



Research Article

CHARACTERIZATION OF SOME INDIGENOUS GENOTYPES OF TURMERIC IN TERAI REGION OF WEST BENGAL

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Abstract: Twelve genotypes of turmeric (*Curcuma longa* L.) were taken for observation of different parameters like plant height, petiole length, leaf length, plant diameter, venation pattern, leaf margin, rhizome length, number of mother rhizomes, internode pattern, dry recovery percentage and yield per plot. The experiment was conducted in field gene banks of Uttar Banga Krishi Viswavidyalaya. The overall characterization was done according to DUS characters selected by IISR (Indian Institute of Spices Research). The plot size was 3m x 1m for the investigation and a spacing of 30 cm row to row and 20 cm plant to plant. The local check was taken TCP-2 and National Check was Prativa. In all the genotypes, PTS-8 was found to have maximum yield per plot lowest yield was recorded in PTS-55. Dry recovery percentage was found highest in TCP-64 and lowest in NDH-98. NDH-79 was found to have highest number of leaves per plant. Highest plant height was found PTS-55 and lowest plant height was found in PTS-12. 10 genotypes were found to have better yield than TCP-2 (Suranjana) and Prativa.

Keywords: Turmeric genotypes, Characterization, DUS characters, Maximum yield per plot, Dry recovery percentage

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Introduction

Turmeric (*Curcuma*) is herbaceous perennial plant belong form the Kingdom-Plantae, Order- Zingiberales, the major genus- *Curcuma* form the family zingiberaceae. This genus consists of approximately 110 species distributed in India, south-east Asian countries and north Australia [1]. The Indian Institute of Spices Research (IISR), Calicut, collect and conserve turmeric genotype. Till date, the National Repository of Turmeric Genotype at IISR maintains more than 700 accessions of turmeric, including land races, improved varieties, open pollinated progenies (OP), related species and taxa. The origin of Turmeric is South-East Asia. *Curcuma longa* L. is the most common and important plant among the species of *Curcuma* reported and studied till date. Turmeric is very popular among the people using spices in their food and it is called as "Golden spice" or "Spice of life". Turmeric rhizome is divided into mainly two parts (i) the central mother rhizome of bulb and its lateral axillary branches known as fingers. The planting material is either a bulb or a complete finger. After planting the bulb undergoes branching and the first branching is called primary fingers. The number of primary fingers varies from usually 2 to 5. Primary fingers in diggerent direction and in certain case they grow up to the ground level. The secondary branches develop from the primary branches. In some cases, tertiary branches develop from secondary branches [2]. Although there are some reports about the investigations for genetic potential, not many investigations were reported [2-4]. Genotype collection is the main source of variability for turmeric genetic improvement, these collections is specially contributed in India and most of the genetic diversity is found [3-6]. Hikmat ullah jan, *et al.*, (2012) [7] reported 3 qualitative characters like leaf, rhizome and flower colour and 18 quantitative characters like plant height (cm), leaf length (cm), bract width (cm), spike length (cm), spike width (cm), peduncle length (cm), ligule length (cm), rhizome length (cm), rhizome width (cm), rhizome branches number, rhizome nodes number, and corolla tube length (cm) during his investigation. The objectives of this present investigation are to characterize the 10 genotypes a) to study the morphological characters and b) to find out better genotypes with better yield than local or national check in this terai region of West Bengal.

All of these 10 genotypes were found to have more than 15% projected rhizome yield than national check Prativa. The qualitative morphological characters were taken as (i) Leaf margin (ii) Rhizome Habit (iii) Rhizome Shape (iv) Rhizome internode pattern (v) Rhizome length (vi) Number of mother Rhizome (vii) Status of Tertiary rhizome (viii) Pseudo-stem habit (ix) Leaf Disposition and (x) Venation pattern [2, 8]. The quantitative morphological and yield parameters were chosen as (i) Plant height, (ii) Tiller No (iii) No. of leaves (iv) Pseudo stem girth (v) Leaf length (vi) Leaf breadth (vii) Rhizome yield/plot, (viii) Projected yield (t/ha), (ix) Dry Recovery Percentage and (x) Days to maturity [2,8].

Materials and methods

The experiment was conducted in the field gene banks of Uttar Banga Krishi Viswavidyalaya, taking 12 indigenous genotypes including two checks in the year 2014-15 and 2015-16. Twelve genotypes taken for investigation were- SLP-389/1, PRATIBHA, PTS-12, ACC-79, NDH-8, NDH-98, NDH-79, TCP-2, PTS-8, PTS- 55 and TCP-64. 10 better performing genotypes which were found to have more than15% better yield than Prativa (National check) [Table-2] were investigated. The plot size was 3 mt x 1mt having spacing 30 cm x 20cm. The replications were taken and statistical design was chosen Randomized Block Design (RBD) for the experiment. The critical difference (C.D.), co-efficient of variation (C.V.) was measured to find out the best performing genotypes in this region. Better yielded genotypes were screened out and they were compared with local check TCP-2 and national check Prativa. Standard package of practices was adopted for this region of West Bengal.

Results and Discussion

The results of the 12 performing genotypes including two checks were given in [Table-1] and [Table-2]. In [Table-1], we discussed about some important qualitative morphological parameters and in [Table-2] we discussed about the yield and other quantitative parameters. Mean values of the genotypes studied for different characters under investigation for 2014-15 are presented in [Table-2].

Table-1 Morphological characterization of 12 important turmeric genotypes

Name	Rhizome Habit	Rhizome Shape	Rhizome internode pattern	Rhizome length	No of mother Rhizome	Status of Tertiary rhizome	Pseudo-stem habit	Leaf Disposition	Venation pattern	Leaf margin
SLP-389/1	Intermediate	Straight	Distant	Long	2	Present	Compact	Erect	Distant	Wavy
PRATIBHA (National check)	Intermediate	Straight	Distant	Medium	1	Present	Open	Erect	Distant	Wavy
PTS-12	Intermediate	Straight	Close	Medium	1	Present	Compact	Erect	Distant	Wavy
ACC-48	Compact	Straight	Distant	Medium	3	Present	Compact	Erect	Distant	Wavy
ACC-79	Intermediate	Straight	Close	Long	2	Present	Compact	Erect	Distant	Wavy
NDH-8	Loose	Straight	Distant	Medium	1	Absent	Compact	Erect	Distant	Wavy
NDH-98	Intermediate	Straight	Close	Medium	1	Present	Compact	Erect	Distant	Wavy
NDH-79	Loose	Straight	Distant	Medium	1	Present	Open	Erect	Distant	Wavy
TCP-2 (Local check)	Compact	Curved	Close	Medium	2	Present	Open	Erect	Distant	Wavy
PTS-8	Compact	Straight	Close	Medium	2	Present	Compact	Erect	Distant	Wavy
PTS-55	Intermediate	Straight	Distant	Medium	1	Present	Open	Erect	Distant	Even
TCP-64	Loose	Straight	Distant	Medium	1	Present	Compact	Erect	Distant	Wavy

Table-2 Performance of 10 genotypes in Turmeric along with check varieties in Terai region of West Bengal

SN	Entries	Plant height (cm)	Tiller No	No. of leaves	Pseudo stem girth (cm)	Leaf length (cm)	Leaf breadth (cm)	Rhizome yield/plot (Kg)	Projected yield (t/ha)	Dry Recovery Percentage	Days to maturity	% increase over local check	% increase over national check
1	SLP-389/1	138.55	4.14	7.9	7.86	57.26	11.37	8.7	17.55	30.66	226.66	24.64	36.98
2	TCP-64	112.3	2.76	9.03	6.53	55.22	12.08	10.06	20.35	34	216.67	44.12	107.85
3	PTS-12	99.3	2.13	8.39	6.89	49.14	10.74	7.5	15.11	31	236.66	7.44	54.95
4	ACC-48	120.1	3.81	8.25	6.07	43.16	10.27	5.79	11.68	27.67	222.66	-	19.62
5	ACC-79	108.4	2.56	7.99	8.12	45.72	11.92	5.96	12.02	31.66	224.67	-	23.14
6	NDH-8	127.8	1.63	8.78	8.11	61.95	10.65	8.06	16.36	31	238.33	15.47	66.52
7	NDH-98	108.1	3.16	9.32	6.64	55.99	14.5	9.65	19.02	25.67	227.67	24.21	125.34
8	NDH-79	114.2	2.77	9.42	7.17	51.42	11.31	7.39	14.89	26.67	226	5.87	52.68
9	PTS-55	145.3	2	8.62	12.28	48.7	9.96	5.58	11.25	32	240	-	15.28
10	PTS-8	127.8	1.63	8.78	8.11	61.95	10.65	11.06	22.23	31	238.33	58.45	234.52
11	TCP-2 Local check	123.3	2.39	8.9	8.64	56.3	11.42	6.98	14.07	28	224	-	44.21
12	PRATIBHA National check	121.3	2.72	8.46	7.35	51.9	10.63	4.84	9.74	30.67	230	-	-
	SEm (±)	3.84	0.34	0.46	0.56	1.52	0.78	1.56	2.44	1.23	2.62	-	-
	C.D.	10.58	1.36	1.27	1.44	4.43	2.16	4.38	7.1	3.02	7.1	-	-
	C.V.	17.1	15.34	14.34	17.11	18.68	14.12	19.48	18.98	16.18	15.57	-	-

Narayanpur and Hanamashetti (2003) [9] found that plant height determines the yield potential of the turmeric genotype. So, the plant height is a very important morphological character by whom the selection of rhizome yield could be made. Analysis of data showed that PTS-55 recorded maximum plant height (145.3 cm). PTS-12 recorded the lowest plant height (99.30 cm). SLP-389/1 showed the highest mean value for number of tillers/plant (4.14) while PTS-8 recorded the lowest (1.63). Rajyalakshmi, *et al.*, (2013) [4] concluded that high heritability was for number of tillers per plant where additive gene effects were observed because of high phenotypic variability. It is also proposed by Philip & Nair, (1986) [10] and Pathania, *et al.*, (1988) [11]. In case of number of leaves/plant, NDH-79 recorded the highest (9.42) and SLP-389/1 recorded the lowest (7.90). For pseudo stem girth, PTS-55 recorded the highest (12.28 cm) while ACC-48 showed the lowest (6.07 cm). In case of leaf length, PTS-8 recorded the highest length (61.95 cm) and ACC-48 recorded the lowest (43.16 cm). NDH-98 recorded highest leaf breadth (14.50 cm) whereas PTS-55 recorded lowest (9.96 cm). A wide range of variability was found among the genotypes for different yield characters as shown in [Table-2]. PTS-8 recorded highest yield of 11.06 kg/plot (22.23 t/ha) followed by TCP 64 10.73 kg/plot (21.70 t/ha). Lowest yield per plot was found in PTS-55 5.58kg/plot (11.25 t/ha). Dry recovery (%) was found highest in TCP 64 (34.00) and lowest was found in NDH-8 (24.33). Days to maturity were found highest in PTS-55 (240 days) and lowest was found in TCP-64 (216 days). Padmadevi K., *et al.*, (2012) [12] reported same effects on different grades of rhizomes on growth and yield of turmeric and the growth characters of turmeric with respect to different characters like plant height, number of tillers, stem girth, number of leaves and leaf area.

Conclusion

Among the 10 genotypes of turmeric, PTS-5, TCP-64, NDH-98 were among the top three whose yield is more than rest of the genotypes compared to national check Prativa and local check TCP-2 (Suranjana). Although all the genotypes

except PTS -5, ACC-48 and ACC-79 can be accepted for farmers of this region, the best three genotypes were found to be PTS-5, TCP-64, NDH-98 which can be grown successfully in this region.

Application of research: Characterization of qualitative as well as quantitative characters are of immense importance for conservation of any germplasm. The selection process if is done in such a way so that it can be evaluated in any region which would be very much suitable for farmers in that region.

Research Category: Turmeric germplasm

Abbreviations: C.V.: Coefficient of Variation, RBD: Randomized Block Design, C.D.: Critical difference.

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Study area / Sample Collection: Terai region of West Bengal

Cultivar / Variety name: 10 genotypes along with national check variety Prativa, local check Suranjana. SLP-389/1, PRATIBHA, PTS-12, ACC-79, NDH-8, NDH-98, NDH-79, TCP-2, PTS-8, PTS- 55 and TCP-64

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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