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Phenotypic stability for fresh rhizome yield in turmeric

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Abstract

Eleven turmeric (*Curcuma longa* L.) genotypes were evaluated for rhizome yield for 4 years (seasons). Variance due to genotype, environments, genotype x environment (linear) and genotype x environment (non-linear) components were highly significant for fresh rhizome yield per bed. The genotypes are classified into stable, above average stable (suited to poor environments) and below average stable (suited to favourable environments) based on the stability parameters. The genotypes such as Acc. 126, Acc. 361, Acc. 584, Acc. 585 and Acc. 657 were found desirable and stable over the years while Acc. 656 and Acc. 691 were found suited for poor environments and Acc. 591 for favourable environments.

Key words : Turmeric, rhizome yield, stability, *Curcuma longa* L.

Introduction

Turmeric (*Curcuma longa* L.) is an important rhizomatous spice cultivated mainly in Andhra Pradesh, Tamil Nadu, Orissa, West Bengal, Karnataka and Maharashtra in addition to limited area in Kerala and other states. Year to year fluctuation for yield even within a location is often encountered in turmeric. However, very little work has been reported on yield and quality stability in turmeric barring a report by Shahi *et al.* [2]. The present paper is an attempt to understand the stability parameters of 11 new genotypes of turmeric including two released varieties (Acc. 360 & Acc. 361) and two proposed varieties (Acc. 126 & Acc. 585).

Materials and methods

The experiment set to a randomized block design with four replications was conducted at the Indian Institute of Spices Research Farm, Peruvannamuzhi, Kozhikode for 4 years from 1998-99 through 2001-02. The genotypes evaluated were Acc. 126, Acc. 295, Acc. 360, Acc. 361, Acc. 584, Acc. 585, Acc. 591, Acc. 593, Acc. 656, Acc. 657 and Acc. 691. Fresh rhizome yield per plot ($3m^2$ size) was recorded every year and the stability parameters were worked out for rhizome yield per bed [1].

Results and discussion

Pooled analysis of variance for rhizome yield revealed significant differences among the genotypes as well as the environments (Table-1). Significant genotypes x environments interaction indicates that the genotypes showed different reactions in the different years. Similar results were also reported by Shahi et al. [2] for rhizome yield in turmeric.

Table-1. Pooled analysis of variance for fresh rhizome yield in turmeric

Source	df	MSS
Total	43	24.03
Genotypes (G)	10	9.42**
Environment (E)	3	32.63**
G X E	30	29.38**
Environment + (G XE)	33	28.46
Environment (Linear)	1	718.99*
G X E (Linear)	10	15.66**
Pooled deviation	22	2.89**
Pooled error	132	1.79

** P=0.01

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Table-2. Stability parameters for rhizome yield in turmeric

Genotype	Mean yield/3m^2 bed, kg (fresh)	bi	s^2d
Acc.126	12.50	1.19	-5.98
Acc.295	13.25	0.82	-5.39
Acc.360	12.25	1.23	-6.67
Acc.361	13.00	0.96	-5.05
Acc.584	12.20	0.95	-1.77
Acc.585	11.38	1.19	-5.81
Acc.591	9.00	1.71	-4.58
Acc.593	11.38	1.24	-7.15**
Acc.656	17.13	-0.18	-0.010
Acc.657	14.88	1.31	-1.02
Acc.691	13.50	0.59	-3.46

**P = 0.01

The stability parameters of the turmeric genotypes are presented in Table-2. The mean yield, regression coefficient and deviation from regression were used for testing the genotypes response. Deviation from regression was non significant for all the genotypes except Acc.593, indicating the significance of linear components of G x E interaction in rhizome yield of this genotype and thereby its unpredictable nature. Among the genotypes, Acc. 126, Acc. 361, Acc. 584, Acc. 585 and Acc. 657 can be considered comparatively more stable over seasons as they had nearly uniform values for bi and good mean yield. Among these accessions Acc.360 is released as 'IISR Prabha' whereas Acc.126 & Acc.585 are recently proposed for release as new varieties. Acc. 657 is registered as a unique germplasm having high yield and high curcumin content. Among the remaining accessions, Acc. 656 and Acc. 691 with their low bi value (below average stability) and high mean yield will be especially suited to poor environments while Acc. 591 with its above average stability (bi = 1.7) and low mean yield will be ideal for favourable environments.

Thus among the genotypes studied Acc.126, Acc.361, Acc.584, Acc.585 and Acc. 657 may be considered relatively more stable based on their high mean values, regression coefficients around one and nonsignificant mean square deviation from the regression.

References

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