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Varietal Performance of Turmeric (*Curcuma Longa* L.) in Chamarajanagar District of Karnataka

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ABSTRACT

A field experiment was conducted during 2012-13 and 2013-14 to evaluate and identify superior and most promising variety of Turmeric suitable for Chamarajanagar district. Five varieties of turmeric viz., Chaitanya, IISR Prabha, IISR Pratibha, IISR Allepy supreme and Chamarajanagar local varieties were evaluated. Average data of two years revealed that the variety IISR Pratibha recorded highest fresh (345.43 q/ha) and cured rhizome (70.36 q/ha) yield followed by IISR Allepy supreme and IISR Prabha, while in curing percentage IISR Allepy supreme (22.3%) was found to be superior followed by IISR Prabha and IISR Pratibha. With regard to rhizome numbers and their length, IISR Pratibha produced more number of rhizome (10.75), maximum length (10.12 cm) and girth (2.13 cm) followed by IISR Allepy supreme. The varieties IISR Prabha, IISR Pratibha and IISR Allepy supreme were found to be early duration types (230.75 to 234.50 d) compared to Chaitanya and Chamarajanagar local, which matured relatively late (265.13 to 269.81 d). IISR Pratibha recorded significantly highest per day productivity (149.11 kg/day) followed by IISR Allepy supreme (134.12 kg/day). With respect to curcumin content, IISR Allepy supreme recorded highest (5.73%) followed by IISR Pratibha (5.20%).Over and all, IISR Pratibha and IISR Allepy supreme excelled.

Key Words: Turmeric, varieties, Cured rhizome, Curcumin content, Fresh rhizome, Productivity, Curing percentage.

INTRODUCTION:

Turmeric (*Curcuma longa* L.) is one of the most important spice crops in India and plays a vital role in national economy. Though wide genetic variability exists in this crop with regard to the yield and yield attributes, however, not much work has been done on crop improvement through the selection of superior types with high yield, high quality and earliness in southern dry zone of Karnataka. Chamarajanagar falls under southern dry agro climatic zone-VI of Karnataka with turmeric as a major spice crop of the district, presently growing in an area of 9000 ha (Anonymous, 2013-14). Most of the Turmeric growers are growing local varieties which are low yielding (15-18 t/ ha of fresh rhizome), long duration (280-290 d) and are low in curcumin content (2-3%).Hence, the present study was carried out to evaluate and identify superior, most promising variety of turmeric suitable for Chamarajanagar district with regard to yield, yield components, earliness and quality aspects.

MATERIALS METHODS

The field experiments were conducted at farmer's field at Chamarajanagar district during the year 2012-13 and 2013-14. The trials were laid out in randomized complete block design (RCBD) with four replications using five varieties of turmeric namely Chaitanya, IISR Prabha, IISR Pratibha, IISR Allepy supreme and Chamarajanagar local variety. The plot size was 20 m x 10 m (1481 plants) and rhizomes were planted during third week of May during each year on ridge and furrow method with a spacing of 45 cm x 30 cm. The observations on vegetative growth, yield and yield attributes, earliness, curcumin content were recorded during both the years and pooled analysis was done. All agronomic practices viz., irrigation, mulching,

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weeding, fertilizer application, manuring were done according to the recommendation of University of Horticulture Science, Bagalakot for turmeric production. The crop was harvested at different periods of the year based on the maturity (maturity indices followed were leaf drying and falling of plants) from January to March. Vegetative growth parameters like plant height, number of leaves, number of clumps, yield parameters like number of rhizomes, length and girth of rhizome, fresh rhizome yield, cured rhizome yield, curing percentage and quality attribute (curcumin content) of different varieties were recorded from five randomly selected and tagged plants in each replication. Mean values were computed. Curcumin content was done by following the procedure outlined by Manjunath *et al* (1991). Curing percentage was computed by considering the loss of weight in rhizome after curing and the difference expressed as percentage. The data obtained were statistically analysed following statistical procedures outlined by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Vegetative growth

Significant differences were noticed among the varieties with respect to plant height, number of clumps and number of leaves at different stages of crop growth (Table 1). Variety IISR Pratibha recorded more number of leaves (29.18), number of clumps (7.29) and highest plant height (126.96 cm) at all the stages of crop growth followed by IISR Allepy supreme and IISR Prabha. Chamarajanagar local recorded less number of leaves (21.11) and lowest plant height (105.31 cm) at final stage of the crop growth.

Yield and quality of turmeric

Significant differences were noticed for yield, yield attributes and quality of turmeric (Table 2). Highly significant variations between the cultivars for fresh and cured yield and quality of turmeric were noticed. Further, it was found that yield attributing characters such as rhizome length, girth, number and curing percentage varied significantly among cultivars.

The most important yield contributing character in turmeric was number of rhizomes and their size. More number of rhizomes per plant were produced by IISR Pratibha (10.75) followed by IISR Allepy supreme (9.43) and IISR Prabha (8.67). However Chaitanya and Chamarajanagar local produced less number of rhizomes per plant (5.73 and 5.85, respectively).

The length of the rhizomes varied from 7.14 cm in Chaitanya to 10.13 cm in IISR Pratibha, whereas rhizome girth at centre varied from 1.57 cm in Chamarajanagar local to 2.13 cm in IISR Pratibha. IISR Allepy supreme and Prabha produced thick and large rhizomes, whereas short and thin rhizomes were observed in Chaitanya and Chamarajanagar local. Choudhary *et al* (2006) reported 5 to 11 rhizomes in variety Sudharshan and Krishna.

The data (Table 2) evidenced highly significant variation among turmeric types with regard to the yield of fresh rhizomes per hectare and percentage recovery of the cured produce. Variety IISR Pratibha produced significantly more fresh rhizomes (345.44 q/ha) than all other varieties followed by IISR Allepy supreme (314.39 q/ha), whereas the variety Chamarajanagar local recorded significantly lower fresh rhizome yield (225.56 q/ha). Similar results were obtained by Venkatesha and Siddalingayya (2016).

It was noted that IISR Pratibha and IISR Allepy supreme produced bold, plumpy, thick and larger rhizomes and attained higher green yield. Length and girth of rhizomes correlated positively with the green yield (fresh rhizome yield) because of higher weight due to higher girth and the plants with longer primary rhizome naturally produced more secondary rhizomes and consequently the yield was high.

Curing percentage is an important factor as the fresh rhizomes are to be cured to obtain marketable turmeric. Maximum recovery of the cured produce was recorded in IISR Allepy supreme (22.3 %)

Table1. Plant height, number of clumps, number of leaves of turmeric varieties at different stages of crop.

Particulars	Plant height (cm)					Number of clumps					Number of leaves				
	45 DAP	75 DAP	105 DAP	135 DAP	Final stage of the crop	45 DAP	75 DAP	105 DAP	135 DAP	Final stage of the crop	45 DAP	75 DAP	105 DAP	135 DAP	Final stage of the crop
Chaitanya	14.53	26.87	56.53	83.84	110.01	3.26	4.40	4.73	5.14	5.48	-	9.92	12.27	15.19	21.19
IISR Prabha	13.64	28.56	69.95	91.96	116.67	3.86	4.81	5.41	6.47	6.73	-	10.05	12.95	18.83	26.19
IISR Pratibha	15.98	30.44	77.28	110.14	126.96	3.80	5.01	6.63	7.04	7.29	-	10.40	13.29	20.92	29.19
IISR Allepy supreme	14.30	28.81	68.89	99.08	121.54	3.65	4.91	6.09	6.67	6.91	-	10.28	13.04	12.12	26.62
Chamarajanagar Local	12.53	26.58	54.19	87.74	105.31	3.06	4.39	4.78	5.23	5.75	-	9.93	12.28	16.05	21.11
SEM	0.32	0.15	0.31	1.40	0.82	0.054	0.061	0.057	0.060	0.070	-	0.07	0.08	0.16	0.33
CD @ 0.05 %	0.93	0.42	0.90	4.05	2.39	0.16	0.18	0.17	0.18	0.20	-	0.21	0.24	0.49	0.99
'F' test	*	*	*	*	*	*	*	*	*	*	-	*	*	*	*

Table 2. Studies on yield and yield attributes of turmeric varieties.

Particulars	Corresponding Author's Email:	Length of the rhizome (cm)	Girth of the rhizome (cm)	Gross yield of fresh rhizome (q/ha)	Curing percentage	Cured turmeric (q/ha)	Crop duration (Days)	Curcumin content	Per day productivity (kg/day)
Chaitanya	5.73	7.14	1.57	22.58	16.91	3.84	265.01	3.11	85.19
IISR Prabha	8.67	8.16	1.71	30.21	21.02	6.36	230.75	4.89	130.96
IISR Pratibha	10.75	10.13	2.13	34.54	20.42	7.04	232.06	5.26	149.11
IISR Allepy supreme	9.42	9.01	1.98	31.43	22.30	6.95	234.37	5.73	134.12
Chamarajanagar Local	5.84	7.61	1.56	22.55	17.31	3.97	269.65	3.11	83.65
SEM	0.08	0.11	0.02	0.19	0.12	0.06	0.48	0.05	0.84
CD @ 0.05 %	0.25	0.33	0.06	0.56	0.36	0.19	1.40	0.17	2.43
'F' test	*	*	*	*	*	*	*	*	*

followed by IISR Prabha (21.02 %) and IISR Pratibha (20.42 %). Cured turmeric is also one of the important attributes in grading the turmeric produced for export and domestic market. The yield of cured produce per hectare was found to be maximum in IISR Pratibha (70.4 q/ha) followed by IISR Allepy supreme (69.6 q/ha), whereas comparatively low yield was recorded in Chaitanya (38.4 q/ha) and Chamarajanagara local (39.7 q/ha). The variation in rhizome characters, fresh yield and recovery percentage among various turmeric varieties could be due to genetic factors rather than the environmental conditions as reported by Subharayadu *et al* (1976).

The curcumin content was found to be maximum in variety IISR Allepy supreme (5.73 %) followed by IISR Pratibha (5.21 %), whereas comparatively low curcumin content was recorded in Chaitanya and Chamarajanagar local (both 3.11 %). The varieties IISR Prabha, IISR Pratibha and IISR Allepy supreme were found to be early duration types (230.75 to 234.38 d) compared to Chaitanya and Chamarajanagar local which were matured relatively late (265.06 to 269.66 d, respectively).

Duration of the variety correlated positively with per day productivity because of the earliness and more yield. Variety IISR Pratibha recorded significantly highest per day productivity (149.11 kg/day), followed by IISR Allepy supreme (134.12 kg/day) and IISR Prabha (130.96 kg/day), whereas, comparatively low per day productivity was recorded in Chamarajanagar local (83.65 kg/ha) and Chaitanya (85.19 kg/day).

CONCLUSION

The variation in vegetative characters, rhizome characters, fresh rhizome yield, recovery percentage, cured rhizome yield, curcumin content, earliness among various turmeric varieties could be due to genetic factor rather than the environmental condition . Thus it can be concluded that among the turmeric varieties evaluated under Chamarajanagar condition, the variety IISR Pratibha produced highest fresh and cured rhizome yield, highest number and maximum length and girth of rhizomes, whereas, maximum curing percentage was observed in the variety IISR Allepy supreme. Further, the varieties IISR Prabha, IISR Pratibha and Allepy supreme were found to be early duration types as compared to Chaitanya and Chamarajanagar local. Hence, these three varieties can be recommended for turmeric growers of Chamarajanagar district.

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