Andhra Pradesh, Tamil Nadu, Orissa and West Bengal are the leading states involved in Turmeric production [5]. India's production is 943.30 thousand MT in 186 thousand hectares. Telangana ranks first in area and production followed by Maharashtra. Tamil Nadu stands in third position with an area of 17000 ha and 12.12 lakh MT (Horticulture Statistics, 2017)

According to Horticulture Statistics (2017) the national productivity of India is 5.09 MT of cured rhizomes. Andhra Pradesh stands first in terms of productivity (7.11 t/ha) whereas productivity of Tamil Nadu is 3.8 MT/ha. This shows the gap in turmeric productivity in Tamil Nadu when compared to the national and leading state average. A thorough study on value chain analysis in turmeric by directorate of Arecanut and Spices development, Calicut revealed in depth the reasons that affect the productivity in Turmeric [7]. The variety of turmeric adopted is one of the major reasons that determine the productivity among the various other crop management techniques and socio economic factors are key in adoption of technologies. Utpala Parthasarathy et al. [8] also reported that the production growth rate is only 3.37 compared to the area growth rate which is 6.30. This clearly indicates the necessity of various improved agro technical practices adoption to increase the productivity. Abeynayaka et al. [9] reported that lack of knowledge on agricultural practices and non availability of labour as key reasons which affect turmeric productivity. Dipika [10] has studied the technological gap in turmeric production. The reports reveal that there is 38 percent technological gap in turmeric varieties along with the various other factors such as seed rhizome treatment, disease management etc.

Hence, there is a need for micro level evaluation of varieties to increase the productivity. Therefore the present on farm trials were undertaken in Dharmapuri district of Northern Tamil Nadu to study the performance of turmeric varieties released by various institutes across India.

2. MATERIALS AND METHODS

Dharmapuri district belongs to the tropical region and receives an annual rainfall of 853 mm. Field

experiment were conducted in two Kharif seasons during the year 2018 and 2019 at Krishi Vigyan Kendra of Tamil Nadu Agricultural University, Dharmapuri (India). Soil of the farm was red loamy which well drained and aerated. It is well suited for turmeric cultivation. Six turmeric varieties from various states of India viz. BSR 1, BSR 2, CO 2, Allepey Supreme, PTS 10 and Roma are tested for their performance.

The field was well ploughed and a raised bed of 15 cm height and 120 cm width. The crop management practices are carried out as per Crop Production Guide 2020 of Tamil Nadu Agricultural University, Coimbatore recommendation. The drip laterals are laid in the center of the raised bed and planting was done. Before planting seed rhizomes were treated with *Pseudomonas fluorescence* @ 10g/l of water. The seed rhizomes are dipped for 10 minutes and kept in shade. Then they were used for planting. Raised beds of 4 feet width were formed and three rows were planted in each bed at a spacing of 45 X 15 cm. Application of recommended dose of fertilizers through soil and fertigation was done. Irrigation was through drip system. Required pest and disease management strategies were followed. The experiment was conducted in randomized block design with three replications. The plant height was measured during the fourth month of planting in 120 DAP (days after ploughing). The number of tillers per plant, number of leaves per plant, leaf length, and leaf width were recorded at the same time. The rhizomes were harvested and the weight of primary rhizome and girth of primary fingers were recorded. The number of primary and secondary fingers in each clump was recorded. They were cleaned and their weight was recorded. The weight of the clump per plant was also recorded and expressed as grams per plant. After recording the fresh weight the rhizomes were boiled and dried to determine the dry rhizome yield. The curing percentage was calculated as follows :

$$\text{Curing Percentage (\%)} = \frac{\text{Dry rhizome weight per hectare}}{\text{Fresh rhizome weight per hectare}} * 100$$

The data obtained were analyzed statistically as per [11] using WASP 1.0 software and XLSTAT.

3. RESULTS AND DISCUSSION

Turmeric is water and nutrient loving crop and it responds well to fertilizer application. The yield

data for two crops from the experiment were presented in Table 1, 2 and the pooled data in Table 3. The pooled data revealed that there was significant variation among the turmeric varieties in various growth and yield determining parameters. Among the varieties CO 2 performed better with highest plant height (112.62 cm) followed by BSR 2 (101.95 cm) according pooled data for both seasons. The shortest plants were found in PTS10 (84.34 cm). There was no significant difference between the varieties based on number of tillers per plant and leaf width. The number of leaves per plant were higher in CO 2 (17.67) followed Allepey supreme (14.67). The lowest number of leaves was found in BSR 1 (11.00). The leaf length was significantly higher in Roma (85.74 cm) followed by BSR 2 (83.79 cm). The lowest was found in PTS 10. The weight of mother rhizomes was higher in PTS 10 followed by Allepey supreme and BSR 2 (81.82 and 81.74 g respectively). The lowest weight was recorded in BSR 1 (68.88 cm)

The girth of mother rhizomes was highest in Roma (22.19 cm) followed by BSR 2 (21.27 cm). The lowest girth was recorded by BSR 1 (14.97). The number and weight of primary fingers per clump followed a different trend. The number of primary fingers was highest in Roma (8.50) followed by CO 2. But the weight was highest in CO 2 (244.27 g) followed by PTS 10 (220.49). This shows that though the number was higher weight in lesser due to the thickness of the primary fingers were highest in the CO 2. The number and weight of secondary rhizomes was the highest in CO 2 (19.00 and 109.39 g/ plant) followed by BSR 2 (16.83 and 87.95 g/ plant). The lowest value was recorded in Roma (11.50 and 62.15 g/ plant).

The yield per plant was weight of rhizome clump per plant was highest in CO 2 (468.99 g) followed by PTS 10 (375.90 g). The lowest weight was recorded in Roma (258.90 g). The estimated yield hence followed similar trend. The dried rhizome yield after curing was highest in CO 2 (7.55 tonnes/ha) followed by BSR 2 (6.82 tonnes/ha). The lowest cured rhizome yield was recorded in BSR 1 (5.72 tonnes/ha) though Roma recorded the lowest fresh rhizome yield per hectare. It was due to the comparatively higher curing percentage in Roma than all the other varieties (22.20 %) which was followed by CO 2 (20.28 %). The lowest curing percentage was recorded by Allepey Supreme (18.97 %) which was on par with BSR 1 (19.01 %)

Table 1. Performance of turmeric varieties for growth and yield characteristics (First crop)

| Varieties | Plant height (cm) | No. of tillers per plant | No. of leaves | Leaf Length (cm) | Leaf width (cm) | Weight of mother rhizome (g) | Girth of mother rhizome(cm) | No. of primary fingers | Weight of primary fingers (g) | No. of secondary finger | Weight of secondary fingers (g) | Yield per plant (g) | Yield per hectare (tonne) | Cured rhizome yield (tonne) | Curing percentage |
|------------------|-------------------|--------------------------|---------------|------------------|-----------------|------------------------------|-----------------------------|------------------------|-------------------------------|-------------------------|---------------------------------|---------------------|---------------------------|-----------------------------|-------------------|
| BSR 1 | 89.27 | 3.00 | 11.67 | 75.17 | 13.84 | 69.55 | 15.23 | 8.33 | 134.90 | 16.00 | 69.00 | 290.45 | 30.51 | 5.92 | 19.41 |
| BSR 2 | 101.97 | 3.33 | 14.00 | 85.87 | 13.67 | 83.87 | 21.44 | 8.33 | 165.90 | 17.33 | 87.37 | 348.53 | 37.25 | 6.73 | 18.07 |
| CO 2 | 113.03 | 3.00 | 17.67 | 86.27 | 15.20 | 86.36 | 15.59 | 12.33 | 252.33 | 20.00 | 115.07 | 492.59 | 35.17 | 7.19 | 20.44 |
| Allepey Supreme | 99.17 | 3.33 | 15.33 | 72.70 | 13.34 | 82.91 | 18.34 | 6.67 | 151.50 | 15.67 | 62.87 | 324.24 | 31.97 | 5.55 | 17.92 |
| PTS 10 | 85.97 | 3.67 | 14.00 | 71.77 | 15.89 | 84.03 | 20.42 | 7.33 | 235.39 | 14.00 | 80.66 | 383.02 | 33.60 | 6.13 | 18.24 |
| Roma | 104.80 | 4.33 | 11.33 | 76.40 | 15.36 | 78.53 | 21.54 | 8.67 | 119.63 | 12.67 | 63.10 | 282.26 | 28.97 | 6.30 | 21.75 |
| S.Ed | 5.269 | 0.000 | 1.628 | 2.820 | 0.000 | 4.012 | 1.184 | 0.886 | 6.666 | 1.360 | 2.014 | 3.280 | 2.233 | 0.449 | 0.220 |
| CD (0.05) | 14.377 | - | 4.444 | 7.950 | - | 10.947 | 3.230 | 2.418 | 18.189 | 5.233 | 7.430 | 177.069 | 6.092 | 1.225 | 0.600 |

Table 2. Performance of turmeric varieties for growth and yield characteristics (Second crop)

| Varieties | Plant height (cm) | No. of tillers per plant | No. of leaves | Leaf Length (cm) | Leaf width (cm) | Weight of mother rhizome (g) | Girth of mother rhizome(cm) | No. of primary fingers | Weight of primary fingers (g) | No. of secondary finger | Weight of secondary fingers (g) | Yield per plant (g) | Yield per hectare (tonne) | Cured rhizome yield (tonne) | Curing percentage |
|------------------|-------------------|--------------------------|---------------|------------------|-----------------|------------------------------|-----------------------------|------------------------|-------------------------------|-------------------------|---------------------------------|---------------------|---------------------------|-----------------------------|-------------------|
| BSR 1 | 87.73 | 2.67 | 10.33 | 74.97 | 13.47 | 68.20 | 14.70 | 6.67 | 118.21 | 15.00 | 66.43 | 249.05 | 29.59 | 5.51 | 18.61 |
| BSR 2 | 101.93 | 3.33 | 12.33 | 81.70 | 13.30 | 79.60 | 21.10 | 7.67 | 139.00 | 16.33 | 88.53 | 321.12 | 34.71 | 6.90 | 19.87 |
| CO 2 | 112.20 | 3.67 | 17.67 | 85.20 | 14.80 | 69.23 | 15.33 | 9.67 | 236.21 | 18.00 | 103.70 | 445.38 | 39.25 | 7.90 | 20.12 |
| Allepey Supreme | 94.97 | 3.33 | 14.00 | 77.13 | 12.83 | 80.73 | 18.00 | 5.67 | 131.07 | 16.67 | 59.67 | 308.07 | 30.30 | 5.54 | 18.28 |
| PTS 10 | 82.70 | 3.67 | 13.67 | 76.13 | 15.43 | 82.67 | 21.13 | 6.67 | 205.59 | 15.67 | 72.67 | 368.78 | 32.89 | 6.29 | 19.12 |
| Roma | 95.87 | 4.33 | 11.67 | 73.27 | 15.83 | 80.77 | 22.83 | 8.33 | 102.40 | 10.33 | 61.20 | 235.53 | 27.42 | 6.21 | 22.65 |
| S.Ed | 2.604 | 0.000 | 1.235 | 2.603 | 0.000 | 3.179 | 0.900 | 0.795 | 6.391 | 1.479 | 7.935 | 7.169 | 0.985 | 0.376 | 0.958 |
| CD (0.05) | 7.105 | - | 3.371 | 7.103 | - | 8.674 | 2.455 | 2.169 | 17.439 | 4.036 | 21.651 | 19.651 | 2.687 | 2.687 | 2.615 |

Table 3. Performance of turmeric varieties for growth and yield characteristics (Pooled data)

| Varieties | Plant height (cm) | No. of tillers per plant | No. of leaves | Leaf Length (cm) | Leaf width (cm) | Weight of mother rhizome (g) | Girth of mother rhizome (cm) | No. of primary fingers | Weight of primary fingers (g) | No. of secondary finger | Weight of secondary fingers (g) | Yield per plant (g) | Yield per hectare (tonne) | Cured rhizome yield (tonne) | Curing percentage |
|-----------|-------------------|--------------------------|---------------|------------------|-----------------|------------------------------|------------------------------|------------------------|-------------------------------|-------------------------|---------------------------------|---------------------|---------------------------|-----------------------------|-------------------|
| BSR 1 | 88.50 | 2.84 | 11.00 | 75.07 | 13.66 | 68.88 | 14.97 | 7.50 | 126.56 | 15.50 | 67.72 | 269.75 | 30.05 | 5.72 | 19.01 |
| BSR 2 | 101.95 | 3.33 | 13.17 | 83.79 | 13.49 | 81.74 | 21.27 | 8.00 | 152.45 | 16.83 | 87.95 | 334.83 | 35.98 | 6.82 | 18.97 |
| CO 2 | 112.62 | 3.34 | 17.67 | 85.74 | 15.00 | 77.80 | 15.46 | 11.00 | 244.27 | 19.00 | 109.39 | 468.99 | 37.21 | 7.55 | 20.28 |

| Varieties | Plant height (cm) | No. of tillers per plant | No. of leaves | Leaf Length (cm) | Leaf width (cm) | Weight of mother rhizome (g) | Girth of mother rhizome (cm) | No. of primary fingers | Weight of primary fingers (g) | No. of secondary finger | Weight of secondary fingers (g) | Yield per plant (g) | Yield per hectare (tonne) | Cured rhizome yield (tonne) | Curing percent age |
|------------------|-------------------|--------------------------|---------------|------------------|-----------------|------------------------------|------------------------------|------------------------|-------------------------------|-------------------------|---------------------------------|---------------------|---------------------------|-----------------------------|--------------------|
| Allepey Supreme | 97.07 | 3.33 | 14.67 | 74.92 | 13.09 | 81.82 | 18.17 | 6.17 | 141.29 | 16.17 | 61.27 | 316.16 | 31.14 | 5.55 | 18.10 |
| PTS 10 | 84.34 | 3.67 | 13.84 | 73.95 | 15.66 | 83.35 | 20.78 | 7.00 | 220.49 | 14.84 | 76.67 | 375.90 | 33.25 | 6.21 | 18.68 |
| Roma | 100.34 | 4.33 | 11.50 | 74.84 | 15.60 | 79.65 | 22.19 | 8.50 | 111.02 | 11.50 | 62.15 | 258.90 | 28.20 | 6.26 | 22.20 |
| S.Ed | 2.60 | 0.00 | 1.24 | 2.60 | 0.00 | 3.18 | 0.90 | 0.79 | 6.39 | 1.48 | 7.93 | 7.17 | 0.98 | 0.38 | 0.96 |
| CD (0.05) | 8.710 | - | 3.021 | 5.798 | - | 8.457 | 2.471 | 1.097 | 13.657 | 3.316 | 11.356 | 13.509 | 3.503 | 0.742 | 1.258 |

Table 4. Correlation matrix among different traits of turmeric

| Variables | Plant height | No. of tillers per plant | No. of leaves | Leaf Length | Leaf width | Weight of mother rhizome | Girth of mother rhizome | No. of primary fingers | Wt. of primary fingers | No. of secondary finger | Wt. of secondary fingers | Yield per plant | Yield per hectare | Cured rhizome yield | Curing percentage |
|--------------------------|--------------|--------------------------|---------------|-------------|------------|--------------------------|-------------------------|------------------------|------------------------|-------------------------|--------------------------|-----------------|-------------------|---------------------|-------------------|
| Plant height | 1 | 0.118 | 0.602 | 0.809 | -0.016 | 0.107 | -0.136 | 0.776 | 0.226 | 0.446 | 0.630 | 0.477 | 0.494 | 0.746 | 0.438 |
| No. of tillers per plant | 0.118 | 1 | -0.123 | -0.235 | 0.702 | 0.550 | 0.769 | 0.099 | -0.122 | -0.700 | -0.229 | -0.161 | 0.336 | 0.099 | 0.714 |
| No. of leaves | 0.602 | -0.123 | 1 | 0.615 | 0.083 | 0.362 | -0.322 | 0.511 | 0.815 | 0.755 | 0.739 | 0.925 | 0.753 | 0.631 | -0.150 |
| Leaf Length | 0.809 | -0.235 | 0.615 | 1 | -0.111 | 0.057 | -0.211 | 0.750 | 0.476 | 0.737 | 0.899 | 0.668 | 0.855 | 0.886 | 0.090 |
| Leaf width | -0.016 | 0.702 | 0.083 | -0.111 | 1 | 0.229 | 0.340 | 0.412 | 0.404 | -0.399 | 0.177 | 0.257 | -0.049 | 0.362 | 0.633 |
| Weight of mother rhizome | 0.107 | 0.550 | 0.362 | 0.057 | 0.229 | 1 | 0.720 | -0.176 | 0.282 | -0.062 | 0.061 | 0.283 | 0.276 | 0.170 | -0.081 |
| Girth of mother rhizome | -0.136 | 0.769 | -0.322 | -0.211 | 0.340 | 0.720 | 1 | -0.282 | -0.249 | -0.618 | -0.302 | -0.304 | -0.185 | -0.045 | 0.278 |
| No. of primary fingers | 0.776 | 0.099 | 0.511 | 0.750 | 0.412 | -0.176 | -0.282 | 1 | 0.487 | 0.383 | 0.799 | 0.605 | 0.513 | 0.891 | 0.591 |
| Wt. of primary fingers | 0.226 | -0.122 | 0.815 | 0.476 | 0.404 | 0.282 | -0.249 | 0.487 | 1 | 0.634 | 0.789 | 0.957 | 0.775 | 0.652 | -0.178 |
| No. of secondary finger | 0.446 | -0.700 | 0.755 | 0.737 | -0.399 | -0.062 | -0.618 | 0.383 | 0.634 | 1 | 0.767 | 0.761 | 0.848 | 0.517 | -0.499 |
| Wt. of secondary fingers | 0.630 | -0.229 | 0.739 | 0.899 | 0.177 | 0.061 | -0.302 | 0.799 | 0.789 | 0.767 | 1 | 0.884 | 0.919 | 0.932 | 0.044 |
| Yield per plant | 0.477 | -0.161 | 0.925 | 0.668 | 0.257 | 0.283 | -0.304 | 0.605 | 0.957 | 0.761 | 0.884 | 1 | 0.866 | 0.762 | -0.133 |
| Yield per hectare | 0.494 | -0.336 | 0.753 | 0.855 | -0.049 | 0.276 | -0.185 | 0.513 | 0.775 | 0.848 | 0.919 | 0.866 | 1 | 0.790 | -0.282 |
| Cured rhizome yield | 0.746 | 0.099 | 0.631 | 0.886 | 0.362 | 0.170 | -0.045 | 0.891 | 0.652 | 0.517 | 0.932 | 0.762 | 0.790 | 1 | 0.362 |
| Curing percentage | 0.438 | 0.714 | 0.150 | 0.090 | 0.633 | -0.081 | 0.278 | 0.591 | -0.178 | -0.499 | 0.044 | -0.133 | -0.282 | 0.362 | 1 |

The correlation between the yield parameters of the turmeric varieties was presented in Table 4. The table shows that the yield parameters are positively correlated with the yield per plant except for leaf length and girth of mother rhizome. The plant height, number of leaves per plant, weight of mother rhizome, number and weight of primary and secondary fingers are all positively correlated with yield. Since rhizome has a different growth nature and in a rhizomatous crop, the correlation effect of number and weight of primary and secondary fingers were high. It was even noted that enough number of primary fingers was high in PTS 10 the weight was lesser than BSR 2. This may be due to the fact that the size of the secondary fingers was higher in BSR 2 than PTS 10 and this may be varietal character.

Similar reports were given by Ravi et al. [12] in Ginger. The variety with higher number of primary and secondary fingers recorded highest yield. It was obvious that the vigorous plant growth with other yield determining factors lead to increase in yield [13]. Venkatesa and Siddhlingayya [14] claimed that the number of leaves per plant lead to increase in carbohydrate production. Similar result interpretation can be done in the present study. The variety CO 2 with higher number of leaves per plant recorded higher yield. The same authors had reported that the growth of genotypes under identical environment was the genetic constituent of the variety. Hence the performance of CO 2 with higher fresh and dry rhizome yield under the experimental condition shows its superiority under Dharmapuri conditions.

Many workers had reported that the increase in number of leaves, primary and secondary fingers number and weight resulted in higher yield in Turmeric [15] Goudar et al, 2017. Venkatesa and Siddhlingayya (2016) viewed that the varieties with good vigour and yield components recorded the highest fresh rhizome yield. The important criteria in selection of turmeric varieties are curing percentage as cured rhizome is the economic produce to be marketed.

Venkatesa and Siddhlingayya (2016) claimed that the variation in the fresh rhizomes and curing percentage determine the final dried rhizome yield. In the present study though Roma recorded comparatively lesser fresh rhizome yield, it gave highest curing percentage. This was in accordance with Ravindra Kumar et al. [16-18] They reported that Roma recorded the highest

curing percentage of 24.8 % than the other varieties under comparison. They reasoned out the increase in dry matter production as the key factor behind this increase in curing percentage. Similarly in case of the associated characters the number of tillers was high in Roma though not significantly higher than the other varieties [20-21].

4. CONCLUSION

The results of the on farm trials showed that CO 2 performed better with highest yield and yield attributing characteristics followed by BSR 2 when compared to other varieties and hence can be preferably recommended to the farmers for better yield. The yield attributing factors viz. plant height, leaf size, weight of mother rhizome, weight and number of primary and secondary fingers are positively correlated with the yield per plant and hence can be use as criteria for varietal selection.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bhowmik D, Chiranjib Sampath Kumar KP, Margret Chandira Jayakar, B. Turmeric: A herbal and traditional medicine. Archives of Applied Science Research. 2009;1:86-108.
2. Ankur Gupta, Surabhi Mahajan, Rajendra Sharma. Evaluation of antimicrobial activity of Curcuma longa rhizome extract against Staphylococcus aureus. Biotechnology Reports. 2015; 6:51-55.
3. Parveen Gul, Jehan Bakht. Antimicrobial activity of turmeric extract and its potential use in food industry. J Food Sci Technol. 2015;52:2272-2279.
4. Prasad S, Aggarwal BB. Turmeric, the Golden Spice: From Traditional Medicine to Modern Medicine. In: Benzie IFF, Wachtel-Galor S, editors. Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis. Available: <https://www.ncbi.nlm.nih.gov/books/NBK92752/>.2011
5. Angles S, Sundar A. and Chinnadurai, M. Impact of globalization on production and export of turmeric in India – An Economic Analysis. Agricultural Economics Research Review. 2011;24: 301-308.

6. Anne Plotto. Turmeric: Post-Production management. Food and Agriculture Organization of the United Nations (FAO), AGST. 2004;21.
7. Padmaja Kaja, Gelloboina KK. A study on Turmeric in Telangana with emphasis on value chain Analysis. Directorate of Arecanut and Spices Development, Ministry of Agriculture and Farmers Welfare, GOI, Calicut, India. 2017;50.
8. Utpala Parthasaraathy, Johny AK, Jayarajan K, Parthasarathy VA. Suitability of turmeric production in India on GIS interpretation. Natural Product Radiance. 2007;6:142-147.
9. Abeynayaka AASL, Bandara AMKR, Lankapura AIY, Idamekorala PR. Economics of turmeric production in Sri Lanka: An empirical analysis in major turmeric growing Districts. Asian Journal of Agricultural and Horticultural Research. 2020;6:10-17
10. Dipika AD. Technological gap in turmeric production technology. M.Sc. Thesis. Mahatma Phule Krishi Vidhyapeeth, Rahuri, India. 2012;120
11. Gomez KA, Gomez AA. Statistical procedures for agricultural research (2 ed.). John wiley and sons, NewYork. 1984;680p.
12. Ravi Y, Narayanpur VB, Hiremath JS, Ravi JP, Shantappa T. Evaluation of ginger (*Zingiber officinale* Rosc.) genotypes for growth and yield attributes under soppinabetta ecosystem of Karnataka. Environment & Ecology. 2017;35(1B):454–457.
13. Karthikeyan S, Anand M, Malathi S, Manonmani S. Evaluation of ginger (*Zingiber officinale*) Genotypes for High Yield and Resistance to Soft Rot Suitable for Gudalur Regions in Nilgiris District. International Journal of Current Microbiology and Applied Sciences. 2018;7(7):2979-2985.
14. Venkatesa JS. Siddhlingayya. Evaluation of turmeric (*Curcuma longa* L.) cultivars for growth and yield to determine regional specificity. Acta Horticulturae; 2016. DOI: 10.17660/ActaHortic.2016.1125.44
15. Kallappa N, Raviraja Shetty G, Nagaraj G, Ravi P, Sudeep HP, Shivakumar HJ. Performance of ginger (*Zingiber officinale* Rosc.) varieties for yield and quality attributes under hill zone of Karnataka. Eco. Env. & Cons. 2015;21(3):259-262.
16. Ravindra Kumar K. Narasimha Rao S, Raja Kumar N. Evaluation of turmeric (*Curcuma longa* L.) cultivars at North coastal Andhra Pradesh. Progressive Research. 2015;10:2417-2420. Spice board. Available:<http://www.indianspices.com/indianspices>.
17. Goudar SA, Gangadharappa PM, Shashidhar M. Dodamani, Cherukupalli Lokesh. and Vittal Uddappa Dharamatti. Evaluation of Ginger (*Zingiber officinale* Rosc.) genotypes for growth and yield attributes. Int. J. Pure App. Biosci. 2014;5(2):994-999.
18. Govindarajan VS, William HS. Turmeric-chemistry, technology, and quality. CRC Critical Reviews in Food Science and Nutrition. 1980;12:199–301.
19. Hamid Nasri, Najmeh Sahinfard , Mortaza Rafieian, Samira Rafieian, Maryam Shirzad, Mahmoud Rafieian-kopaei. Turmeric: A spice with multifunctional medicinal properties. J HerbMed Pharmacol. 2014;3:5-8.
20. Hewlings SJ, Kalman DS. Curcumin: A Review of Its Effects on Human Health. Foods. 2014;6:92.
21. Horticultural statistics at a glance. Horticulture statistics division department of agriculture, cooperation & farmers' welfare ministry of agriculture & farmers' Welfare Government of India; 2018.

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