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GENETIC VARIABILITY IN TURMERIC (*CURCUMA LONGA* L.)

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ABSTRACT

Estimates of genetic parameters for 14 characters in 108 collections of turmeric (*C. longa* L.) revealed significant variability for all the traits. Moderate to high heritability coupled with good genetic gain was observed for weight of mother finger and secondary rhizomes and number of secondary rhizome. Yield per bed had moderate heritability and genetic gain. PCV estimates were higher than the GCV estimates for all the traits studied. The estimates of genetic parameters revealed scope for further improvement of rhizome yield by selection.

Key words: Turmeric, variability.

Turmeric (*Curcuma longa* L.) is an important rhizomatous spice produced and exported mainly from India. Many turmeric varieties, mainly identified by the locality of cultivation, are grown in different states of India. Even though attempts have been made to study the genetic variability in this clonally propagated crop, most of such studies are done with limited number of accessions [1–6]. The present paper deals with genetic evaluation of 108 collections of turmeric at Calicut (Kerala State).

An experiment involving 108 turmeric collections from different states (Andhra Pradesh 46; Arunachal Pradesh 1; Assam 10; Bihar 1; Kerala 33; Meghalaya 3; Mizoram 1; Nagaland 1; Orissa 2; Tamil Nadu 3; Tripura 2; Sikkim 3; and West Bengal 2) collected either directly or through research agencies was laid out in a randomised block design with two replications at the National Research Centre for Spices Farm at Peruvannamuzhi, Calicut, Kerala. Each entry was grown in three square meter beds replicated twice. There were 40 plants per bed with the standard spacing. Observations were recorded on eight random plants for each replication on plant height, plant girth, number of leaves on the main shoot, number of tillers, number of leaves per tiller, leaf length, leaf breadth, number and weight of mother rhizomes, number and weight of fingers, number and weight of secondary fingers, and yield per bed. The various genetic parameters were estimated following standard procedures.

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Analysis of variance revealed highly significant variation for all the traits studied. The estimates of various genetic parameters are presented in Table 1. In general, the PCV estimates were higher than the GCV estimates for all the traits. This indicates the role of environment in the expression of these traits. However, the magnitude of difference between PCV and GCV estimates was less for plant height, plant girth, number of leaves on the main shoot, leaf length, leaf breadth, number and weight of mother, primary and secondary fingers as compared to the rest. A high GCV and broad sense heritability estimate coupled with very good genetic gain were observed for weight of mother and finger rhizomes as well as number and weight of secondary rhizomes, indicating the predominance of additive genetic variance in the expression of these traits. Yield per bed and number of mother and finger rhizomes had moderate estimates of heritability and genetic gain. But plant height, girth and leaf length had high heritability with low genetic gain. High heritability for plant height and leaf breadth as well as moderate to low heritability for yield and other yield attributes have been reported [1–4]. Thus, inspite of the large number of collections studied in the present case, the variability pattern was similar to those reported by earlier workers. This indirectly implies that at least one of these collections are not true varieties in the strict sense but the same genotypes, may be known by different names in the respective growing tracts.

Table 1. Genetic parameters for yield and yield attributes in turmeric

Character	Mean	Range	GCV (%)	PCV (%)	Herita-bility (%)	Genetic gain (as % of mean)	F
Plant height (cm)	26.42	10-29	11.20	13.34	70.48	19.37	5.78**
Plant girth (cm)	7.93	3-16	15.19	17.78	72.94	26.72	6.40**
No. of leaves	7.39	1-19	7.80	10.26	57.78	12.24	3.72**
No. of tillers	0.94	0-4	17.99	32.59	30.48	20.47	1.89**
No. of leaves/tiller	5.06	1-20	19.94	31.88	39.09	25.47	2.40**
Leaf length (cm)	41.26	15-70	9.16	11.46	63.84	15.05	4.53**
Leaf breadth (cm)	12.62	7-20	6.37	9.31	46.96	8.98	2.76**
No. of mother rhizomes	1.62	1-5	18.9	25.42	55.29	28.95	3.47**
Wt. of mother rhizomes g)	36.71	2-300	42.92	50.38	72.60	75.34	6.30**
No. of finger rhizomes	7.15	1-26	21.94	28.38	59.78	34.95	3.98**
Wt. of finger rhizomes (g)	87.79	2-480	38.96	45.95	71.84	68.08	6.10**
No. of secondary rhizomes	11.47	1-145	45.98	50.09	84.24	86.92	11.69**
Wt. of secondary rhizomes (g)	55.92	2-410	60.08	66.07	82.71	112.57	10.57**
Yield/bed (kg)	10.04	1.6-23.0	29.33	40.07	46.13	35.33	2.71**

**$P \leq 0.01$.

Nevertheless, the present study indicates that selection for yield taking into consideration the most important yield attributes such as weight of mother and finger rhizomes, number and weight of primary fingers, number and weight of secondary fingers would be useful as these traits had high heritability and good genetic gain. Scope of clonal selection in improving rhizome yield of turmeric is suggested [7]. In fact, three turmeric varieties, viz., PCT-8 (Suvarna), PCT-13 (Suguna) and PCT-14 (Sudarsana), selected from the germplasm have already been released for cultivation [8].

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