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EVALUATION OF SOME TURMERIC GENOTYPES IN TERAI REGION OF WEST BENGAL

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Abstract: A co-ordinated variety trial of turmeric in twelve selected genotypes were organized in the year 2013-14, 2014-15 and 2015-16 in experimental plots of the field gene banks of Uttar Banga Krishi Viswavidyalaya in order to investigate the best performing varieties against the local (TCP-2) and national check variety (Prativa). Parameters which were taken into account are Plant ht, tiller no., no. of leaves/plant, leaf length, leaf breadth, psudostem girth, rhizome yield/plot, projected yield/plot, dry recovery(%), days to maturity, leaf blotch and leaf spot of the genotypes. The genotypes which showed significant difference in result in tiller number (SLP-389/1) (3.27), leaf length (NDH-98) (60.41), leaf breadth (NDH-98) (15.06), Rhizome yield per plot (NDH 98) (18.09), projected yield (t/ha) (NDH-98) (36.53), curcumin (%) (TCP-64) (5.3), oleoresin (%) (TCP-2) and essential oil (%) (TCP-2), lowest leaf blotch (TCP-64), (PDI 23.75) and leaf spot (PTS-12) (PDI 8.20). From the investigation, NDH-98, TCP-64 and PTS-8 can be considered for better performing varieties in this region of West Bengal.

Keywords: Co-ordinated Variety trial, Yield per plot, Projected yield, Curcumin percentage, Leaf blotch, Leaf spot.

Introduction

Turmeric (*Curcuma longa* L.) is a tropical perennial herb belonging to the family Zingiberaceae. Commonly used as a spice and natural food dye, turmeric powder is obtained from *C. longa* rhizomes, which, after drying and processing, result in a bright yellow powder valued as a natural food dye. Some efforts have been reported to identify the genetic potential of turmeric germplasm from India, however, very few investigations have been reported about the characterization and evaluation of turmeric from north-eastern India [1]; [2]; [3]. Germplasm 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 [1]; [4];[5]. Turmeric (*Curcuma longa* L.) is an important spice crops in the world. India is the largest producer and exporter of this crop. It is extensively used in culinary application, cosmetic, pharmaceutical and dyeing industries. Indian turmeric has the high demand in the world market. Curcuminoids the active principles in turmeric rhizomes is known to have

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some medicinal properties and has been used efficiently in the treatment of circulatory problems, liver diseases, dermatological disorders [6];[7]. In order to meet the export and internal demands of turmeric, production has to be increased. For its long crop duration, rhizomatous nature and high productivity it requires heavy input of fertilizers, water, plant protection chemicals.

Materials and Methods

The investigation was carried out in field gene banks of Uttar Banga Krishi Viswavidyalaya in the year 2013-14, 2014-15 and 2015-16. Number of genotypes chosen for the assessment of genetic diversity was 12 including one check of TCP-2 and National Check Prativa taken for the overall assessment. The origins of collected genotypes were listed in Table-1. The design of experiment was taken as Randomized Block Design (RBD) and three replications were taken and genotypes namely ACC-48, ACC-79, SLP- 389/1, NDH-8, NDH-79, NDH-98, TCP-64, PTS-12, PTS-8, PTS-55, TCP-2 (local check), Pratibha (National check).

Planting was done in raised beds of 3 m × 1 m plot size with a spacing of 30 cm row to row and 20 cm plant to plant having 40 plants per plot. Standard error (SEM±), Critical difference (CD) and Co-efficient of Variation (CV) were measured in the investigation to find out the best yielding varieties. The important attributes like plant ht, tiller no., no. of leaves per plant, leaf length, leaf breadth, rhizome yield/plot, projected yield(t/ha), curcumin, olereosin and essential oil percentage, leaf blotch and leaf spot(PDI) were statistically measured to find out the best genotypes in their corresponding quantitative and qualitative parameters. Similar overall characterization was similarly done by [8] in turmeric germplasm in different quantitative characters for evaluation of quality of turmeric.

Results and Discussion

Analysis of mean data pooled over 3 years (2013-14, 2014-15 and 2015-16) for the different growth and yield parameters are presented in Table No-2. Analysis of data showed non-significant results in plant height. SLP-389/1 showed the highest mean value and significantly higher number of tillers/plant (3.27) than other genotypes while PTS-12 recorded the lowest (2.08). [2] proposed that high estimates of heritability were observed for the no. of tillers per plant which indicating that a major part of the phenotypic variability and this character was contributed by additive gene effects. In respect of number of leaves/plant, non-significant results were obtained among the 12 selected genotypes (Table-2). For pseudo stem girth also, non significant results were obtained. In respect of leaf length, NDH-98 recorded the highest mean length (60.41cm) and it is significantly higher than other

genotypes. Acc-48 recorded the lowest leaf length (50.60 cm). NDH-98 recorded highest leaf breadth (15.06 cm) where as SLP-389/1 recorded lowest (12.53 cm) (Table-2).

Highest rhizome yield per plot was found in NDH-98 (18.09 kg)/plot which is significantly higher than other genotypes whereas lowest rhizome yield per plot was found in ACC-48 (6.79 kg/plot) (Table-2).

After NDH 98, TCP-64 was found to have second highest yield per plot (13.00 kg/plot) which is at par with ACC-79, SLP- 389/1, NDH-8, NDH-98, PTS-12, PTS-8, PTS-55, TCP-2 (local check) genotypes. Projected yield per plot was found highest in NDH-98 (36.53 t/ha) which is significantly higher than other genotypes and lowest was found in ACC-48 (13.68t/ha). Here also, TCP-64 was found second highest and at par with ACC-79, SLP-389/1, NDH-8, NDH-98, PTS-12, PTS-8, PTS-55, TCP-2 (local check) genotypes. Rest of the genotypes was found significantly lower in projected yield than TCP-64 (Table-2).

Similar results were found by [9]. [10] found on their study similar effects on the effect of different grades of rhizomes on growth and yield of turmeric, that the growth characters of turmeric with respect to different parameters such as plant height, number of tillers, stem girth, number of leaves and leaf area.

The quality analysis data it was found that TCP -64 and PTS-12 from Pundibari centre contains highest curcumin (5.3%) and lowest was found in SLP-389/1 (4.3%). whereas in oleoresin (%) highest was found in PTS-8 (12.33) and lowest was found in NDH-98 (10.47) and essential oil (%) was found highest in Prativa (7.00) and lowest in NDH-79 (6.1) Table-2.

In case of leaf blotch tolerance (PDI), highest disease incidence was found in PTS-8 (43.61) and lowest was found in TCP-64 (23.75 PDI). In case of leaf spot disease percentage, highest was found in ACC-48 (31.92 PDI) which is at par with TCP-64 and PTS- 12. All other genotypes were found significantly lower than ACC-48. Lowest was found in PTS-12 (8.20 PDI).

Conclusion

It was concluded from the conservation programme of turmeric that genotypes like NDH-98, TCP-64 and PTS-8 on the basis of yield per plot, projected yield per plot, curcumin percentage and incidence of disease (%). NDH-98 was found highest yield/plot, highest projected yield/plot, TCP-64 was found second highest yield per plot, highest curcumin percentage and lowest in leaf spot disease and PTS-8 has third highest yield in this region both in yield/plot and projected yield/plot. These are the very important characters of turmeric for conservation, evaluation and multiplication in this region. It is therefore

recommended that NDH-98, TCP-64 and PTS-8 should be chosen for seed production in commercial basis in this region by the farmers.

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Table 1: Origin of genotypes for co-ordinated varietal trail experiment

S.N	Genotype	Place of origin	Latitude	Longitude	Altitude	District	State
1	ACC-79, ACC 48	IISR	22.930 N	88.530E	9.75m	Kozhikode	Kerala
2	NDH-8,79,98	Kumarganj	25.21° N	88.0632°E	98m	Faizabad	U.P
3	Pratibha	IISR	22.930 N	88.530E	9.75m	Kozhikode	Kerala
4	PTS-12,55,8	Pottangi	37°34'N	126°57'E	87m	Koraput	Orissa
5	SLP-389/1	Solan	30.90° N	77.10° E	1502m	Solan	H.P
6	TCP-2,64	Pundibari	26.52 N	89.10 E	66 m	Coochbehar	W.B.

Table 2: Evaluation of promising turmeric genotypes in terai region of West Bengal

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	Curcumin (%)	% increase over local check	% increase over national check	Leaf blotch (PDI)	Leaf spot (PDI)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ACC-79	116.42	2.37	7.81	6.99	51.11	13.89	8.18	16.48	31.11	224.78	**4.3**	-	19.07	36.13	12.03
SLP-389/1	127.15	**3.27**	8.30	6.93	54.53	**12.53**	9.22	18.59	31.67	226.66	4.4	10.60	34.32	36.44	11.65
ACC-48	123.65	3.12	7.94	**5.84**	**50.60**	12.68	**6.79**	**13.68**	27.22	221.78	4.7	-	-	34.12	**31.92**
PTS-8	**115.48**	2.21	7.81	6.67	53.57	12.48	9.23	18.65	30.67	238.00	4.8	11.20	34.75	**43.61**	24.42
PTS-12	118.86	**2.08**	8.23	**5.84**	53.86	13.24	8.63	17.40	30.78	234.78	**5.3**	-	25.72	24.03	**8.20**
PTS-55	133.61	2.04	8.44	**10.41**	52.74	12.57	7.69	15.51	31.78	**239.11**	5.1	-	12.06	34.56	11.52
TCP-64	119.84	2.33	8.50	6.11	55.12	13.85	**13.00**	**26.22**	**34.11**	**216.67**	**5.3**	49.57	**89.45**	**23.75**	26.58
NDH-8	125.11	2.59	8.14	6.37	54.29	14.33	9.14	18.43	24.67	220.44	**4.3**	5.1	33.16	26.11	6.15
NDH-79	119.26	2.77	8.71	6.33	56.09	13.09	7.39	14.89	26.45	224.67	4.6	-	7.5	30.73	20.89
NDH-98	**134.33**	2.90	**9.28**	9.00	**60.41**	**15.06**	**18.09**	**36.53**	**24.11**	228.11	4.8	108.38	**163.94**	30.82	8.22
TCP-2 Local Check	120.09	2.35	7.95	7.22	52.07	12.71	8.70	17.53	28.11	223.56	4.9	-	26.66	29.34	12.39
PRATIBHA National Check	120.34	2.65	**7.60**	6.08	51.89	12.67	6.87	13.84	30.74	231.78	5.1	-	-	28.51	12.57
SEm (±)	**-**	0.78	**-**	-	2.74	0.55	1.89	3.81	0.56	1.26	-	-	-	3.63	5.67
CD	NS	0.26	NS	NS	3.88	1.64	5.58	11.25	1.67	3.72	**-**	**-**	**-**	10.71	16.75
C.V. (5%)	-	17.93	**-**	**-**	8.83	7.28	34.80	34.78	10.35	9.46	**-**	**-**	**-**	19.95	24.56