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

ABSTRACT

An experiment was conducted on the Performance of turmeric (*Curcuma longa* L.) genotypes on growth and yield under Prayagraj agro-climatic zone at 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 were evaluated to ascertain the performance of genotypes under Prayagraj agro-climatic conditions. The experiment was laid out with 15 genotypes 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 concluded that the genotype Pragati, performed well in plant growth and yield followed by Sona, and Prabha. In terms of economics, the maximum Cost Benefit ratio (4.78) was recorded in Pragati. Overall results revealed that Pragati was suitable for growing under Prayagraj agro-climatic conditions.

Keywords: Turmeric, Genotypes, Growth, Yield

INTRODUCTION

Turmeric (*Curcuma longa* L.), the sacred and ancient spice of India known as the “Indian saffron" belongs to the family Zingiberaceae and plays a vital role in the national economy.Probably, it has been originated on the slopes of hills in the tropical forests of the West Coast of South India **(Stahl, 1980)**. The total area under vegetables in India during 2020-2021 was 10803- thousand-hectare area 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 the 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, Haritha in Sanskrit. India is the largest producer & exporter of turmeric in the world. The 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 the locality where they are cultivated. Some of the popular cultivars are Duggirala, Tekkurpet, Sugandham, Amalapuram, Erode local, Salem, Alleppey, Muvattupuzha, and Lakadong. According to the spices board, Calicut, Kerala, mainly 52 spices are grown in India. **(Rao and Reddy. 1988)** Out of these three genera viz., Curcuma (Turmeric), elettaria (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

The importance of turmeric as a spice and medicinal plant is well known to Indians from timeimmemorial. A large number of turmeric genotypes of turmeric are being grown in different parts of the country and not much research work has been undertaken on the morphological and quality aspects for the improvement of this crop. Information regarding the adaptability of cultivars, particularly in the Prayagraj agro-climatic zone is very limited. So, an attempt is being made to trace the morphological and quality aspects of the turmeric which is grown in the southern and eastern part of India and to findout its impact on Prayagraj condition to know the betterment of turmeric growth which enhances a new line of study in an aspect of different performance of genotypes. Keeping these facts in view, an experiment was carried out with the following objectives: To evaluate the different genotypes of turmeric in terms of growth and yield. To work out

the economics of various genotypes.

MATERIALS AND METHODS

The experiment was carried out from 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 15 genotypes. Alleppey supreme, Kandi, Kedaram, Lakadong, Megha-1, Prabha, Pragati, Prathibha, Soba, Sona, Sudharsana, Suguna, Suvarna, Varna, and UP Local. Among these, genotypes were collected from IISR (Indian Institute of Spice Research) Calicut, KAU (Kerala Agricultural University) Thrissur, Nagaland, and Uttar Pradesh. The plot size was 1.5m×2m with 45×30cm 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&120kg/ha respectively. The rhizomes were treated with Saaf fungicide before sowing and the plants were sprayed with K_2SO_4 after 180 days of sowing to compete for the potassium deficiency in the plants. The experiment was laid out in a randomized block design with three replications. Experimental materials comprised 15 genotypes. Among these, genotypes were collected from IISR (Indian Institute of Spice Research) Calicut, KAU (Kerala Agricultural University) Thrissur, Nagaland, and Uttar Pradesh. For growth parameters Days to germination, Plant height (cm), Leaf length (cm), Leaf width (cm), Number of leaves per plant, Number of tillers per plant, and for yield parameters Fresh rhizome weight per plant (g), Dry rhizome weight per plant (g), Number of mother rhizomes per plant, Number of secondary rhizomes per plant, Field rhizome yield per plot (kg), Fresh rhizome yield per hectare (t/ha). The mean data of each character would be replicated three times and each character would be worked out statistically by the method of analysis of variance using RBD (Randomized Block Design)

RESULTS AND DISCUSSION

The present investigation concluded that the genotype, IISR Pragati found best in terms of plant growth parameters, and in terms of yield parameters, Pragati was showing best. In terms of economics, the maximum Cost Benefit ratio (4.78) was also found in IISR Pragati is suitable for growing under Prayagraj agro-climatic conditions and is highly recommended for the farmers over here.

GROWTH PARAMETERS

The maximum Days to germination (33.53) were recorded in the variety Suguna, followed by Sona (22.07) and the 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 shown by **Rajeev *et al.*, (2021**) that Pragati was found at plant height (114.6cm) during the evaluation of high-yielding varieties 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.,* (2021)** that Pragati found leaf length (47.4cm) during the evaluation of high-yielding varieties of turmeric.

The maximum leaf width at 160 DAS (cm) was recorded in the variety Sona (14.17), followed by Pragati (13.77), and the minimum leaf width (9.51) was recorded in Kedaram. The maximum leaf width at 200 DAS (cm) was (14.88) recorded in the variety Pragati, followed by Sona (14.61) and the minimum leaf width (10.3) was recorded in Kedaram. The maximum leaf width at 240 DAS (cm) was (14.97) recorded in the variety Pragati, followed by Sona (13.63) and the minimum leaf width (9.87) was recorded in Suguna. Similar results were shown by **Rajeev *et al.,* (2021)** that Pragati found leaf width (13.7cm) during the evaluation of high-yielding varieties of turmeric.

The maximum number of leaves at 160 DAS was recorded in the variety Pragati (16.47), followed by Sona (15.40) and a 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 a 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 a minimum number of leaves (9.5) was recorded in Megha 1. Similar results were shown by **Shanmugasundaram *et al.,* (2000)** that Alleppey Supreme, Shoba, and Kanti were found in a number of leaves (19.54,20.54 and 19.38cm) during the evaluation and selection of turmeric (*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 the 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 the 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 the minimum number of tillers (2.3) was recorded in Suguna. Similar results were shown by **Shanmugasundaram *et al.,* (2000)** that Alleppey Shoba and Kanti found the number of tillers (3.73,4.54 and 4.88cm) during the evaluation and selection of turmeric (*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 the minimum fresh rhizome weight per plant (197.77) was recorded in Suguna. Similar results were shown by **Chaudhary *et al.,* (2006)** that Suvarna, Suguna and Sudharsanawas found rhizomes per plant during studies on varietal performance of turmeric. **Mariam *et al.,* (2019)** was found Prathiba and Megha 1 have (0.13 and 0.14kg) on the evaluation of turmeric genotypes of growth, yield and quality under rainfed conditions.

The maximum dry rhizome weight per plant (61.89) was recorded in the variety Pragati, followed by Sona (56.83) and the 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 the 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 the 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 found the number of tillers (3.73,4.54 and 4.88kg/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 the minimum number of fresh rhizomes yield per ha (13.16) was recorded in Suguna. Similar results were shown by **Shanmugasundaram *et al., (*2000)** that Alleppey Shoba and Kanti found curcumin percentages (4.29,4.62 and 4.81 %) during the evaluation and selection of turmeric (*Curcuma longa* L.) genotypes. **Mariam *et al.*, (2019)** found that Prathibha and Megha 1 have (5.40 and 6.20%) on the evaluation of turmeric genotypes of growth, yield, and quality under rainfed conditions.

CONCLUSION

Based on the present investigation it was concluded among the 15 genotypes, the variety V_7 was showing the most beneficial in terms of growth and yield followed by sona and prabha. The highest Gross return (Rs/ha) (11,07,600), Net profit/ha (9,16,233), cost-benefit ratio (4.78) was found highest in Pragati (V_7).

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

Sl 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_1	Alleppey Supreme	26.40	107.43	39.71	12.04	11.40	3.03
V_2	Kanti	29.93	100.08	41.03	12.83	13.4	2.6
V_3	Kedaram	27.87	98.59	41.73	10.38	10.5	2.5
V_4	Lakadong	30.40	94.49	42.68	11.37	11.5	2.7
V_5	Megha 1	25.13	96.01	41.61	11.67	9.5	2.3
V_6	Prabha	23.87	113.07	45.38	12.33	15.4	4.6
V_7	Pragati	21.13	119.37	47.1	14.97	18.4	4.9
V_8	Prathibha	25.07	97.12	43.54	10.96	13.33	3.9
V_9	Sobha	26.93	93.49	41.16	11.93	11.73	3.9
V_{10}	Sona	22.07	115.18	45.03	13.63	14.4	4.8
V_{11}	Sudharsana	29.73	98.37	39.75	12.68	15.5	2.7
V_{12}	Suguna	33.53	90.92	39.55	9.87	11.6	2.3
V_{13}	Suvarna	30.53	90.97	43.47	9.92	12.5	2.7
V_{14}	Varna	31.00	94.19	38.56	10.79	11.4	2.9
V_{15}	UP Local variety	24.73	105.57	40.67	12.47	13.8	3.5
	F- Test	**S**	**S**	**S**	**S**	**S**	**S**
	C.D at 5%	**1.31**	**2.06**	**2.30**	**0.34**	**0.82**	**0.30**
	S.Ed.	**0.64**	**1.01**	**1.12**	**0.17**	**0.40**	**0.15**
	C.V	**2.87**	**1.22**	**3.27**	**1.72**	**3.76**	**5.45**

Sl No	Genotypes	Fresh rhizomes Per plant (g)	Dry rhizomes per plant (g)	No: of mother rhizomes per plant	No: of secondary rhizomes per plant	Rhizomes yield per plot (kg)	Rhizomes yield per ha (t/ha)
V_1	Alleppey Supreme	235.94	25.73	1.77	4.1	4.71	15.7
V_2	Kanti	292.87	46.2	1.6	4.3	5.85	19.52
V_3	Kedaram	213.02	24.39	2.5	4.2	4.26	14.2
V_4	Lakadong	268.4	35.78	1.7	3.4	5.36	17.89
V_5	Megha 1	222.68	24.9	1	4	4.45	14.85
V_6	Prabha	329.68	52.08	3.1	5	6.59	21.69
V_7	Pragati	415.47	61.89	3.6	5.3	8.28	27.69
V_8	Prathibha	218.97	21.9	1.1	4.5	4.54	14.6
V_9	Sobha	248.97	34.87	2.1	4.5	4.97	16.56
V_{10}	Sona	376.5	56.83	3.4	5	7.53	25.09
V_{11}	Sudharsana	237.77	33.07	1.5	2.3	4.74	15.84
V_{12}	Suguna	197.77	19.8	1.3	2.8	3.95	13.16
V_{13}	Suvarna	256	34.29	1.3	4.4	5.11	17.06
V_{14}	Varna	218.2	23.7	1.3	4.2	4.36	14.54
V_{15}	UP Local variety	284.17	43.5	2	3.9	5.29	18.94
	F- Test	**S**	**S**	**S**	**S**	**S**	**S**
	C.D at 5%	**15.98**	**2.98**	**0.17**	**0.34**	**0.44**	**1.07**
	S.Ed.	**7.80**	**1.45**	**0.08**	**0.16**	**0.22**	**0.52**
	C.V	**3.57**	**4.96**	**5.09**	**4.81**	**4.94**	**3.57**

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

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