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METROGLYPH AND INDEX SCORE ANALYSIS OF TURMERIC GERMPLASM IN NORTH EASTERN REGION OF INDIA

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Twenty-three genotypes of turmeric collected from Meghalaya, Assam and Tripura were evaluated at Barapani Farm, Meghalaya. BD-7-105 (18), DKH-26 (13), AH6/2(12) and BD-17(8) were among five top ranking genotypes for six characters. There were four distinct morphological complexes recognised on the basis of total yield per plant and weight of primary rhizomes. Within group, morphological variations were of low order. Majority of the high scoring genotypes were in group III and IV characterized by high yield.

Turmeric (*Curcuma longa* L.) is grown almost all over the country. It is an important condiment used in daily routine diet in India. It is said to be native of South East Asia and extends towards India, Bangladesh, Sri Lanka and Indonesia. There is a vast genetic variation believed to be present among the indigenous materials grown in North Eastern (N.E.) Region. In last few years, several genotypes of turmeric had been collected from different states of N-E region. The genotypes collected from different altitudes of different states have shown diversity which could be grouped to form one or more complexes in broad sense. Little attempts had been made to distinguish among these genotypes for identifying their genetic potential. In the present investigation, an attempt has been made to classify 23 genotypes of Assam, Meghalaya and Tripura of North Eastern region into distinct complexes and to establish their genetic worth as germplasm.

MATERIALS AND METHODS

The materials consisted of twenty three genotypes namely BD-23(1), DKH-40(2), DKH-30(3), BDS-693(4), BD-21(5), BD-14(6), DKH-20(7), BD-17(8), DKH-22(9), BD-20(10), BDS-694(11), AH6/2(12), DKH-26(13), BD-12(14), DKH-36(15), DKH-34(16), BD-13(17), BD-7-105(18), DKH-23(19), DKH-27(20), DKH-32(21), BD-7-11/91(22), and AH6/1(23). Rhizomes of uniform size were planted in a randomized block design with two replications at NBPGR Regional Station farm, Barapani, Shillong (Meghalaya) (100 m mean sea level). The plot size was 1.80 x 1.50 metre having row to row

distance of 60 cm and plant to plant distance of 30 cm. Cultural practices common for the region were followed. Observations were recorded on five plants in each replication for yield and other characters and performance presented (Table 1). Metroglyph and index score analysis was carried out according to the method suggested by Anderson (1957). The class interval for various morphological traits and symbol used for different character is represented in Table-2. The index score were obtained by allotting numerical values (1, 2, 3, 4 and 5) to the five grades of each expression recognised in respect of each character and finally summing up the scores obtained by each genotypes for all the characters under study.

RESULTS AND DISCUSSION

Mean performance of selected genotypes for different characters is presented in Table-1. Highest total yield per plant was exhibited by BD-7-105 (258.9 g) followed by AH6/2 (216.5 g), DKH-26 (211.5 g), DKH-30 (188.0 g) and BDS-694 (119.9 g). The genotypes BD-7-105, DKH-26, AH6/2 and BD-17 had high performance for more than six characters as well. They were among five top ranking genotypes for most of the characters.

The results of metroglyph analysis drawn on the basis of yield per plant and weight of primary rhizome per plant are shown in Fig. 1.. These two characters are the most important from breeding point of view and, therefore, they were used in plotting the glyphs, remaining eight characters have been represented by different symbols at different position on glyph (Table 2).

An examination of scatter diagram (Fig. 1) revealed that four groups could be distinguished on the basis of morphological variation. The first group consisted of eight genotypes obtained from Assam and one each from Meghalaya and Tripura. The genotypes of this group were characterized by low yield, lesser weight of primary rhizome, higher dry weight and lower plant height, number of leaves and suckers per plant. It had a narrow score range varied from 14 to 19. This group mainly included the germplasm of Assam (between 200-1300 m mean sea level). However, one germplasm BD-12(14) of Meghalaya and other BDS-693(4) from Tripura (obtained below 200 m mean sea level) were also characterized in the same group.

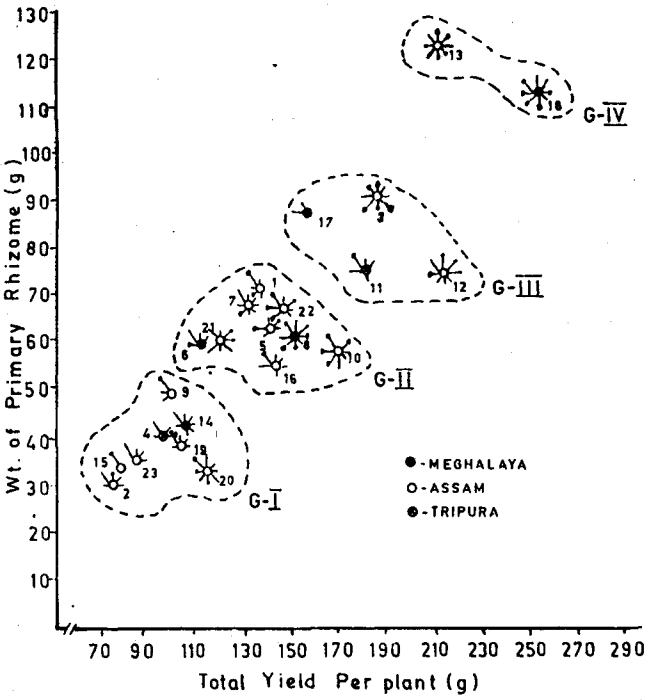
The second group consisted of 9 genotypes which were characterized by average total yield per plant and weight of primary rhizome. This group exhibited higher number of suckers, high percentage of dry weight recovery, medium to high weight of secondary rhizome and number of primary rhizomes. The variation in different characters was more in this group as indicated by wide range of its index scores (17 to 35). The genotypes of this

Table 1. Mean performance of selected genotypes of turmeric

S. No.	Accession No.	Plant height (cm)	No. of leaves	No. of suckers	No. of mother rhizome	Weight of mother rhizome	No. of primay rhizome	Weight of primary rhizome	Weight of secondary rhizome %	Dry weight of rhizome	Total yield/ plant (g)
1.	DKH–30	73.00	11.00	1.62	2.49	58.80	7.27	91.00	38.16	17.07	187.97
2.	DKH–20	57.57	10.50	1.50	1.37	47.87	5.04	69.10	15.42	19.60	132.42
3.	BD–17	73.40	13.12	2.12	1.33	58.03	6.83	61.40	35.00	19.90	151.92
4.	BD–20	48.07	11.50	1.62	1.50	73.37	7.25	57.54	41.37	21.37	170.28
5.	BDS–694	59.12	10.87	1.12	1.00	43.75	4.00	75.00	38.83	19.75	180.70
6.	AH 6/2	96.34	15.87	2.33	1.37	51.87	4.50	75.55	27.81	19.30	216.48
7.	DKH-26	96.34	15.87	2.33	1.62	67.12	6.00	121.55	27.31	19.20	211.48
8.	BD-13	46.61	8.25	1.00	1.00	36.42	4.00	87.33	34.28	17.25	158.08
9.	BD–7–105	80.63	13.70	1.95	1.50	98.50	7.50	112.63	47.75	20.00	258.88
10.	DKH–27	78.71	10.87	1.50	2.12	60.62	4.87	32.54	24.08	22.12	117.24
11.	DKH–32	51.34	16.25	3.00	2.00	49.76	6.27	59.51	10.65	18.20	119.92
12.	BD–7–11/91	54.32	11.87	1.75	1.37	35.62	6.87	63.83	46.58	20.40	142.05
	Mean	60.75	11.47	1.68	1.36	47.77	4.94	62.02	27.26	19.29	140.17
	C.D. (.05)	31.51	0.47	12.91	1.19	0.52	0.31	3.29	0.72	13.93	2.15
	C.V.	25.51	19.30	27.07	28.34	34.35	29.37	39.34	44.79	12.31	34.01

Table 2. Index range and symbols used for different scores for different character in turmeric

Character	Range of mean	Score-I Index range (1)	Symbol	Score-II Index range (2)	Symbol	Score-III Index range(3)	Symbol	Score-IV Index range (4)	Symbol	Score-V Index range (5)	Symbol
Plant height (cm)	38.09–96.34	38.09–49.74		49.75–61.39		61.40–73.04		73.05–84.69		84.70–96.36	
Number of leaves	8.25–16.25	8.25–9.85		9.86–11.45		11.46–13.05		13.06–14.65		14.66–16.25	
Number of suckers	1.0–3.0	1.0–1.40		1.41–1.80		1.81–2.20		2.21–2.60		2.61–3.00	
Number of Mother rhizome	1.0–2.50	1.0–1.30		1.31–1.60		1.61–1.90		1.91–2.20		2.21–2.50	
Weight of Mother rhizome (g)	26.62–98.50	26.62–41.00		41.01–55.38		55.39–69.76		69.77–84.14		84.14–98.50	
Number of primary rhizome	3.12–7.52	3.12–4.0		4.10–4.88		4.89–5.76		5.77–6.64		6.65–7.52	
Weight of secondary rhizome (g)	7.32–47.75	7.32–15.41		15.42–23.50		23.51–31.59		31.60–39.67		39.68–47.75	
Dry weight	10.25–22.12	10.25–12.62		12.63–14.99		15.00–17.36		17.37–19.73		19.74–22.12	



Scatter diagram in metroglyph analysis.

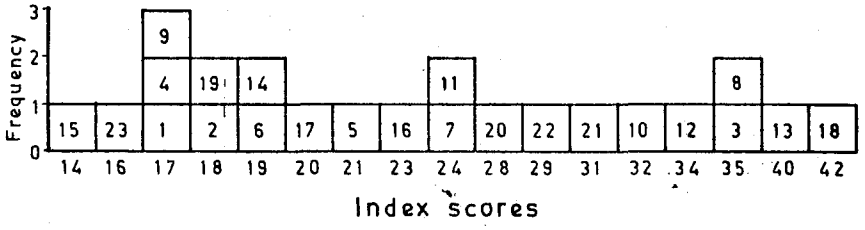


Fig. 1. Frequency diagram

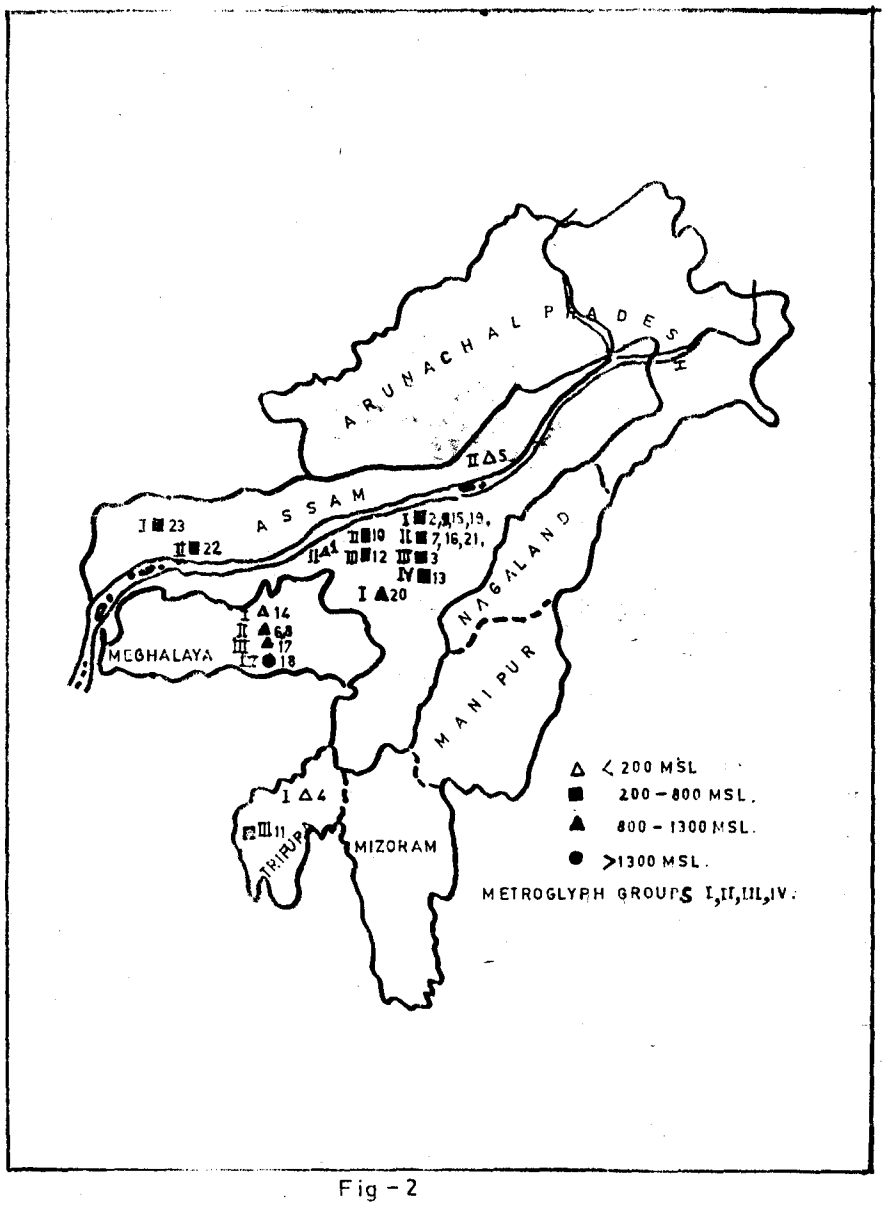


Fig - 2

Fig. 2. Distribution of four groups of germplasm of turmeric at different altitudes of North-east region

group mainly belong to Assam from varying altitudes ranging from 0 to 900 m mean sea level. However, two genotypes collected from Meghalaya (800 – 1300 m mean sea level) (Fig. 2) were also characterized in this group.

The third group consisted of four genotypes characterized by medium to high total per plant and weight of primary rhizome. Two of the four genotypes belonging to Assam (200 – 800 m mean sea level) and one each from Tripura (200 – 800 m mean sea level) and Meghalaya (800 – 1300 m mean sea level). The genotypes of Assam exhibited medium to high range for almost all the characters whereas those collected from Meghalaya and Tripura ranged from low to medium. This also lead to high range of index scores varied from 25 to 35 (Fig. 1).

The fourth group was represented by only two genotypes namely DKH-26(1) and BD-7-105(18) from Assam (200-800 m mean sea level) and Meghalaya (above 1300 m mean sea level), respectively. This group was characterized by the highest score for all the characters except for number of mother rhizome per plant which had medium score. The extreme scores (40 and 42) were obtained by accessions DKH-26 and BD-7-105.

Germplasm collected from Assam at an altitude mostly below 800 m mean sea level could be classified into four broad groups as discussed above. The germplasm of Tripura were collected from two altitude which was grouped separately in group I and group III whereas germplasm of Meghalaya were collected from various altitudes were grouped separately. These results indicate that different altitudes were important as a rich resource of various desirable germplasm of turmeric and there exist some relationship of germplasm obtained from different states irrespective of political boundary of the states.

The extreme scores 40 and 42 were obtained by DKH-26(13) and BD-7-105(18) respectively. These genotypes could be selected for further breeding programmes for various characters. Their actual worth could however be known through subsequent testing. The large variation existed in almost all the plant characters and many of these characters offer valuable criteria for systematic cataloguing of the germplasm.

On the basis of the results from the graphic analysis in turmeric, four tentative germplasm complexes could be recognised into which these genotypes sort out themselves. This information could be utilized in breeding programmes in order to combine the characters from different germplasm complexes.

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