Plant Archives Vol. 14 No. 1, 2014 pp. 593-596 *ISSN 0972-5210*

STABILITY ANALYSIS OF DIPLOID COTTON (*GOSSYPIUM ARBOREUM* L.)

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Abstract

Studies to estimate the relative stability of *G. arboreum* cotton genotypes commonly grown in the Rayalaseema region of Andhra Pradesh revealed that partitioning the seasons of (genotype x seasons) components of variation to be significant for characters like seed cotton yield per hectare, halo length and fibre strength except for micronaire, bolls per plant, boll weight indicating the seasons were quite diverse with regarding to their effect on the performance of the genotypes for different traits studied.

Key words : Boll weight, boll per plant, ginning percentage, seed cotton yield, halo length, fibre, strength and micronaire.

Introduction

Cotton is an important fibre crop of global importance widely referred to as "King of fibre crops". The average productivity of cotton in India is lowest among cotton growing countries of the world. One of the major constraints in realizing higher productivity is that the crop is grown under diverse agro - climatic conditions and is highly sensitive to environmental fluctuations which cause instability in the production from year to year. So, the present study was carried out to assess the stability of promising cotton genotypes developed at Acharya N.G.Ranga Agricultural University, Regional Agricultural Research Station, and Nandyal along with checks.

Materials and Methods

The experiment was conducted at R.A.R.S, Nandyal for three seasons i.e. from 2009 to 2011. The experimental material consisted of 13 genotypes (along with two checks) and studied over three different seasons. The experiment was laid out in Randomized Block Design with 6 rows in each of the three replications with row to row spacing 60 cm and plant to plant spacing of 30 cm.

Data was recorded on seed cotton yield per hectare and other characters on five competitive plants from the center of the row excluding border plants. The characters under study were boils per plant, boll weight, ginning percentage, halo length, fibre strength and micronaire and seed cotton yield per hectare. The stabiBjy analysis was carried out as per Eberhart and Russell model (1996).

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Results and Discussion

The analysis of variance for stability with regard to seed cotton yield, yield components and fibre quality characters are presented in table 1. The mean squares for genotypes was observed to be significant for bolls per plant, ginning percent and halo length and fibre strength except for seed cotton yield per hectare, boll weight and micronaire studies. Further, seasons of (G & S) interaction was observed to be significant for seed cotton yield per hectare, ginning percent, halo length and fibre strength. Similar findings were reported earlier by several workers (Tomar and Singh, 1992) (Singh and Gill, 1986). The partitioning of seasons + (G x S) components of variation revealed that the seasons (linear) components of variation was significant for seed cotton yield per hectare, bolls per plant, boll weight, ginning per cent, halo length and fibre strength except for micronaire. Higher magnitude of mean squares due to seasons (linear) compared to G x Seasons (linear) was noticed fo*r all characters studied (Nizama and Patil 1989, Patil et.ai, 1991, Singh et.al, 1991, Mohiddin, 1996,). Further, the genotypes x seasons (linear) components was found to be significant for seed cotton yield per hectare, ginning per cent, halo length and fibre strength similar findings

Table 1 : Analysis of variance (pooled) for yield and fibre component characters in cotton (*G. arboreium*).

		Mean squares						
Source of variance	**df**	**Seed cotton yield /Ha**	**Number of boils per plant**	**Boll weight (g)**	**Ginning percentage**	**2.5% Span length (mm)**	**Fibre strength (g/tex)**	**Micronaire (ug/inch)**
Genotypes	12	82305.33	50.77**	0.029	2.61**	6.99**	1.32**	0.15
Env+(var.*Env)	26	597674.31**	33.65	0.05	0.37**	0.03*	0.27**	0.09
Environments (lin)	1	9335170.45**	479.13**	0.55**	0.47**	0.07*	0.91**	0.13
Var.*Env (lin)	12	469427.25**	16.47	0.04	0.73**	0.04*	0.49**	0.09
Pooled deviation	13	43941.12**	15.24**	0.03**	0.03**	0.01	0.01	0.11**
Pooled Error	72	1863.95**	1.39	0.013	0.013	0.01	0.01	0.01

** Significant at both 5% and 1%, *Significant at 5%

were reported by Gupta and Katiyar, 1980,Singh and Gill, 1986, Shroff *et al.*, 1989. However the pooled deviation was significant for all the characters studied (Nizama *et al.*, 1998) except for halo length and micronaire.

Stability parameters namely mean (.V) regression coefficient (pi) and deviation from Linear regression (S^2di) were obtained for seed cotton yield, yield components and fibre quality characters and are presented table 2.

Seed cotton yield per hectare was recorded higher than the general mean in six genotypes. These genotypes also exhibited non significant deviations from linear regression and regression co efficient recorded around unity value genotypes i.e. NDLA - 3020, NDLA - 2977 and NDLA - 2981. These genotypes are adoptable for seed cotton yield.

Bolls per plant

Seven genotypes i.e., NDLA - 2985, NDLA - 3005, NDLA - 3015, NDLA - 2959, NDLA -2977, NDLA - 2981 and NDLA - 3019 have recorded higher no.of bolls per plant than mean. But, four genotypes exhibited significant deviation from linear regression and regression coefficient value less than unity value (NDLA - 2959, NDLA - 2977 and NDLA - 3019) except NDLA - 3015. However, genotypes (NDLA - 3005 and NDLA- 2981) showed non significant deviation from linear regression and regression coefficient value less than unity except NDLA -2985.

Boll weight

Eight genotypes i.e., NDLA - 3020(1.04), NDLA - 2959 (0.4), NDLA - 2977 (0.9), NDLA -2981 (1.6), NDLA - 3037 (1.05), NDLA - 3056 (2.63) and NDLA - 2933 (0.6) have recorded higher boll weight than mean. But, all genotypes studied have recorded non significant deviation from regression. The regression coefficient of NDLA-2981 and NDLA-3056 genotypes recorded higher unity value whereas (NDLA -3020, NDLA - 2959, NDLA - 2977, NDLA - 3037and NDLA - 2933) genotypes recorded lower unity value. These varieties are stable for boll weight.

Ginning percent

Seven genotypes i.e., NDLA - 2985(1.5), NDLA - 3005(1.02), NDLA-3015(0.60), NDLA-3020(1.48), NDLA-2959(5.18), NDLA - 2977(6.16), NDLA - 3037(0.23) have recorded higher ginning per cent than mean. However, all genotypes studied have recorded non significant deviation from linear regression. The regression coefficient of five (NDLA - 2985, NDLA -3005, NDLA - 3020, NDLA - 2959, NDLA - 2977) genotypes recorded higher unity. Lower unity was recorded in genotypes NDLA - 3015 and NDLA - 3037.

Halo length

Seven genotypes i.e., NDLA - 3005(1.7), NDLA - 2977(0.6), NDLA - 3037(0.9), NDLA -3056(0.89), NDLA - 3028(5.8), NDLA - 2933(1.5), NDLA - 2463(5.2) have recorded higher halo length than mean. However, all genotypes studied recorded non significant deviation from linear regression But, five genotypes have recorded lower unity stable. So two genotypes with higher unity are adoptable.

Fibre strength

Eight genotypes i.e., NDLA - 2985(2.05), NDLA - 3005(0.11), NDLA - 2959(0.3), NDLA -2981(0.51), NDLA - 3019(2.79), NDLA- 3037(0.2), NDLA-3028(0.54), NDLA-2933(2.8) have recorded higher fibre strength than mean. However, all genotypes studied recorded non significant deviation from linear regression. But five genotypes (NDLA - 3005, NDLA - 2959, NDLA - 2981, NDLA - 3037, NDLA - 3028) recorded lower

Table 2 : Estimates of stability parameters for yield and fibre component characters of 13 varieties of cotton (*G. arboreum*).

S. no.	Varieties	Seed cotton yield/ha			Number of bolls/plant			Boll weight			Ginning percentage			2.5% span length (mm)			Fibre strength (g/tex)			Micronaire (µg/inch)		
		$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di	$\bar{x}$	βi	S^2Di
1.	NDLA - 2985	2190.0	-0.104*	-2245.5	33.3	1.906	4.5716	2.40	0.296	0.1020**	36.43	1.545	0.0253	20.43	2.180	-0.0143	21.85	2.047	0.0051	4.51	1.382	0.0031
2.	NDLA - 3005	2101.7	-0.017	2699.4	31.4	0.693	3.8643	2.47	1.550	0.0033	36.24	1.018	-0.0143	21.51	1.677	-0.0095	21.47	0.108	-0.0172	4.98	-3.315	0.2718
3.	NDLA-3015	2175.3	0.073*	294.8	36.1	1.921	27.8535***	2.27	1/155	0.0021	36.40	-0.601	0.0537*	20.42	1.728	0.0029	19.96	3.574	0.0001	4.78	-0.450	0.1488
4.	NDLA-3020	2309.7	0.589	1144.1	28.4	0.774	4.8328	2.49	1.038	-0.0061	38.07	1.481	0.0323	18.61	1.753	0.0113	20.85	3.456	-0.0193	4.76	1.402	0.2930
5.	NDLA-2959	2489.0	0.935	31566.8***	37.0	0.420	49.2245***	2.53	0.366	0.0001	36.67	5.180*	-0.0174	20.66	0.010	-0.0168	21.53	-0.314	-0.0173	4.74	4.212	0.1233
6.	NDLA-2977	2361.7	1.304	-1690.9	33.0	0.966	10.0322*	2.61	0.948	-0.0030	36.45	-6.162	0.1589**	22.47	0.062	-0.0139	20.74	2.278	-0.0133	4.76	-3.963	-0.0019
7.	NDLA-2981	2244.6	1.304	3075.6	34.0	0.501	2.9292	2.53	1.592	-0.0090	35.79	3.081	-0.0092	18.61	-2.618	-0.0075	21.58	0.506	-0.0097	4.56	0.862	0.0072
8.	NDLA-3019	1982.7	0.244	199868.4***	35.3	0.881	13.7629**	2.38	2.294	-0.0070	35.50	1.305	-0.0145	19.63	4.503	-0.0139	21.73	2.788	-0.0186	4.64	5.292	0.1826
9.	NDLA-3037	2047.0	1.707	178821.4***	30.7	2.368*	-1.6343	2.56	1.052	-0.0096	36.43	0.232	-0.0108	23.44	0.894	-0.0166	22.18	-2.244	0.0442	4.97	6.015	0.1024
10.	NDLA-3056	2134.3	1.796	39974.5***	23.6	0.182	-0.3009	2.50	2.627	0.0223	35.82	-7.903*	-0.1196	21.57	0.896	0.0069	20.51	-0.221	0.0002	4.55	0.917	0.0336
11.	NDLA-3028	2398.8	2.517	27542.0***	29.8	1.031	-1.6304	2.46	0.862	-0.0096	34.45	-0.246	0.0408	22.37	5.864	0.0151	21.80	-5.430	-0.0036	4.54	-0.595	-0.0127
12.	NDLA-2933	2384.7	1.606	41607.9***	26.7	0.994	19.3051***	2.58	-0.615	0.0126	35.26	9.554*	-0.0187	22.64	1.524	-0.0112	22.02	2.842	-0.0168	4.23	0.322	0.0535
13.	NDLA-2463	1977.3	1.045	18656.3***	26.3	0.362	41.5568***	2.34	-0.165	0.1009**	34.72	4.591	-0.0122	21.81	-5.263	-0.0011	20.92	3.608	-0.0186	4.35	0.917	0.0336
	Mean	2215.1	—–		31.2	—–		2.47	—–		36.02	—–		21.09	—–		21.32	—–		4.65	—–	
	SE	148.2	0.2		2.8	0.64		0.11	0.77		0.13	0.93		0.08	1.47		0.08	0.43		0.23	3.34	

$\bar{x}$ = Mean values

βi = Regression coefficient

S^2Di = Deviation from regression coefficient

than unity (regression coefficient) except two higher than unity NDLA - 2985, NDLA - 3019 and NDLA - 2933.

Micronaire

Six genotypes (NDLA - 3005(3.3), NDLA - 3015(0.45), NDLA - 3020(1.4), NDLA - 2959(4.2), NDLA - 2977(3.9), NDLA - 3037(6.01)) have recorded higher micronaire than mean. However, all genotypes studied recorded non significant deviation from linear regression. But, three genotypes (NDLA - 3005, NDLA - 3015, NDLA - 2977) recorded lower unity (regression coefficient) except NDLA - 3015, NDLA - 3020, NDLA - 2959, and NDLA - 3037 have recorded higher unity (regression coefficient).

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