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CHARACTER ASSOCIATION AND PATH ANALYSIS IN VIRGINIA RUNNER GROUNDNUT (Arachis hypogaea L.)

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ABSTRACT

Correlation and path co-efficient analysis were carried out for pod yield and some of its component characters in 50 Virginia runner genotypes of groundnut. The genotypic correlation co-efficients were observed to be relatively of higher magnitude than the corresponding phenotypic and environmental correlation co-efficient, indicating strong inherent association, between the character. Pod yield possessed significant positive association with harvest index, shelling percentage, number of mature pods per plant, 100-seed weight and number of primary branches per plant at both the genotypic and phenotypic levels. Path analysis also revealed the importance of these traits as they had affected pod yield directly. Therefore, selection based on these characters will lead to rapid improvement in pod yield.

Pod yield, in groundnut, a quantitatively inherited complex trait is the resultant of a very complex interaction among a number of inter-related traits. To understand this complex interaction it is necessary that a large number of traits are studied on a large number of genotypes. The present investigation is an attempt at understanding such inter-relationship by studying a 50 array of diverse strains and 10 number of inter-related traits.

MATERIALS AND METHODS

Fifty virginia runner groundnut varieties were grown in randomized block design with four replications during the rainy (kharif) season of 1986 at the Experimental Farm, Main Oilseeds Research Station, Gujarat Agricultural University, Junagadh. Thirty four plants spaced at 60 cm x 15 cm constituted a plot. From each plot, five plants were selected at random and the ten quantitative characters were recorded. The phenotypic and genotypic correlation co-efficient were estimated by using the procedure suggested by Falconer (1964). The path analysis of genotypic correlations were used to study the direct and indirect effects of various independent attributes on pod yield, following Dewey and Lu (1959).

RESULTS AND DISCUSSION

The differences among the genotypes were significant for all the characters studied (Table 1). Genotypic correlations were of higher magnitude than and the same sign, as the respective phenotypic correlations. This indicated the strong inherent association between

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various attributes and are governed by genetic causes. The pod yield exhibited highly significant and positive association (Table 2), with harvest index, shelling percentage, number of mature pods per plant, 100-seed weight and number of primary branches per plant at both genotypic and phenotypic levels. Pod yield also exhibited positive association with number of pegs and oil content, while its correlation with days to 50 per cent flowering and days to maturity was highly significant but negative. Yadava et al (1981) reported positive correlation of pod yield with number of pods and number of primary branches, whereas, the association of yield with maturity was negative, while Kumar and Yadava (1982) have reported positive significant correlation between pod yield and number of primary branches. Rao et al (1983) also reported positive association of pod yield with number of mature pods and 100-kernel weight, while Lakshmaiah et al (1983) reported positive association between pod yield and number of mature pods. Similarly, Bhagat et al (1986) observed significant positive phenotypic correlations between pod yield and mature pods and shelling percentage, while Deshmukh et al (1986) found significant positive genotypic correlation between pod yield and mature pods per plant and 100-seed weight, but negative association with days to 50 per cent flowering. These all findings corroborate the findings of the present investigation.

The genotypic correlations between pod yield and various characters were partitioned into the direct components and the indirect components (Table 3). The result indicated that the harvest index exerted the highest positive direct effect on pod yield followed by number of primary branches. This suggests that the selection should be exercised giving prime importance to these two traits for

TABLE 1 : Analysis of variance for 10 characters of 50 Virginia runner groundnut genotypes.

Characters	Mean sum of squares		
	Replications (d.f. : 3)	Genotypes (d.f. : 49)	Error (d.f. : 147)
Pod Yield (g)	4.292*	15.958**	1.366
Days to 50% flowering	4.177*	13.087**	0.954
Days to maturity	3.417	244.418**	1.328
Number of Primary branches	1.938*	2.278**	0.622
Number of pegs	1.250	306.622**	50.026
Number of mature pods	2.701	20.230**	1.969
Harvest Index (%)	9.281*	110.777**	3.194
100-seed weight (g)	2.802*	78.661**	0.662
Shelling percentage	0.750	26.858**	0.350
Oil Content (%)	0.021	1.598**	0.072

*, ** = Significant at 5% and 1% levels, respectively.

TABLE 2 : Genotypic (G) and Phenotypic (P) correlation matrix of yield and its components in 50 genotypes of Virginia runner groundnut.

	Days to 50% flowering	Days to maturity	Number of primary branches	Number of pegs	Number of mature pods	Harvest Index	100-seed weight (g)	Shelling percentage	Oil content (5)
Pod yield G	-0.5446**	-0.5013**	0.7506**	0.2675	0.8387**	0.8486**	0.7926**	0.8571**	0.2193
(g) P	-0.4080**	-0.4177**	0.4175**	0.1693	0.6220**	0.7099**	0.6653**	0.7155**	0.2025
Days to G		0.7942**	-0.2441	-0.0507	-0.3240*	-0.3703**	-0.4955**	-0.5246**	-0.4337**
50% flowering P		0.6916**	-0.2009	0.0002	-0.2632	-0.3214**	-0.4257**	-0.4495**	-0.3552*
Days to G			-0.2813	-0.0129	-0.3791**	0.2733	-0.4214**	-0.5134**	-0.5305**
maturity P			-0.1765	-0.0122	-0.3233*	-0.2579	-0.4125**	-0.4951**	-0.4787**
Number of G			0.5035**	0.6601**	0.4933**	0.6063**	0.7294**	-0.0810	
Primary branches P			0.3201*	0.3776**	0.3131*	0.3852**	0.4500**	-0.0286	
Number of G				0.2094	0.0414	0.0116	0.1646	-0.1531	
pegs P					0.1148	0.318	0.0544	0.1141	-0.0895
Number of G					0.8079**	0.6892**	0.7431**	0.1328	
mature pods P						0.6701**	0.5632**	0.6092**	0.0947
Harvest G							0.6860**	0.6845**	0.0401
Index P							0.6464**	0.6335**	0.0477
100-Seed G								0.8047**	0.3090*
Weight(g) P								0.7726**	0.2794*
Shelling G									0.3492*
Percentage P									0.3075*

TABLE 3 : Path co-efficient for direct and indirect effect of nine agronomic traits on pod yield of 50 virginia runner groundnut genotype.

Correlation with pod yield	Days to 50% flowering	Days to maturity	Number of primary branches	Number of pegs	Number of mature	Harvest index	100-seed weight (g)	Shelling percentage	Oil content (%)	Genotypic correlation co-efficient
Days to 50% flowering	-0.1142	-0.0362	-0.0837	-0.0034	-0.0137	-0.1945	-0.0185	-0.0244	-0.0561	-0.5466**
Days to maturity	-0.0907	-0.0455	-0.0965	-0.009 i	-0.0160	-0.1435	-0.0157	-0.0239	-0.0686	-0.5013**
Number of primary branches	0.0279	0.0128	0.3431	0.0339	0.0278	0.2591	0.0226	0.0340	-0.0105	0.7506**
Number of pegs	0.0058	0.0006	0.1727	0.0673	0.0088	0.0217	0.0027	0.0077	-0.0198	0.2675
Number of mature pods	0.0370	0.0173	0.2265	0.0141	0.0422	0.1243	0.0257	0.0346	0.0172	0.8387**
Harvest index	0.0423	0.0124	0.1692	0.0022	0.0341	0.5252	0.0256	0.0319	0.0052	0.8486**
100-Seed weight (g)	0.0566	0.0192	0.2080	0.0048	0.0291	0.3603	0.0373	0.0375	0.0399	0.7926**
Shelling percentage	0.0599	0.0234	0.2502	0.0111	0.0313	0.3595	0.0300	0.0465	0.0451	0.8571**
Oil content (%)	0.0495	0.0242	-0.0278	-0.0103	0.0056	0.0211	0.0115	0.0163	0.1293	0.2193

Residual = 0.2463, _____ = Indicates direct effect ** = Significant at 1 % level of probability.

improving pod yield of virginia runner groundnuts. Days to 50 per cent flowering and days to maturity had small negative direct effect on pod yield and also had low negative indirect effects through other traits, studied. Number of pegs, number of mature pods per plant, 100 seed weight and shelling percentage were also exhibited positive direct effect on pod yield but of low magnitude. Yadava, et al. (1981) had also reported positive direct effect of pod number, number of primary branches on pod yield, while, negative effect of days to maturity, on pod yield. Bhagat et al. (1986) reported strong to substantial direct effects for number of mature pods, primary branches and shelling percentage on pod yield. Similarly, Deshmukh et al. (1986) also reported high positive direct effects for number of mature pods and 100-seed weight. All these findings are in conformity with the findings of the present investigation.

CONCLUSION

The above studies concluded that for selecting high yielding genotypes in Virginia runner groundnut, main importance may be given to the following characters like harvest index, number of primary branches, number of mature pods, 100-seed weight, number of pegs and shelling percentage coupled with early to medium flowering and maturity.

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