RESEARCH ARTICLE

EVALUATION OF TURMERIC GERMPLASM UNDER TELANGANA CONDITIONS

B. Anitha*, M. Padma, N. Seenivasan, D. Lakshmi Narayana, M. Sujatha and Mahender

College of horticulture, Rajendranagar, Sri kondalaxman Telangana State Horticultural University, Hyderabad, Telangana-500030
Email: bandianitha786@gmail.com

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Abstract: The present investigation entitled "Germplasm evaluation of Turmeric (*Curcuma longa* L.)" was undertaken to evaluate the performance of different types of germplasm of turmeric under Telangana conditions.The experiment was carried outduring kharif from 2017-18 and 2018-19 at Turmeric research station, Kammarapally, NizamabadDistrict, Telangana. MahalanobisD^2 statistics revealed that considerable genetic diversity exists within and among the four clusters. The characters Rhizome length (58%) Size of mother Rhizomes (58%), showed that the variation among genotypes. In addition to genetic divergence, considering the mean performance and horticulturally desirable attributes, five genetically distant lines *viz*.,Selam, Acc-94, Tekurpet, Lakadong, and Kasturiavidi, were selected as parents from cluster II, cluster III, cluster IV and cluster V for development of hybrids.

Keywords: Turmeric,Selam, Varieties, Biocontrol, Rhizome rot

INTRODUCTION

Turmeric (*Curcuma longa* L.) is a rhizomatous herbaceous perennial plant belonging to the family, Zingiberaceae. It is native to tropical South Asia, but is now widely cultivated in the tropical and subtropical regions of the world**.** Turmeric is valued for its underground orange coloured rhizome which is used as natural colouring agent for food, cosmetics and dye. It has been used in traditional medicines as a household remedy for various diseases including, anorexia, cough, diabetic wounds, rheumatism and sinusitis. Turmeric has attracted much attention due to its significant medicinal potential. The most active component of turmeric is curcumin. Curcumin is one of three curcuminoids present in turmeric, the other two being desmethoxycurcumin and bis-desmethoxycurcumin.These curcuminoids give turmeric its yellow color and curcumin is used as a yellow food colorant and food additive. Curcumin is obtained from the dried rhizome of the turmeric plant. Curcuminoids are a family of active compounds within turmeric. Curcuminoids are polyphenolic pigments and include curcumin, dimethoxy curcumin, and bisdemethoxycurcumin. Curcumin is the primary curcuminoid in turmeric.

The characteristic yellow colour of turmeric is due to the curcuminoids. Curcumin is an orange yellow crystalline powder practically insoluble in water. A compound curcuminoid, present in turmeric acts as inhibitor of human immune deficiency virus type1 (HIV-1).

Globally, India is the major producer and exporter of turmeric. India is also the largest consumer of turmeric in the world accounting for nearly 90% of total production. Major producing states in India are Telangana, Andhra Pradesh, Tamil Nadu, Orissa, West Bengal, Karnataka and Kerala. Andhra Pradesh is the major producer of turmeric contributing more than 60% of total production followed by Tamil Nadu and Karnataka. The area in Telangana and Andhra Pradesh under turmeric cultivation is 71,488 ha, with the production of 4,43,226 tons, mostly confined to the clay loam soils of the state. In Telangana, the turmeric crop is being grown in an area of 42535 Hectares with a production of 1,842,85 MT during 2015-16. In Telangana, the four districts viz. Nizamabad, Karimnagar, Warangal and Adilabad account for around 90% of the production of turmeric in the State.

Turmeric is a cross-pollinated, triploid species, which can be vegetatively-propagated using its underground rhizomes (Sasikumar 2005). The systematic efforts on introduction and evaluation of improved varieties have not been undertaken consistently. The varietal improvement work, so far attempted is only through selection and to a limited extent, mutations since hybridization is impossible due to sterility. 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) recombination breeding programme can take shape in this clonally propagated crop (Sasikumar *et al*.,). Since hybridization is ineffective in most cases, genetic improvement is often limited to germplasm selection.

MATERIALS AND METHODS

The present investigation entitled "Germplasm evaluation of Turmeric (*Curcuma longa* L.)"was undertaken in Turmeric. The experiment was carried outduring kharif from 2017-18 and 2018-19 at Turmeric research station,

*Corresponding Author

Kammarapally,NizamabadDistrict,Telangana by including 46 germplasm collected from different regions.

RESULTS AND DISCUSSION

Germination parameters:

The mean performance of 46 genotypes of turmeric in respect of various growth,yield and yield attributes are described character wise below. Mean performance of the genotypes for 34 biometric characters are presented in Table wise

Time taken for sprouting

The time taken for sprouting ranged from 16.17 to 25.67. Among 46 genotypes, BDJR-1183 taken the maximum time for sprouting (25.67), while the minimum time for sprouting was taken by Rajendra Sonalika and Tekurpeta (16.17).Twentythree genotypes recorded significantly lower values for sprouting time than the grand mean.

Time taken for 50% sprouting

The time taken for 50% sprouting ranged from 22.83 to 31.50. Among 46 genotypes, BDJR-1183 taken the maximum time for 50% sprouting (31.50), while the minimum time for 50% sprouting was taken by Parbhani, Roma and LTS-2 (22.83).Twenty four genotypes recorded significantly lower values for sprouting time than the grand mean.

Percentage of sprouting

The percentage of sprouting ranged from 77.57% to 94.75%. Among 46 genotypes, Selam recorded the maximum percentage of sprouting (94.75%), while the minimum percentage of sprouting was recorded by BDJR-1183 (77.57%). Twentyfour genotypes recorded significantly lower values for sprouting time than the grand mean.

Growth parameters

Pseudostem habit

The genotypes, based on Pseudostem habit were divided into 2 groups*viz.*, compact, open. Maximum genotypes (31) were recorded that the psedostem habit is open type . Where as minimum number of genotypes (15) were of compact type of Pseudostem habit.

Plant height

The Plant height ranged from 117.17cm to 163.83 cm. among 46 genotypes, selam showed that the maximum plant height (163.83cm), while the minimum was observed in Co-1 (117.17cm).Twenty six genotypes recorded significantly higher values for plant height than the grand mean.

Number of tillers per plant

The number of tillers ranged from 1.83 to 3.83 Among 46 genotypes, Selam showed the maximum number of tillers (3.83), while the minimum was observed in genotypes PCT-7, JTS-38, BDJR-1183, KasturiAraku,Sonajuli and waigon (1.83). Five genotypes exhibited significantly higher values for number of tillers than the grand mean.

Plant: Number of leaves on main shoot

The Number of leaves ranged from 7.83 to 17.17 Among 46 genotypes, KasturiAvidi showed maximum number of leaves (17.17), while the minimum number of leaves was observed in CCA-301 (7.83). Twentythree genotypes exhibited significantly higher values for number of leaves on main shoot than the grand mean.

Leaf disposition

At maturity stage, based on leaf disposition the genotypes were divided into 2 groups*viz.*, Erect and Semi erect. Maximum genotypes (24) have erect type of leaf disposition. Where as other genotypes (22) were showed semi erect type of leaf disposition.

Leaf Petiole length (cm)

The leaf petiole length ranged from 5.83 to 8.40 Among 46 genotypes, Kasturiavidi showed maximum leaf petiole length (8.40), while the minimum length of petiole was recorded in Parbhani (5.83). Twentythree genotypes exhibited significantly higher values for leaf petiole length than the grand mean.

Leaf lamina length (cm)

The leaf lamina length ranged from 38.67 cm to 52.50 cm Among 46 genotypes, CA-19/1 showed maximum length of leaf lamina (52.50 cm), while the minimum length of leaf lamina was recorded in NDH-4 (38.67 cm). Twentyfour genotypes exhibited significantly higher values for length of Leaf lamina than the grand mean.

Leaf lamina width (cm)

The leaf lamina width ranged from 13.72 cm to 16.67 cm Among 46 genotypes, Selam showed maximum width of leaf lamina (16.67 cm), while the minimum width of leaf lamina was recorded in BDJR-1183 (13.72 cm). Twent two genotypes exhibited significantly higher values for width of leaf lamina than the grand mean.

Weight of mother rhizome

The weight of mother rhizomes per plant ranged from 37.62 g to 116.67gAmong 46 genotypes, Selam showed the maximum weight of mother rhizomes per plant (116.67g), while the minimum weight of mother rhizomes per plant was recorded in JTS-3 (37.62g).Twentythree genotypes exhibited significantly higher values for weight of mother rhizomes per plant than the grand mean.

Weight of finger rhizome

The weight of finger rhizomes per plant ranged from 164.93 g to 441.52gAmong 46 genotypes,Selam showed the maximum weight of finger rhizomes per plant(441.52g), while the minimum weight of finger rhizomes per plant was recorded in Shillong (164.93g). Nineteen genotypes exhibited significantly higher values for weight of finger rhizomes per plant than the grand mean.

Table 1. Mean values for germination parameters of 46 genotypes in turmeric

Treatments	Time taken for sprouting			Time taken for 50% Germination			Percentage of sprouting (%)		
	2017-18	2018-19	pooled	2017-18	2018-19	pooled	2017-18	2018-19	pooled
T_1- ACC-94	23.67	25.00	**24.33**	30.67	29.67	**30.17**	80.83	83.50	**82.17**
T_2- BDJR-1183	25.00	26.33	**25.67**	32.00	31.00	**31.50**	76.57	78.57	**77.57**
T_3-BDJR-1082	22.33	23.33	**22.83**	29.00	28.00	**28.50**	78.30	80.30	**79.30**
T_4-CA SOMPET	24.67	25.67	**25.17**	31.00	30.00	**30.50**	84.67	86.67	**85.67**
T_5-CCA-304	22.33	23.33	**22.83**	30.00	29.00	**29.50**	85.00	87.00	**86.00**
T_6-CLI-24	23.33	24.33	**23.83**	29.67	28.67	**29.17**	87.33	89.33	**88.33**
T_7-CCA-301	21.33	22.33	**21.83**	29.33	28.33	**28.83**	90.33	92.33	**91.33**
T_8-CA-19/1	22.00	23.00	**22.50**	29.00	28.00	**28.50**	83.00	85.00	**84.00**
T_9-CLI-342	23.67	24.67	**24.17**	31.00	30.00	**30.50**	84.00	86.00	**85.00**
T_{10}-PCT-7	24.00	25.00	**24.50**	31.00	30.33	**30.67**	85.00	87.00	**86.00**
T_{11}-CLI-322	21.00	22.00	**21.50**	27.33	26.33	**26.83**	84.00	87.00	**85.50**
T_{12}-CLI-JYOTHI	20.33	21.33	**20.83**	27.00	26.33	**26.67**	90.00	92.33	**91.17**
T_{13}-ST-34	21.00	22.00	**21.50**	28.00	27.00	**27.50**	77.00	79.67	**78.33**
T14-Daghi	18.33	19.33	**18.83**	25.33	24.33	**24.83**	81.00	83.00	**82.00**
T_{15}-GL-Puram	20.67	21.67	**21.17**	28.00	27.00	**27.50**	87.00	89.00	**88.00**
T_{16}-JTS-3	21.00	22.00	**21.50**	28.33	27.33	**27.83**	90.00	91.67	**90.83**
T_{17}-Kasturiaraku	18.67	19.67	**19.17**	25.67	25.00	**25.33**	81.83	83.83	**82.83**
T_{18}-CA-90	17.33	19.33	**18.33**	24.67	23.33	**24.00**	84.33	86.33	**85.33**
T_{19}-CO-1	21.00	22.00	**21.50**	27.67	26.67	**27.17**	87.17	89.17	**88.17**
T_{20}-Shillong	18.00	19.00	**18.50**	28.00	27.00	**27.50**	86.53	88.53	**87.53**
T_{21}-NDH-79	18.67	19.67	**19.17**	25.00	24.33	**24.67**	84.17	86.17	**85.17**
T_{22}-PTS-62	21.00	22.00	**21.50**	26.33	25.67	**26.00**	83.13	85.13	**84.13**
T_{23}-JTS-38	20.67	21.67	**21.17**	27.33	27.00	**27.17**	86.07	88.07	**87.07**
T_{24}-Jamairika	18.33	19.33	**18.83**	25.00	24.00	**24.50**	86.70	88.70	**87.70**
T_{25}-KTS-1	17.00	18.00	**17.50**	24.00	23.00	**23.50**	86.83	88.83	**87.83**

Table 2. Mean values for germination parameters of 46 genotypes in turmeric

Treatments	Time taken for sprouting			Time taken for 50% Germination			Percentage of sprouting (%)		
	2017-18	2018-19	pooled	2017-18	2018-19	pooled	2017-18	2018-19	pooled
T_{26}-Lakadong	18.33	19.33	**18.83**	25.67	24.67	**25.17**	91.67	93.67	**92.67**
T_{27}-Kasturiavidi	20.67	21.67	**21.17**	27.33	26.33	**26.83**	87.67	89.67	**88.67**
T_{28}-Manipur local	18.33	19.33	**18.83**	24.67	23.67	**24.17**	88.50	90.50	**89.50**
T_{29}-NDH-4	17.67	18.67	**18.17**	25.00	24.00	**24.50**	79.97	81.97	**80.97**
T_{30}-Parbhani	16.33	17.33	**16.83**	23.33	22.33	**22.83**	81.83	86.17	**84.00**
T_{31}-Rajendrasonalika	15.67	16.67	**16.17**	26.33	25.33	**25.83**	79.33	81.33	**80.33**
T_{32}-RH-5	20.00	21.00	**20.50**	26.00	25.00	**25.50**	83.50	85.50	**84.50**
T_{33}-SB-1084	20.33	21.33	**20.83**	27.00	26.00	**26.50**	82.07	84.07	**83.07**
T_{34}-Sonajuli	18.67	19.67	**19.17**	26.33	25.33	**25.83**	87.00	89.00	**88.00**
T_{35}-Waigon	17.00	18.00	**17.50**	25.00	24.00	**24.50**	80.17	82.17	**81.17**
T_{36}-Tekurpet	15.67	16.67	**16.17**	23.33	22.33	**22.83**	88.73	90.73	**89.73**
T_{37}-SLP-389/1	17.33	18.33	**17.83**	25.00	24.00	**24.50**	79.67	81.67	**80.67**
T_{38}-Nagaland local	18.67	19.67	**19.17**	25.67	24.67	**25.17**	88.97	90.97	**89.97**

T_{39}-Nizamabad local	21.00	22.00	**21.50**	28.00	27.00	**27.50**	91.67	93.67	**92.67**
T_{40}-PTS-43	20.33	21.33	**20.83**	27.33	26.33	**26.83**	92.33	94.33	**93.33**
T_{41}-NO.94-02	18.33	19.33	**18.83**	25.33	24.33	**24.83**	77.67	79.67	**78.67**
T_{42}-Roma	16.33	17.33	**16.83**	23.33	22.33	**22.83**	78.50	80.50	**79.50**
T_{43}-LTS-2	15.67	16.67	**16.17**	23.33	22.33	**22.83**	80.87	82.87	**81.87**
T_{44}-KTS-8	17.33	18.33	**17.83**	24.33	23.33	**23.83**	85.00	87.00	**86.00**
T_{45}-CT-1	18.67	19.67	**19.17**	25.67	24.67	**25.17**	85.50	87.50	**86.50**
T_{46}-Selam	19.00	21.00	**20.00**	26.00	26.00	**26.00**	93.50	96.00	**94.75**
Mean	**19.71**	**20.77**	**20.24**	**26.83**	**25.90**	**26.37**	**84.67**	**86.78**	**85.73**
CD(5%)	**1.090**	**1.220**	**0.305**	**1.370**	**1.410**	**0.301**	**4.650**	**4.700**	**0.577**
Sem±	**0.390**	**0.440**	**0.107**	**0.490**	**0.500**	**0.105**	**1.650**	**1.670**	**0.202**

Table 3. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Pseudo stem habit**		**Plant height (cm)**			**Number of tillers**		
	2017-18	**2018-19**	**2017-18**	**2018-19**	**pooled**	**2017-18**	**2018-19**	**pooled**
T_1- ACC-94	compact	compact	138.00	147.70	**142.85**	2.33	3.67	**3.00**
T_2- BDJR-1183	compact	compact	130.60	140.27	**135.43**	1.33	2.33	**1.83**
T_3-BDJR-1082	open	open	141.63	151.30	**146.47**	1.33	2.67	**2.00**
T_4-CA SOMPET	open	open	140.97	150.63	**145.80**	1.33	2.67	**2.00**
T_5-CCA-304	compact	compact	138.77	148.43	**143.60**	1.67	3.33	**2.50**
T_6-CLI-24	open	open	142.93	152.60	**147.77**	1.67	2.67	**2.17**
T_7-CCA-301	open	open	127.07	136.73	**131.90**	1.67	2.67	**2.17**
T_8-CA-19/1	open	open	137.30	146.97	**142.13**	1.67	2.67	**2.17**
T_9-CLI-342	compact	compact	143.60	153.27	**148.43**	1.67	2.67	**2.17**
T_{10}-PCT-7	open	open	143.43	153.10	**148.27**	1.33	2.33	**1.83**
T_{11}-CLI-322	open	open	127.17	136.40	**131.78**	1.67	2.67	**2.17**
T_{12}-CLI-JYOTHI	open	open	142.33	152.27	**147.30**	1.67	2.67	**2.17**
T_{13}-ST-34	open	open	139.30	149.23	**144.27**	1.67	2.67	**2.17**
T14-Daghi	compact	compact	137.80	147.47	**142.63**	1.67	2.67	**2.17**
T_{15}-GL-Puram	open	open	128.03	137.70	**132.87**	1.67	2.67	**2.17**
T_{16}-JTS-3	compact	compact	144.20	153.87	**149.03**	1.67	2.67	**2.17**
T_{17}-Kasturiaraku	open	open	127.33	137.00	**132.17**	1.33	2.33	**1.83**
T_{18}-CA-90	open	open	124.70	134.37	**129.53**	1.67	2.67	**2.17**
T_{19}-CO-1	open	open	112.33	122.00	**117.17**	1.67	2.67	**2.17**
T_{20}-Shillong	open	open	141.37	151.03	**146.20**	1.67	2.67	**2.17**
T_{21}-NDH-79	compact	compact	136.77	146.43	**141.60**	1.67	2.67	**2.17**
T_{22}-PTS-62	compact	compact	148.47	158.13	**153.30**	1.33	2.33	**1.83**
T_{23}-JTS-38	open	open	138.87	148.53	**143.70**	1.33	2.33	**1.83**
T_{24}-Jamairika	open	open	128.97	138.63	**133.80**	1.67	2.67	**2.17**
T_{25}-KTS-1	open	open	126.60	136.27	**131.43**	1.67	2.67	**2.17**
T_{26}-Lakadong	open	open	142.50	152.17	**147.33**	2.67	3.67	**3.17**

Table 4. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Pseudo stem habit**		**Plant height (cm)**			**Number of shoots/tiller**		
	2017-18	**2018-19**	**2017-18**	**2018-19**	**pooled**	**2017-18**	**2018-19**	**pooled**
T_{27}-Kasturiavidi	open	open	155.13	164.80	**159.97**	2.00	3.00	**2.50**
T_{28}-Manipur local	compact	compact	153.40	163.07	**158.23**	1.67	2.67	**2.17**
T_{29}-NDH-4	compact	compact	136.60	146.27	**141.43**	1.67	2.67	**2.17**
T_{30}-Parbhani	open	open	126.20	135.87	**131.03**	1.33	2.33	**1.83**
T_{31}-Rajendrasonalika	open	open	143.97	153.63	**148.80**	1.67	2.67	**2.17**
T_{32}-RH-5	open	open	128.50	138.17	**133.33**	1.67	2.67	**2.17**
T_{33}-SB-1084	open	open	130.10	139.77	**134.93**	1.67	2.67	**2.17**
T_{34}-Sonajuli	compact	compact	127.03	136.70	**131.87**	1.33	2.33	**1.83**
T_{35}-Waigon	compact	compact	127.93	137.60	**132.77**	1.33	2.33	**1.83**

T_{36}-Tekurpet	open	open	143.87	153.53	**148.70**	1.67	2.67	**2.17**
T_{37}-SLP-389/1	open	open	138.53	148.20	**143.37**	1.67	2.67	**2.17**
T_{38}-Nagaland local	open	open	129.17	138.83	**134.00**	1.67	2.67	**2.17**
T_{39}-Nizamabad local	open	open	126.30	135.97	**131.13**	1.67	2.67	**2.17**
T_{40}-PTS-43	open	open	153.30	162.97	**158.13**	1.67	2.67	**2.17**
T_{41}-NO.94-02	compact	compact	143.53	153.20	**148.37**	1.67	2.67	**2.17**
T_{42}-Roma	compact	compact	126.17	135.83	**131.00**	1.67	2.67	**2.17**
T_{43}-LTS-2	open	open	136.77	146.70	**141.73**	1.67	2.67	**2.17**
T_{44}-KTS-8	open	open	126.53	136.37	**131.45**	1.67	2.67	**2.17**
T_{45}-CT-1	open	open	127.07	137.10	**132.08**	1.67	2.67	**2.17**
T_{46}-Selam	compact	compact	158.93	168.73	**163.83**	3.33	4.33	**3.83**
Mean			**136.310**	**146.000**	**141.150**	**1.670**	**2.710**	**2.190**
CD(5%)			**4.280**	**4.310**		**0.550**	**0.690**	**0.181**
Sem±			**1.520**	**1.530**		**0.200**	**0.250**	**0.063**

Table 5. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Number of leaves on main shoot**			**Leaf disposition**		**Leaf petiole length**		
	2017-18	**2018-19**	**pooled**	**2017-18**	**2018-19**	**2017-18**	**2018-19**	**pooled**
T_1- ACC-94	10.33	12.67	**11.50**	Erect	Erect	6.67	7.40	**7.03**
T_2- BDJR-1183	9.33	11.67	**10.50**	Semi erect	Semi erect	6.50	7.23	**6.87**
T_3-BDJR-1082	11.67	14.00	**12.83**	Erect	Erect	6.30	7.03	**6.67**
T_4-CA SOMPET	7.67	10.33	**9.00**	Erect	Erect	6.30	7.03	**6.67**
T_5-CCA-304	11.33	13.67	**12.50**	Erect	Erect	7.03	7.77	**7.40**
T_6-CLI-24	14.00	16.33	**15.17**	Erect	Erect	6.47	7.20	**6.83**
T_7-CCA-301	6.67	9.00	**7.83**	Semi erect	Semi erect	5.53	6.27	**5.90**
T_8-CA-19/1	10.67	13.00	**11.83**	Semi erect	Semi erect	7.53	8.27	**7.90**
T_9-CLI-342	11.67	14.00	**12.83**	Erect	Erect	7.33	8.07	**7.70**
T_{10}-PCT-7	11.67	14.00	**12.83**	Erect	Erect	6.93	7.67	**7.30**
T_{11}-CLI-322	9.33	11.67	**10.50**	Erect	Erect	7.50	8.23	**7.87**
T_{12}-CLI-JYOTHI	9.67	12.00	**10.83**	Erect	Erect	6.87	7.60	**7.23**
T_{13}-ST-34	11.67	14.00	**12.83**	Erect	Erect	7.23	7.97	**7.60**
T14-Daghi	9.67	12.00	**10.83**	Semi erect	Semi erect	6.37	7.10	**6.73**
T_{15}-GL-Puram	11.67	14.00	**12.83**	Erect	Erect	7.23	7.97	**7.60**
T_{16}-JTS-3	11.67	14.00	**12.83**	Erect	Erect	7.63	8.37	**8.00**
T_{17}-Kasturiaraku	11.67	14.33	**13.00**	Semi erect	Semi erect	6.70	7.43	**7.07**
T_{18}-CA-90	10.67	13.00	**11.83**	Erect	Erect	6.23	6.97	**6.60**
T_{19}-CO-1	11.00	13.33	**12.17**	Erect	Erect	6.50	7.23	**6.87**
T_{20}-Shillong	9.67	12.00	**10.83**	Semi erect	Semi erect	6.50	7.23	**6.87**
T_{21}-NDH-79	9.67	12.00	**10.83**	Semi erect	Semi erect	7.13	7.87	**7.50**
T_{22}-PTS-62	8.67	11.00	**9.83**	Semi erect	Semi erect	6.20	6.93	**6.57**
T_{23}-JTS-38	7.33	9.67	**8.50**	Semi erect	Semi erect	6.30	7.03	**6.67**
T_{24}-Jamairika	9.33	11.67	**10.50**	Semi erect	Semi erect	6.20	6.93	**6.57**
T_{25}-KTS-1	12.67	15.00	**13.83**	Erect	Erect	6.70	7.43	**7.07**

Table 6. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Number of leaves on main shoot**			**Leaf disposition**		**Leaf petiole length**		
	2017-18	**2018-19**	**pooled**	**2017-18**	**2018-19**	**2017-18**	**2018-19**	**pooled**
T_{26}-Lakadong	11.67	14.00	**12.83**	Semi erect	Semi erect	7.67	8.40	**8.03**
T_{27}-Kasturiavidi	16.00	18.33	**17.17**	Semi erect	Semi erect	8.03	8.77	**8.40**
T_{28}-Manipur local	12.67	15.00	**13.83**	Erect	Erect	6.87	7.60	**7.23**
T_{29}-NDH-4	12.67	15.33	**14.00**	Erect	Erect	7.50	8.23	**7.87**
T_{30}-Parbhani	9.00	11.33	**10.17**	Semi erect	Semi erect	5.47	6.20	**5.83**

T_{31}-Rajendrasonalika	9.00	11.33	**10.17**	Erect	Erect	7.07	7.80	**7.43**
T_{32}-RH-5	9.00	11.33	**10.17**	Semi erect	Semi erect	5.97	6.70	**6.33**
T_{33}-SB-1084	9.00	11.33	**10.17**	Erect	Erect	6.53	7.27	**6.90**
T_{34}-Sonajuli	7.33	10.33	**8.83**	Erect	Erect	7.07	7.80	**7.43**
T_{35}-Waigon	7.33	9.67	**8.50**	Semi erect	Semi erect	6.33	7.07	**6.70**
T_{36}-Tekurpet	7.33	10.00	**8.67**	Semi erect	Semi erect	7.13	7.87	**7.50**
T_{37}-SLP-389/1	7.67	10.33	**9.00**	Semi erect	Semi erect	6.30	7.03	**6.67**
T_{38}-Nagaland local	8.67	11.00	**9.83**	Erect	Erect	6.47	7.20	**6.83**
T_{39}-Nizamabad local	10.67	13.00	**11.83**	Semi erect	Semi erect	5.80	6.53	**6.17**
T_{40}-PTS-43	9.67	12.00	**10.83**	Erect	Erect	7.27	8.00	**7.63**
T_{41}-NO.94-02	13.33	15.67	**14.50**	Erect	Erect	7.20	7.93	**7.57**
T_{42}-Roma	11.33	14.00	**12.67**	Semi erect	Semi erect	6.07	6.80	**6.43**
T_{43}-LTS-2	11.33	13.67	**12.50**	Semi erect	Semi erect	6.93	7.67	**7.30**
T_{44}-KTS-8	8.67	11.00	**9.83**	Semi erect	Semi erect	7.47	8.20	**7.83**
T_{45}-CT-1	9.00	11.67	**10.33**	Semi erect	Semi erect	7.20	7.93	**7.57**
T_{46}-Selam	12.67	15.67	**14.17**	Erect	Erect	7.13	7.87	**7.50**
Mean	**10.290**	**12.700**	**11.500**			**6.770**	**7.500**	**7.140**
CD(5%)	**1.040**	**1.220**	**0.251**			**0.500**	**0.500**	**0.010**
Sem±	**0.370**	**0.440**	**0.088**			**0.180**	**0.180**	**0.003**

Table 7. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Leaf lamina length(cm)**			**Leaf lamina width(cm)**		
	2017-18	**2018-19**	**pooled**	**2017-18**	**2018-19**	**pooled**
T_1- ACC-94	46.23	48.57	**47.40**	14.80	16.63	**15.72**
T_2- BDJR-1183	48.07	50.40	**49.23**	12.80	14.63	**13.72**
T_3-BDJR-1082	44.43	46.77	**45.60**	13.57	15.40	**14.48**
T_4-CA SOMPET	39.07	41.40	**40.23**	14.13	15.97	**15.05**
T_5-CCA-304	41.97	44.30	**43.13**	14.43	16.27	**15.35**
T_6-CLI-24	45.60	47.93	**46.77**	15.37	17.20	**16.28**
T_7-CCA-301	43.00	45.33	**44.17**	14.73	16.57	**15.65**
T_8-CA-19/1	51.33	53.67	**52.50**	14.20	16.03	**15.12**
T_9-CLI-342	46.53	48.87	**47.70**	14.17	16.00	**15.08**
T_{10}-PCT-7	43.73	46.07	**44.90**	13.93	15.77	**14.85**
T_{11}-CLI-322	46.37	48.70	**47.53**	14.10	15.93	**15.02**
T_{12}-CLI-JYOTHI	45.47	47.80	**46.63**	13.87	15.70	**14.78**
T_{13}-ST-34	45.63	47.97	**46.80**	14.30	16.13	**15.22**
T14-Daghi	47.17	49.50	**48.33**	13.30	15.13	**14.22**
T_{15}-GL-Puram	40.40	42.73	**41.57**	13.67	15.50	**14.58**
T_{16}-JTS-3	43.53	45.87	**44.70**	14.30	16.13	**15.22**
T_{17}-Kasturiaraku	46.83	49.17	**48.00**	15.10	16.93	**16.02**
T_{18}-CA-90	49.53	51.87	**50.70**	13.23	15.07	**14.15**
T_{19}-CO-1	48.50	50.83	**49.67**	14.00	15.83	**14.92**
T_{20}-Shillong	43.83	46.17	**45.00**	13.00	14.83	**13.92**
T_{21}-NDH-79	40.77	43.10	**41.93**	14.20	16.03	**15.12**
T_{22}-PTS-62	44.40	46.73	**45.57**	15.10	16.93	**16.02**
T_{23}-JTS-38	39.20	41.83	**40.52**	14.70	16.53	**15.62**
T_{24}-Jamairika	43.63	46.30	**44.97**	13.77	15.60	**14.68**
T_{25}-KTS-1	45.20	47.53	**46.37**	14.07	15.90	**14.98**

Table 8. Mean values for vegetative parameters of 46 genotypes in turmeric

Treatments	**Leaf lamina length(cm)**			**Leaf lamina width(cm)**		
	2017-18	**2018-19**	**pooled**	**2017-18**	**2018-19**	**pooled**
T_{26}-Lakadong	48.27	50.60	**49.43**	14.57	16.40	**15.48**
T_{27}-Kasturiavidi	49.73	52.07	**50.90**	14.50	16.33	**15.42**
T_{28}-Manipur local	46.93	49.27	**48.10**	13.87	15.70	**14.78**
T_{29}-NDH-4	37.50	39.83	**38.67**	14.00	15.83	**14.92**
T_{30}-Parbhani	38.17	40.50	**39.33**	14.77	16.60	**15.68**

T_{31}-Rajendrasonalika	41.50	43.83	**42.67**	13.10	14.93	**14.02**
T_{32}-RH-5	45.53	47.87	**46.70**	14.23	16.11	**15.17**
T_{33}-SB-1084	45.53	47.87	**46.70**	13.80	15.63	**14.72**
T_{34}-Sonajuli	42.67	45.00	**43.83**	14.00	15.83	**14.92**
T_{35}-Waigon	44.17	46.50	**45.33**	13.40	15.23	**14.32**
T_{36}-Tekurpet	44.23	46.57	**45.40**	12.83	14.67	**13.75**
T_{37}-SLP-389/1	43.47	45.80	**44.63**	13.20	15.03	**14.12**
T_{38}-Nagaland local	46.87	49.20	**48.03**	14.23	16.07	**15.15**
T_{39}-Nizamabad local	46.20	48.53	**47.37**	13.97	15.80	**14.88**
T_{40}-PTS-43	44.17	46.50	**45.33**	12.93	14.77	**13.85**
T_{41}-NO.94-02	44.90	47.23	**46.07**	13.67	15.57	**14.62**
T_{42}-Roma	40.63	42.97	**41.80**	13.90	15.73	**14.82**
T_{43}-LTS-2	43.53	45.87	**44.70**	13.27	15.10	**14.18**
T_{44}-KTS-8	44.87	47.20	**46.03**	13.87	15.80	**14.83**
T_{45}-CT-1	47.10	49.43	**48.27**	14.23	16.07	**15.15**
T_{46}-Selam	50.90	53.90	**52.40**	15.70	17.63	**16.67**
Mean	**44.720**	**47.090**	**45.900**	**14.020**	**15.860**	**14.940**
CD(5%)	**2.760**	**2.830**	**0.173**	**0.670**	**0.670**	**0.036**
Sem±	**0.980**	**1.010**	**0.060**	**0.240**	**0.240**	**0.013**

Table 9. Mean values for yield and yield attributing parameters of 46 genotypes in turmeric

Treatments	**Weight of mother rhizomes(g)**			**Weight of finger rhizomes(g)**			
	pooled	**2017-18**	**2018-19**	**pooled**	**2017-18**	**2018-19**	**pooled**
T_1- ACC-94	**26.13**	76.80	87.97	**82.38**	404.77	408.50	**406.63**
T_2- BDJR-1183	**24.07**	66.67	77.83	**72.25**	394.60	398.33	**396.47**
T_3-BDJR-1082	**24.33**	67.80	78.97	**73.38**	402.57	406.30	**404.43**
T_4-CA SOMPET	**24.90**	56.70	67.87	**62.28**	404.33	408.07	**406.20**
T_5-CCA-304	**24.43**	40.47	51.63	**46.05**	423.03	426.77	**424.90**
T_6-CLI-24	**24.20**	62.77	73.93	**68.35**	408.03	411.77	**409.90**
T_7-CCA-301	**23.40**	54.60	65.77	**60.18**	394.13	397.87	**396.00**
T_8-CA-19/1	**24.47**	73.63	84.80	**79.22**	358.53	362.27	**360.40**
T_9-CLI-342	**24.20**	45.37	56.53	**50.95**	216.80	220.53	**218.67**
T_{10}-PCT-7	**23.63**	34.93	46.10	**40.52**	235.57	239.30	**237.43**
T_{11}-CLI-322	**21.37**	54.63	65.80	**60.22**	225.87	229.60	**227.73**
T_{12}-CLI-JYOTHI	**21.33**	50.30	61.47	**55.88**	260.80	264.53	**262.67**
T_{13}-ST-34	**23.53**	57.83	69.00	**63.42**	216.03	219.77	**217.90**
T14-Daghi	**23.57**	66.40	77.57	**71.98**	205.77	209.50	**207.63**
T_{15}-GL-Puram	**23.60**	64.00	75.17	**69.58**	198.13	201.87	**200.00**
T_{16}-JTS-3	**19.70**	32.03	43.20	**37.62**	211.90	215.63	**213.77**
T_{17}-Kasturiaraku	**24.53**	72.83	84.00	**78.42**	302.73	306.47	**304.60**
T_{18}-CA-90	**23.53**	49.27	60.43	**54.85**	259.63	263.37	**261.50**
T_{19}-CO-1	**20.50**	57.77	68.93	**63.35**	229.37	233.10	**231.23**
T_{20}-Shillong	**21.50**	75.87	87.03	**81.45**	163.07	166.80	**164.93**
T_{21}-NDH-79	**23.33**	57.33	68.50	**62.92**	351.47	355.20	**353.33**
T_{22}-PTS-62	**24.50**	73.87	85.03	**79.45**	288.50	292.23	**290.37**
T_{23}-JTS-38	**20.40**	58.23	69.40	**63.82**	188.90	192.63	**190.77**
T_{24}-Jamairika	**23.33**	48.63	59.80	**54.22**	276.83	280.57	**278.70**
T_{25}-KTS-1	**22.03**	70.40	81.57	**75.98**	193.40	197.13	**195.27**

Table 10. Mean values for yield and yield attributing parameters of 46 genotypes in turmeric

Treatments	Weight of mother rhizomes(g)			Weight of finger rhizomes(g)		
	2017-18	2018-19	pooled	2017-18	2018-19	pooled
T_{26}-Lakadong	82.90	94.07	**88.48**	412.60	416.33	**414.47**
T_{27}-Kasturiavidi	62.93	74.10	**68.52**	232.73	236.47	**234.60**
T_{28}-Manipur local	60.70	71.87	**66.28**	236.50	240.23	**238.37**
T_{29}-NDH-4	60.70	71.87	**66.28**	244.93	248.67	**246.80**
T_{30}-Parbhani	73.27	84.43	**78.85**	235.50	239.23	**237.37**
T_{31}-Rajendrasonalika	51.03	62.20	**56.62**	227.73	231.47	**229.60**
T_{32}-RH-5	64.27	75.43	**69.85**	331.27	335.00	**333.13**
T_{33}-SB-1084	47.77	58.93	**53.35**	241.20	244.93	**243.07**
T_{34}-Sonajuli	55.20	66.37	**60.78**	266.83	270.57	**268.70**
T_{35}-Waigon	62.77	73.93	**68.35**	259.33	263.07	**261.20**
T_{36}-Tekurpet	80.57	91.73	**86.15**	385.10	388.83	**386.97**
T_{37}-SLP-389/1	51.57	62.73	**57.15**	268.87	272.60	**270.73**
T_{38}-Nagaland local	73.23	84.40	**78.82**	212.37	216.10	**214.23**
T_{39}-Nizamabad local	60.67	71.83	**66.25**	244.77	248.50	**246.63**
T_{40}-PTS-43	74.83	86.00	**80.42**	292.40	296.13	**294.27**
T_{41}-NO.94-02	69.23	80.40	**74.82**	193.10	196.83	**194.97**
T_{42}-Roma	78.43	89.60	**84.02**	332.03	335.77	**333.90**
T_{43}-LTS-2	64.30	75.47	**69.88**	224.50	228.23	**226.37**
T_{44}-KTS-8	58.57	69.73	**64.15**	416.10	419.83	**417.97**
T_{45}-CT-1	58.57	69.73	**64.15**	290.10	293.83	**291.97**
T_{46}-Selam	110.47	122.87	**116.67**	440.27	442.77	**441.52**
Mean	**62.420**	**73.610**	**68.010**	**287.020**	**290.730**	**288.880**
CD(5%)	**4.560**	**4.650**	**0.272**	**20.320**	**20.250**	
Sem±	**1.620**	**1.650**	**0.095**	**7.230**	**7.210**	

CONCLUSION

Thus, from the present study considering the better performance in terms of germination and growth, and rhizome parameters of different cultivars of turmeric, Selam, Tekurpet, Acc-94, Kasturiavidi are identified as promising ones for using in breeding programme.

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