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PHENOTYPIC STABILITY ANALYSIS OF BIDI TOBACCO HYBRIDS FOR CURED LEAF YIELD (*NICOTIANA TABACUM* L.)

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Nineteen bidi tobacco genotypes (cytoplasmic male sterility based) along with MRGTH 1 were used for investigation. The hybrid genotypes were evaluated in randomize block design with three replication and 90 x 75 cm spacing in three consecutive year (2013-14 to 2015-16) at Bidi Tobacco Research Station, Anand Agricultural University, Anand. The result of pooled analysis revealed that mean square of G X E interaction was significant for cured leaf yield, indicating the differential response of genotypes to environments. The genotypes BTH 331, BTH 336, BTH 338, BTH 339 and BTH 342 exhibited high mean performance (x), non significant regression co-efficient (bi) and minimum deviation from regression (S^2di) indicated these hybrids were stable and adapted to all environment for cured leaf yield, whereas, genotypes BTH315, BTH 332, BTH 333 and MRGTH 1 were favorable to better environment for cured leaf yield due to its significant high responsiveness (b>1) and non significant deviation from regression. Genotypes BTH 328, BTH 329, BTH 337 and BTH 341 were unstable to changing environment because of significant deviation from regression with low mean yield performance.

INTRODUCTION

In Gujarat, tobacco is cultivated in around 1.65 lakh hectare, the major type being bidi tobacco. There are considerable area under hybrids *viz.* MRGTH 1 and GABTH 2. It is well known that environment greatly affects the expression of quantitative traits, since expression of a character is the manifestation of interaction between genetic constitution of the individual and the environment. So, it is imperative to assess the phenotypic stability of hybrid for its suitability over wide range of agro-climatic conditions. Eberhart and Russell (1966) and Freeman and Perkins (1971), developed the methods for estimating stability parameters namely environment, regression (bi) and deviation from regression (S^2di) which are used widely in various crops. They suggested that both linear (bi) and non linear (S^2di) functions are to be considered for judging the phenotypic stability of a genotype. They further emphasized that an ideal variety should have high mean, unit linear regression and least deviation from regression.

The development of high yielding hybrids that are relatively stable in their performance under varied environmental condition is one of the main objectives of plant breeder. To find out the nature and magnitude of G x E interaction for stability parameters of yield and its quantitative characters is utmost important for plant breeder. Keeping these aspects in view, the investigation in tobacco was carried out to identify information on phenotypic stability.

MATERIALS AND METHODS

Nineteen divergent genotypes of bidi tobacco, cytoplamic male sterility based hybrid, along with MRGTH 1 were used for investigation. The genotypes were evaluated in randomize complete block design with three replications in three consecutive years (2013-14 to 2015-16) at Bidi Tobacco Research Station, Anand Agricultural University, Anand. Transplanting was done on 1st week of September every year. This three year taken as environment for stability analysis as shown under.

Genotypes were transplanted at 90 cm X 75 cm spacing following standard package of practices. The cured leaf yield was recorded from twenty plants to obtain yield per plot in kg. The pooled analysis of variance was carried out as per the standard procedure given by Singh and Chaudhary (1985) and stability analysis as per by Eberhart and Russell (1966).

Keywords: Tobacco, Hybrid, Phenotypic stability

List of genotypes used for investigation

Sr. No.	Name of genotypes	Sr. No.	Name of genotypes	Sr. No.	Name of genotypes	Sr. No.	Name of genotypes
1	BTH 315	6	BTH 330	11	BTH 335	16	BTH 340
2	BTH 318	7	BTH 331	12	BTH 336	17	BTH 341
3	BTH 322	8	BTH 332	13	BTH 337	18	BTH 342
4	BTH 328	9	BTH 333	14	BTH 338	19	BTH 343
5	BTH 329	10	BTH 334	15	BTH 339	20	MR GTH 1

Table 1: Pooled analysis of variance shows mean square for different traits.

Source	d.f.	Cured leaf yield (kg)	Day to flower	Day to maturity	Number of leaf per plant	Leaf length (cm)	Leaf width (cm)	Plant height (cm)
Genotype / Hybrid	19	0.438*	102.38*	44.289	7.46*	5.944*	7.457*	228.197*
Enviroment	2	1.975	4770.08*	2012.25*	60.04*	15.354*	17.018*	944.333*
G x E interaction	38	0.151	45.81	24.346	2.27	1.818	4.307	40.007
Environment (Linear)	1	3.946*	9540.2*	4024.5*	120.1	30.71	34.036*	1888.667*
G x E interaction (Linear)	19	0.0939	43.31	29.937	3.39	1.956	2.397	64.299*
Pooled deviation	20	0.197*	45.90	17.795	1.08	1.594	5.906*	30.133
Pooled error	114	0.193	116.54	68.254	2.44	5.061	4.869	49.505

RESULTS AND DISCUSSION

The results of pooled analysis (Table 1) showed that the mean square due to genotype was significant. This showed additive environment effects and amply genetic variability among the genotypes.

The variance of genotype and environment were significant indicating variability in genotypes and environment. The mean sum of square of G X E interaction (GEI) was significant for cured leaf yield, showed the differential response of genotype to environments (Table 2)

Table 2: Mean sum of square for cured leaf yield

Source	d.f.	ms
Environment	2	5.924*
Genotype/treatment	19	1.314*
G X E interaction	38	0.452*
Pooled error	114	0.193
Total	**179**	

*significant at 0.05 probability level

The illustrated data (Table 3) for stability parameters revealed that genotypes BTH 331, BTH 336, BTH 338,BTH 339, BTH 340 and BTH 342 exhibited high mean performance (x), non significant regression co-efficient (bi=1) and minimum deviation from regression (S^2di) indicated these genotypes were stable and adapted to all environment for cured leaf yield, whereas, genotypes viz., BTH 315, BTH 332, BTH 333 and MR GTH 1 were favorable to better environment for cured leaf yield due to it's significant high responsiveness (bi >1) and non significant deviation from regression. While, BTH 328, BTH 329, BTH 330, BTH 337, BTH 341 and BTH 343 were found unstable to changing environment because of significant deviation from regression with low mean yield performance.

Table 3: Mean performance over environment (Œ), regression co-efficient (bi) and deviation from regression (S^2di) for different traits.

Sr. no.	Genotype / Hybrid	Cured leaf yield (kg) x	bi	S^2di
1	BTH 315	4.951	1.962*	1.141
2	BTH 318	5.161	1.093	-0.058

3	BTH 322	4.209	0.769	-0.001
4	BTH 328	3.888	0.661	0.279*
5	BTH 329	4.088	1.240	0.144*
6	BTH 330	4.457	1.113	0.416*
7	BTH 331	4.580	0.938	0.061
8	BTH 332	4.648	1.345*	-0.059
9	BTH 333	4.032	-1.187**	-0.054
10	BTH 334	4.471	0.739	-0.054
11	BTH 335	4.179	1.099	-0.012
12	BTH 336	4.951	0.471	0.073
13	BTH 337	4.053	0.150	1.001*
14	BTH 338	4.768	1.039	0.138
15	BTH 339	4.956	0.585	0.187
16	BTH 340	5.106	1.471	-0.009
17	BTH 341	4.214	1.633	0.300*
18	BTH 342	4.537	1.208	-0.040
19	BTH 343	4.369	1.079	0.222*
20	MR GTH 1	4.451	2.232*	-0.016
SEm	0.224	-	-	
Over all mean		4.504	-	-

*significant at 0.05 probability level
@ significant at 0.05 probability level against bi=1

The pooled analysis showed that the mean square due to genotype was significant. This showed additive environment effects and amply genetic variability among the genotypes. The variance of genotype and environment were significant indicating variability in genotypes and environment. The mean sum of square of G X E interaction (GEI) was significant for cured leaf yield, indicating the differential response of genotype to environments.

Genotypes BTH 331, BTH 336, BTH 338,BTH 339, BTH 340 and BTH 342 exhibited high mean performance (x), indicated these genotypes were stable and adapted to all environment for cured leaf yield, whereas, genotypes viz., BTH 315, BTH 332, BTH 333 and MRGTH 1 were favorable to better environment for cured leaf yield. While, BTH 328, BTH 329, BTH 330, BTH 337, BTH 341 and BTH 343 were found unstable for these environments.

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