

## Review Article

### “PERFORMANCE OF TURMERIC (*Curcuma longa* L.) GENOTYPES ON GROWTH AND YIELD UNDER PRAYAGRAJ AGRO CLIMATIC ZONE”

#### ABSTRACT

The present investigation entitled, “Performance of turmeric (*Curcuma longa* L.) genotypes on growth and yield under Prayagraj agro climatic zone” was conducted in Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during April 2021 to February 2022. Fifteen genotypes including check variety are evaluated to ascertain the performance of genotypes under Prayagraj agro climatic conditions. The experiment was laid out with 3 treatments replicated thrice in Randomized Block Design. The result of the present investigation, regarding the performance of 15 genotypes Alleppey supreme, Kandi, Kedaram, Lakadong, Megha-1, Prabha, Pragati, Prathibha, Soba, Sona, Sudharsana, Suguna, Suvarna, Varna and UP Local from different sources evaluated for plant growth and yield.

The present investigation was concluded that the genotype Pragati, performed well in plant growth and yield followed by Sona, Prabha. In terms of economics maximum Cost Benefit ratio (5.78) was also found in Pragati was suitable for growing under Prayagraj agro climatic condition.

Keywords : TURMERIC, GENOTYPES, GROWTH, YIELD

#### INTRODUCTION

Turmeric (*Curcuma longa* L.), the sacred and ancient spice of India known as the “Indian saffron” belonging to the family Zingiberaceae and plays a vital role in the national economy. Probably, it has been originated in the slopes of hills in the tropical forests of West Coast of South India (Stahl, 1980). Total area under vegetable in India during 2020-2021 was 10803 thousand hectares and the production was 196268 thousand metric tonnes. The commercial types are sterile triploids of *Curcuma longa* L. ( $3n = 63$ ) and the cultivars of *Curcuma aromatica* are tetraploids ( $2n = 84$ ), which set seed. With recently reported success of viable seed set in turmeric (under Kerala conditions). Turmeric is known as Indian Saffron and golden spice. Common names are Haldi in Hindi, Manjal in Malayalam, Hariitha in Sanskrit. India is the largest producer & exporter of turmeric in the world. Largest producer is Telangana and Erode is famously known as turmeric city or yellow city.

A number of cultivars are available in the country and are known mostly by the name of locality where they are cultivated. Some of the popular cultivars are Duggirala, Tekkurpet, Sugandham, Amalapuram, Erode local, Salem, Alleppey, Muvattupuzha and Lakadong. According to spices board, Calicut, Kerala, mainly 52 spices are grown in India. (Rao and Rao, 1988) Out of these three genera viz., curcuma (Turmeric), elettaria

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(Cardamom) and Zingiber (Ginger) have commercial importance as spices. Curcuma has 40-50 species. The improved varieties of turmeric released from ICAR-Indian Institute of Spices Research, Kozhikode are Suvarna, Suguna, IISR Prabha, IISR Prathiba, Kedaram, Sudharsana, Alleppey Supreme, Pragati released from ICAR-IISR

Turmeric is very much identified with human civilization, religion, customs and it finds use both in developed and underdeveloped countries. It is grown for underground stems called as rhizomes, which are used to impart flavour and colour to foodstuffs after clearing, boiling, drying, polishing and powdering. It is a principal ingredient in curry powder. Turmeric oleoresin is used in brine pickles and to some extent in non-alcoholic beverages, gelatins, butter and cheese, etc. The colour curcumin extracted from turmeric is used as a colourant. Turmeric is also used as a dye in textile industry (Tonnesen & Karlson, 1985). It is used in the preparation of medicinal oils, ointments and poultice. It is stomachic, carminative, tonic, blood purifier and an antiseptic. It is also used in cosmetics. The aqueous extracts have biopesticidal properties.

## MATERIALS AND METHODS

The experiment was carried out during April 2021 to February 2022 at the Experimental Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, (UP). Experimental materials comprised of 15 genotypes. Among these, genotypes were collected from IISR (Indian Institute of Spices Research) Calicut, KAU (Kerala Agricultural University) Thrissur, Nagaland and Uttar Pradesh. The plot size was 1.5m x 2m with 45x30cm spacing rows and plants. Ridge and furrow method used for sowing the rhizomes and applied dose of FYM 40 tonnes/ha and N, P, K is 60, 50 & 120 kg/ha respectively. The rhizomes were treated with Saaffungicide before sowing and the plants were sprayed with  $K_2SO_4$  after 180 days of sowing to compete the potassium deficiency in the plant.

## RESULTS AND DISCUSSION

The present investigation was concluded that the genotype, IISR Pragati found best in terms of plant growth parameters such as days to germination, leaf length, leaf width, plant height, number of tillers. Number of leaves were recorded in Megha 1 and in terms of yield parameters fresh rhizomes weight per plant, dry rhizomes yield per plant, fresh rhizomes yield per plot, fresh rhizomes yield per hectare was recorded high for Pragati. In terms of economics maximum Cost Benefit ratio (5.78) was also found in IISR Pragati whereas minimum Cost benefit ratio (2.75) was for Suguna suitable for growing under Prayagraj agro climatic condition.

## GROWTH PARAMETERS

The maximum Days to germination (33.53) was recorded in the variety Suguna, followed by Sona (22.07) and minimum germination day (21.3) was recorded in Pragati.

The maximum plant height at 160 DAS (cm) was recorded in the variety Pragati (88.58), followed by Sona (86.22) and minimum plant height (75.67) was recorded in Suguna. The maximum plant height at 200 DAS (cm) was recorded in the variety Pragati (100.9), followed by Prabha (96.25) and minimum plant height (81.51) was recorded in Varna. The maximum plant height at 240 DAS (cm) was recorded in the variety Pragati (119.37), followed by Sona (115.18) and minimum plant height (90.92) was recorded in Suguna. Similar results were

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shown by **Rajeev et al., (2020)** that Pragati was found plant height(114.6cm)duringthe evaluation of highyieldingvarieties of turmeric.

The maximum leaf length at 160 DAS (cm)was recorded in the variety Sona (41.6), followed by Pragati (39.4) and minimum leaf length (29.5) was recorded in Suguna.The maximum leaf length at 200 DAS (cm) was recorded in the variety Pragati (45.45), followed by Sona (43.84) and minimum leaf length (35.56) was recorded in Suguna. The maximum leaf length at 240 DAS (cm) was recorded in the variety Pragati (47.1), followed by Prabha (45.38) and minimum leaf length (38.56) was recorded in varna.Similar results were shown by **Rajeev et al., (2020)** that Pragati was found leaf length(47.4cm)duringthe evaluation of highyieldingvarietiesof turmeric.

The maximum leaf width at 160 DAS (cm) was recorded in the variety Sona (14.17), followed by Pragati (13.77) and minimum leaf width (9.51) was recorded in Kedaram.The maximum leaf width at 200 DAS (cm) was (14.88) was recorded in the variety Pragati, followed by Sona (14.61) and minimum leaf width (10.3) was recorded in Kedaram. The maximum leaf width at 240 DAS (cm) was (14.97) was recorded in the variety Pragati, followed by Sona (13.63) and minimum leaf width (9.87) was recorded in Suguna.Similar results were shown by **Rajeev et al., (2020)** that Pragati was found leaf width(13.7cm)duringthe evaluation of highyieldingvarieties of turmeric.

The maximum number of leaves at 160 DAS was recorded in the variety Pragati (16.47), followed by Sona (15.40) and minimum number of leaves (7.53) was recorded in Megha 1.The maximum number of leaves at 200 DAS was recorded in the variety Pragati (21.07), followed by Sona (18.47) and minimum number of leaves (11.47) was recorded in Kedaram. The maximum number of leaves at 240 DAS was recorded in the variety Pragati (18.4), followed by Sona (14.4) and minimum number of leaves (9.5) was recorded in Megha 1.Similar results were shown by **Shanmugasundaram et al., (2000)** that Alleppey Supreme, Shoba andKanti was found number of leaves (19.54,20.54 and 19.38cm) during the evaluation andselectionofturmeric(*Curcuma longa*L.)genotypes.

The maximum number of tillers at 160 DAS was recorded in the variety Pragati (2.7) and Sona (2.7), followed by Prabha (2.5) and minimum number of tillers (1.2) was recorded in Suguna.The maximum number of tillers at 200 DAS was recorded in the variety Pragati (3.7), followed by Sona (3.6) and minimum number of tillers (1.9) was recorded in Suguna.The maximum number of tillers at 240 DAS was recorded in the variety Pragati (4.9), followed by Sona (4.8) and minimum number of tillers (2.3) was recorded in Suguna.Similar results were shown by **Shanmugasundaram et al., (2000)** that Alleppey Shoba andKanti was found number of tillers (3.73,4.54 and 4.88cm) during the evaluation and selectionofturmeric(*Curcuma longa*L.)genotypes.

## **YIELD PARAMETERS**

The maximum fresh rhizome weight per plant (415.47) was recorded in the variety Pragati, followed by Sona (376.5) and minimum fresh rhizome weight per plant (197.77) was recorded in Suguna.Similar results were shown by **Chaudharet al., (2006)** that Suvarna, Suguna and Sudharsanawas found rhizomes per plantduring studies on varietal performance ofturmeric.**Mariam et al., (2019)** was found Prathiba and Megha 1 have (0.13 and 0.14kg) on theevaluationofturmeric genotypes of growth,yieldandqualityunderrainfedcondition.

The maximum dry rhizome weight per plant (61.89) was recorded in the variety Pragati, followed by Sona (56.83) and minimum dry rhizome weight per plant (19.8) was recorded in Suguna. The maximum number of mother rhizomes per plant (3.6) was recorded in the variety Pragati, followed by Sona (3.4) and minimum mother rhizomes per plant (1) was

The maximum number of secondary rhizomes per plant (5.3) was recorded in the variety Pragati, followed by Prathibha and Sobha (4.5) and minimum secondary rhizomes per plant (2.3) was recorded in Sudharsana. The maximum fresh rhizomes yield per plot (8.28) was recorded in the variety Pragati, followed by Sona (7.53) and minimum number of fresh rhizomes yield per plot (3.95) was recorded in Suguna. Similar results were shown by **Shanmugasundaram et al., (2000)** that Allepey Shoba and Kanti was found number of tillers (3.73, 4.54 and 4.88 kg/plot) during the evaluation and selection of turmeric (*Curcuma longa* L.) genotypes.

The maximum fresh rhizomes yield per ha (27.69) was recorded in the variety Pragati followed by Sona (25.09) and minimum number of fresh rhizomes yield per ha (13.16) was recorded in Suguna. Similar results were shown by **Shanmugasundaram et al., (2000)** that Allepey Shoba and Kanti was found curcumin percentage (4.29, 4.62 and 4.81 %) during the evaluation and selection of turmeric (*Curcuma longa* L.) genotypes. **Mariam et al., (2019)** was found Prathibha and Megha 1 have (5.40 and 6.20%) on the evaluation of turmeric genotypes of growth, yield and quality under rainfed condition.

## CONCLUSION

The present investigation entitled "Performance of Turmeric (*Curcuma longa* L.) genotypes on growth and yield under Prayagraj agro climatic zone" was concluded that Pragati (V<sub>7</sub>) was found best in terms of Days to germination, plant height (cm), leaf length (cm), leaf width (cm), number of leaves per plant, number of tillers per plant, fresh rhizome weight per plant (g), dry rhizome weight per plant (g), number of mother rhizomes per plant, number of secondary rhizomes per plant, fresh rhizomes per plot (kg), fresh rhizomes yield (t/ha) and Shobha (V<sub>9</sub>) was found best in terms of curcumin content (%). Among the different performance of genotypes, the highest Gross return (Rs/ha) (11,07,600), Net profit/ha (9,16,233), cost benefit ratio (5.78) was found highest in Pragati (V<sub>7</sub>).

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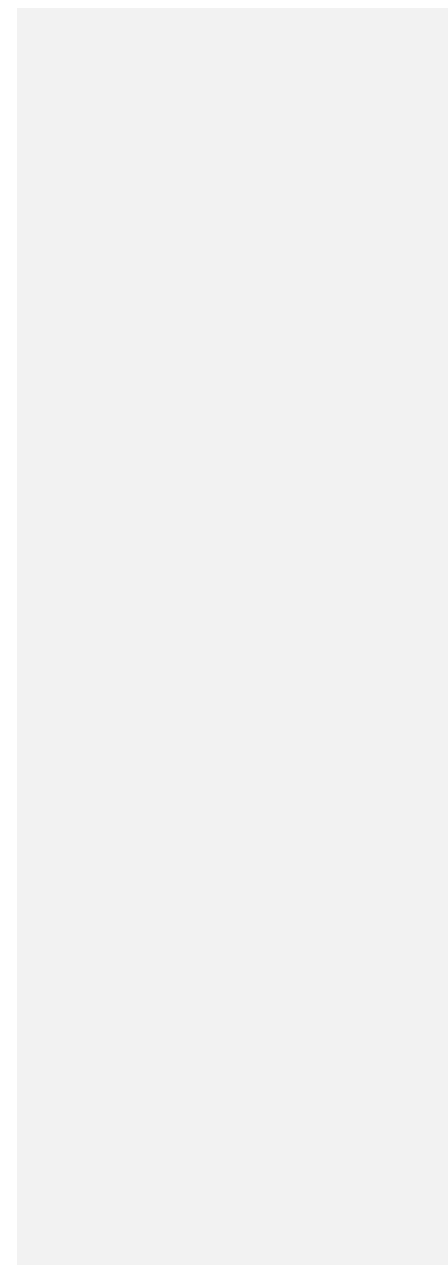
**Table 1 Effect of performance of genotypes of Turmeric (*Curcuma longa* L.) on growth parameters**

| SI No           | Genotypes        | Days to germination | Plant Height (cm) | Leaf Length (cm) | Leaf Width (cm) | No. of leaves per plant | No. of tillers per plant |
|-----------------|------------------|---------------------|-------------------|------------------|-----------------|-------------------------|--------------------------|
| V <sub>1</sub>  | Alleppey Supreme | 26.40               | 107.43            | 39.71            | 12.04           | 11.40                   | 3.03                     |
| V <sub>2</sub>  | Kanti            | 29.93               | 100.08            | 41.03            | 12.83           | 13.4                    | 2.6                      |
| V <sub>3</sub>  | Kedaram          | 27.87               | 98.59             | 41.73            | 10.38           | 10.5                    | 2.5                      |
| V <sub>4</sub>  | Lakadong         | 30.40               | 94.49             | 42.68            | 11.37           | 11.5                    | 2.7                      |
| V <sub>5</sub>  | Megha 1          | 25.13               | 96.01             | 41.61            | 11.67           | 9.5                     | 2.3                      |
| V <sub>6</sub>  | Prabha           | 23.87               | 113.07            | 45.38            | 12.33           | 15.4                    | 4.6                      |
| V <sub>7</sub>  | Pragati          | 21.13               | 119.37            | 47.1             | 14.97           | 18.4                    | 4.9                      |
| V <sub>8</sub>  | Prathibha        | 25.07               | 97.12             | 43.54            | 10.96           | 13.33                   | 3.9                      |
| V <sub>9</sub>  | Sobha            | 26.93               | 93.49             | 41.16            | 11.93           | 11.73                   | 3.9                      |
| V <sub>10</sub> | Sona             | 22.07               | 115.18            | 45.03            | 13.63           | 14.4                    | 4.8                      |
| V <sub>11</sub> | Sudharsana       | 29.73               | 98.37             | 39.75            | 12.68           | 15.5                    | 2.7                      |
| V <sub>12</sub> | Suguna           | 33.53               | 90.92             | 39.55            | 9.87            | 11.6                    | 2.3                      |
| V <sub>13</sub> | Suvarna          | 30.53               | 90.97             | 43.47            | 9.92            | 12.5                    | 2.7                      |
| V <sub>14</sub> | Varna            | 31.00               | 94.19             | 38.56            | 10.79           | 11.4                    | 2.9                      |
| V <sub>15</sub> | UP Local variety | 24.73               | 105.57            | 40.67            | 12.47           | 13.8                    | 3.5                      |
|                 | <b>F- Test</b>   | <b>S</b>            | <b>S</b>          | <b>S</b>         | <b>S</b>        | <b>S</b>                | <b>S</b>                 |
|                 | <b>C.D at 5%</b> | <b>1.31</b>         | <b>2.06</b>       | <b>2.30</b>      | <b>0.34</b>     | <b>0.82</b>             | <b>0.30</b>              |
|                 | <b>S.Ed.</b>     | <b>0.64</b>         | <b>1.01</b>       | <b>1.12</b>      | <b>0.17</b>     | <b>0.40</b>             | <b>0.15</b>              |
|                 | <b>C.V</b>       | <b>2.87</b>         | <b>1.22</b>       | <b>3.27</b>      | <b>1.72</b>     | <b>3.76</b>             | <b>5.45</b>              |

| SI No           | Genotypes        | Fresh rhizomes<br>Per plant<br>(g) | Dry rhizomes<br>per plant (g) | No: of mother<br>rhizomes per<br>plant | No: of secondary<br>rhizomes per plant | Rhizomes yield<br>per plot (kg) | Rhizomes yield<br>per ha (t/ha) |
|-----------------|------------------|------------------------------------|-------------------------------|--|--|---------------------------------|---------------------------------|
| V <sub>1</sub>  | Alleppey Supreme | 235.94                             | 25.73                         | 1.77                                   | 4.1                                    | 4.71                            | 15.7                            |
| V <sub>2</sub>  | Kanti            | 292.87                             | 46.2                          | 1.6                                    | 4.3                                    | 5.85                            | 19.52                           |
| V <sub>3</sub>  | Kedaram          | 213.02                             | 24.39                         | 2.5                                    | 4.2                                    | 4.26                            | 14.2                            |
| V <sub>4</sub>  | Lakadong         | 268.4                              | 35.78                         | 1.7                                    | 3.4                                    | 5.36                            | 17.89                           |
| V <sub>5</sub>  | Megha 1          | 222.68                             | 24.9                          | 1                                      | 4                                      | 4.45                            | 14.85                           |
| V <sub>6</sub>  | Prabha           | 329.68                             | 52.08                         | 3.1                                    | 5                                      | 6.59                            | 21.69                           |
| V <sub>7</sub>  | Pragati          | 415.47                             | 61.89                         | 3.6                                    | 5.3                                    | 8.28                            | 27.69                           |
| V <sub>8</sub>  | Prathibha        | 218.97                             | 21.9                          | 1.1                                    | 4.5                                    | 4.54                            | 14.6                            |
| V <sub>9</sub>  | Sobha            | 248.97                             | 34.87                         | 2.1                                    | 4.5                                    | 4.97                            | 16.56                           |
| V <sub>10</sub> | Sona             | 376.5                              | 56.83                         | 3.4                                    | 5                                      | 7.53                            | 25.09                           |
| V <sub>11</sub> | Sudharsana       | 237.77                             | 33.07                         | 1.5                                    | 2.3                                    | 4.74                            | 15.84                           |
| V <sub>12</sub> | Suguna           | 197.77                             | 19.8                          | 1.3                                    | 2.8                                    | 3.95                            | 13.16                           |
| V <sub>13</sub> | Suvarna          | 256                                | 34.29                         | 1.3                                    | 4.4                                    | 5.11                            | 17.06                           |
| V <sub>14</sub> | Varna            | 218.2                              | 23.7                          | 1.3                                    | 4.2                                    | 4.36                            | 14.54                           |
| V <sub>15</sub> | UP Local variety | 284.17                             | 43.5                          | 2                                      | 3.9                                    | 5.29                            | 18.94                           |
|                 | <b>F- Test</b>   | <b>S</b>                           | <b>S</b>                      | <b>S</b>                               | <b>S</b>                               | <b>S</b>                        | <b>S</b>                        |
|                 | <b>C.D at 5%</b> | <b>15.98</b>                       | <b>2.98</b>                   | <b>0.17</b>                            | <b>0.34</b>                            | <b>0.44</b>                     | <b>1.07</b>                     |
|                 | <b>S.Ed.</b>     | <b>7.80</b>                        | <b>1.45</b>                   | <b>0.08</b>                            | <b>0.16</b>                            | <b>0.22</b>                     | <b>0.52</b>                     |
|                 | <b>C.V</b>       | <b>3.57</b>                        | <b>4.96</b>                   | <b>5.09</b>                            | <b>4.81</b>                            | <b>4.94</b>                     | <b>3.57</b>                     |

**Table 2 Effect of performance of genotypes of Turmeric (*Curcuma longa* L.) on yield parameters**

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## REFERENCE

Comment [U6]: The references should be expanded

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**Chaudhary, A.S., Sachan, S. K. and Singh, R. L. (2006).** Studies on varietal performance of Turmeric (*Curcuma longa* L.). *Indian Journal Crop Science*, 1(1-2): 189-190 (2006).

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