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Research Article

CHARACTER ASSOCIATION AND PATH COEFFICIENT ANALYSES OF YIELD AND YIELD COMPONENT TRAITS IN GUAR (*Cyamopsis tetragonoloba* (L.) Taub)

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Abstract: Ninety five genotypes of Guar were evaluated for 11 quantitative characters to study correlation and path coefficient analysis. The character association studies revealed that seed yield per plant had positive significant correlation with no.of pods per plant, no.of seeds per pod, no.of pods per cluster and pod length suggesting that these are the major yield contributing traits. Path co-efficient analysis revealed that no.of pods per plant exerted strong direct positive effect on seed yield per plant signifying the importance of this character while selecting for improvement of seed yield per plant.

Keywords: Guar, Correlation, Path analysis and Seed yield

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Introduction

Guar (*Cyamopsis tetragonoloba* L.) is commonly known as cluster bean and highly self pollinated crop belonging to the family Fabaceae and is characterized as short day, erect or bushy annula plant (Purseglove,1981). Guar is an important and potential vegetable cum industrial crop grown for its tender pods for vegetable purpose and for endospermic gum (30-35%) [1]. The advantage of this crop includes its easiness to grow, adaptation to drought, freedom from serious pests and diseases and long shelf life of the harvested pods.

Ananthapuramu is one of the drought-prone districts in the rain shadow area of Andhra Pradesh. The annual average rainfall of the district is 546 mm. Most of the northern parts of the district receive rainfall in the range of 500 to 575 mm whereas the most of the southern parts receive in the range of 575 to 650mm. The normal rainfall for the SWM period is 338 mm which is 61.2% of the total rainfall for the year. The rainfall for NEM period is 156 mm, which is 28.3% of annual rainfall (October to December). The remaining months (March, April, May) are warm and dry, when the normal daily max. temperature ranges between 29°C and 42°C. Minimum temperature during November, December and January months is around 17.2°C.

Material and Methods

The present investigation was carried out with 95 genotypes of guar germplasm from NBPGR, New Delhi grown in augmented design (Federer, 1956) with two checks during *kharif* 2017 at Agricultural Research Station, Ananthapuramu. Each genotype was sown in a single row of 4M length with a spacing of 30 x 10 cm. All recommended cultural practices were done periodically to raise a healthy crop. Ten uniform size plants per genotype were selected and tagged for recording the observations viz. days to 50% flowering, days to maturity, Plant height, no.of primary branches per plant, no.of pods per cluster, no.of clusters per plant, pod length, no.of pods per plant, no.of seeds per pod, 100 seed weight and seed yield per plant.

The data was statistically analysed to estimate phenotypic correlation Co-efficient [3] and Path Coefficient analysis [4].

Results and Discussion

Augmented block design is used for evaluation of large set of germplasm suitable for different aspects of crop breeding. The ANOVA [Table-1] revealed significant mean sum of squares for days to 50% flowering and seed yield per plant. The block effects were significant for days to 50% flowering, days to maturity, plant height, no.of primary branches, no.of seeds per pod, seed weight and seed yield per plant. Similarly the mean square due to checks vs varieties was significant for no.of primary branches, no.of clusters per plant, no. of seeds per pod and seed yield per plant indicating that the test entries were significantly different from checks for these characters. The results were in accordance with findings of Iram Saba *et al*, (2017) [5]. The results of phenotypic correlation Co-efficient presented in [Table-2]. Correlation coefficients give an idea about the mutual relationship between various plant characters and determines the component characters on which selection can be based for improvement in yield. Days to 50% flowering showed significant positive association with days to maturity (0.95**), Plant height (0.31*) and number of clusters per plant (0.22*). Whereas plant height recorded significant positive association with number of pods per plant (0.52**), number of pods per cluster (0.31**), pod length (0.29**) and number of seeds per pod (0.25*). However similar findings were reported by Sheela *et al*. (2014) [6], Rai and Dharmatti, (2014) [7] and Rajashekar Reddy *et al*. (2018) [8]. Number of primary branches per plant had positive association with Number of clusters per plant (0.41**). Number of pods per cluster showed positive association with Number of pods per plant (0.44**), Number of clusters per plant (0.43**) and pod length (0.27**) these results are similar for earlier findings of Saini *et al* (2010) [9], Girish *et al*. (2012) [10] and Rajashekar Reddy *et al*. (2018). Significant positive association was observed for number of clusters per plant and pods per plant (0.35**) as also reported by Malaghan *et al*. (2014) [11], Divya *et al*. (2018) and Rajashekar Reddy *et al*. (2018). Number of pods per plant showed significant positive association with number of seed per pod (0.22*).

Seed yield per plant recorded positive association with number of pods per plant (0.53**), number of seeds per pod (0.33), pod length (0.23*), number of pods per cluster (0.24).

Table-1 Analysis of variance of Augmented block design for 11 quantitative traits in guar (Cyamopsis tetragonoloba(L.) Taub.)

Augmented R.B.D. ANOVA												
	DF	Days to 50% flowering	Days to maturity	Plant height (cm)	No.of primary branches	no of pods/ cluster	No.of clusters/ plant	Pod length (cm)	No.of pods/ plant	no of seeds/ pod	100 seed weight (g)	Seed yield / Plant (g)
Block (ignoring Treatments)	3	29.81 **	84.21*	216.98*	7.89 *	2.12	0.25	2.48	101.72	8.46 *	1.37**	16.45 **
Treatment (eliminating Blocks)	96	6.01 *	13.62	89.37	3.56	1.45	1.79	0.30	44.30	1.05	0.10	2.80 *
Checks	1	2.00	28.13	55.13	0.50	0.13	1.13	0.13	28.13	2.00	0.01	0.32
Checks+Var vs. Var.	95	6.05 *	13.46	89.73	3.60	1.47	1.80	0.3	44.47	1.04	0.10	2.82 *
ERROR	3	0.67	4.46	19.13	0.83	0.46	0.79	0.34	22.13	0.33	0.03	0.27
Block (eliminating Check+Var.)	3	6.67 *	2.12	5.80	0.17	0.80	1.13	0.27	2.13	0.33	0.01	0.05
Entries (ignoring Blocks)	96	6.73 *	16.18	95.97	3.80	1.50	1.76	0.37	47.41	1.3	0.14	3.31 *
Checks	1	2.00	28.13	55.13	0.50	0.13	1.13	0.13	28.13	2.00	0.01	0.32
Varieties	94	6.85 *	16.17	97.30	3.70	1.52	1.43	0.37	47.54	1.26	0.14	3.10 *
Checks vs. Varieties	1	0.66	4.99	11.46	8.89 *	0.31	33.73**	0.96	53.95	4.97 *	0.27	26.31 **
ERROR	3	0.67	4.46	19.13	0.83	0.46	0.79	0.34	22.13	0.33	0.03	0.27

Table-2 Phenotypic correlation for yield and yield component traits in guar (Cyamopsis tetragonoloba(L.) Taub.)

Character	Days to 50% flowering	Days to maturity	Plant height (cm)	No.of primary branches	no of pods/ cluster	No.of clusters/ plant	Pod length (cm)	No.of pods/ plant	no of seeds/ pod	100 seed weight (g)	Seed yield / Plant (g)
Days to 50% flowering		0.95 **	0.31 **	0.169	0.14	0.22*	0.14	0.11	0.06	-0.19	0.04
Days to maturity			0.30**	0.16	0.16	0.17	0.16	0.14	0.02	-0.25 *	-0.01
Plant height			1	-0.17	0.31 **	0.09	0.29**	0.52 **	0.25*	-0.2	0.26*
No.of primary branches					0.03	0.41 **	-0.24 *	-0.01	0.12	-0.31 **	-0.07
no of pods/ cluster						0.43 **	0.27**	0.44 **	0.08	-0.13	0.24*
No.of clusters/ plant							-0.06	0.35 **	0.08	-0.23 *	0.11
Pod length								0.31**	0.40 **	-0.02	0.23*
No.of pods/ plant									0.22 *	-0.07	0.53**
no of seeds/ pod										-0.26 *	0.33*
100 seed weight											0.23

Table-3 Direct and indirect effects (Phenotypic) between seed yield per plant and yield component traits in 95 genotypes of guar (Cyamopsis tetragonoloba(L.) Taub.)

Character	Days to 50% flowering	Days to maturity	Plant height (cm)	No.of primary branches	no of pods/ cluster	No.of clusters/ plant	Pod length (cm)	No.of pods/ plant	no of seeds/ pod	100 seed weight (g)	Seed yield / Plant (g)
Days to 50% flowering	0.365	0.341	0.114	0.062	0.052	0.079	0.052	0.041	0.02	-0.071	0.04
Days to maturity	-0.304	-0.325	-0.096	-0.051	-0.053	-0.055	-0.051	-0.044	-0.009	0.082	-0.01
Plant height	-0.013	-0.012	-0.041	0.007	-0.012	-0.004	-0.012	-0.021	-0.01	0.008	0.26
No.of primary branches	-0.002	-0.002	0.002	-0.013	0	-0.005	0.003	0	-0.002	0.004	-0.07
no of pods/ cluster	0.015	0.017	0.032	0.003	0.106	0.045	0.028	0.047	0.008	-0.014	0.24
No.of clusters/ plant	-0.019	-0.014	-0.008	-0.035	-0.036	-0.086	0.005	-0.03	-0.007	0.02	0.11
Pod length	-0.011	-0.013	-0.023	0.019	-0.022	0.005	-0.08	-0.025	-0.033	0.002	0.23
No.of pods/ plant	0.057	0.069	0.264	-0.006	0.222	0.179	0.155	0.505	0.111	-0.037	0.53
no of seeds/ pod	0.018	0.009	0.083	0.041	0.025	0.028	0.135	0.073	0.333	-0.086	0.33
100 seed weight	-0.062	-0.081	-0.064	-0.099	-0.043	-0.073	-0.006	-0.023	-0.083	0.322	0.23

Hanchinamani (2003) [12] and Divya *et al*. (2018) also reported similar findings for seed yield per plant. No.of primary branches per plant had negative correlation (-0.07) with seed yield per plant. This suggested that selection of non-branching types would result in better pod yield types. Similar results reported by Divya *et al*. (2018). Phenotypic co-efficient analysis presented in [Table-3] revealed that no.of pods per plant (0.53) (according to Vijay, (1988)) [13] exerted highest positive direct effect on seed yield per plant followed by no.of seeds per pod (0.33), plant height (0.26) (with the findings of Hanchinamani, 2003), no.of pods per cluster (0.24) and 100 seed weight (0.23). These results are in accordance with Divya *et al*. (2018). No.of Primary branches per plant (-0.07) and days to maturity (-0.01) exerted negative direct effect on seed yield per plant. Similar results were reported by Divya *et al*. (2018).

Conclusion

The character association and path coefficient analysis revealed that major emphasis should be laid on balancing between yield component traits viz, no.of pods per plant, no.of seeds per pod and no.of pods per cluster for improvement of seed yield per plant.

Application of research: Study of path coefficient analyses of yield and yield component traits in Guar

Research Category: Path coefficient analysis

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Study area / Sample Collection: Agricultural Research Station, Ananthapuramu

Cultivar / Variety / Breed name: Guar (*Cyamopsis tetragonoloba*(L.)Taub)

Conflict of Interest: None declared

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