

Genetic Variability in Semi Spreading Groundnut (*Arachis hypogaea*)

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Yield and nine components of yield were studied in seventeen semi spreading groundnut varieties. The coefficient of variability, heritability, genetic advance and phenotypic correlations were worked out. High heritability estimates combined with high genetic advance was observed in number of flowers, yield of pod, 1000-pod weight and 1000-kernel weight. The height of main stem had high heritability value with moderate genetic advance as well as positive and strong association with 1000-pod weight and kernel weight.

In breeding programme that aims at improving the yield of crops, information on the genetic variability and inter-relationship in different quantitative characters are essential, therefore an attempt was made in the present investigation to assess the interrelationship, heritability and genetic advance of some quantitative characters of a set of selected semi-spreading groundnut varieties.

MATERIAL AND METHODS

Seventeen semi-spreading varieties, viz; Ah. 2105, 28-206, MK. 374 (Andhra Pradesh), TMV. 6, TMV. 10 (Tamil Nadu), Bh. 8-18 (Mysore), RS. 87 (Rajasthan), Kopergaon-1 (Maharashtra) Gujarat narrow leaf mutant (Gujarat), T. 64 (Kanpur), C. 501, Georgia 119-26, Nc. 4 × (Ludhiana), Early Runner (Bihar), B. 30, B. 31 (West Bengal) and T. G. 1 (BARC) received from different parts of India

were studied in randomised blocks with three replications at the Castor Research Station, Salem under rainfed conditions during *Kharif* of 1970, 1971 and 1972. These varieties were raised in plots of 5.0 m × 2.1 m with a spacing of 30 cm × 15 cm. Five plants in each plot were selected at random and the data on ten characters viz., height of main stem, number of nodes on main stem, number of primary branches, number of secondary branches, number of flowers produced, number of mature pods, yield of pod, 1000 pod weight, 1000 kernel weight and shelling out-turn were recorded. Phenotypic correlations were worked out between the component characters and yield as also among the yield components.

The genetic coefficient of variation was estimated according to Burton (1952) and heritability by the formula suggested by Hanson *et al* (1956). The

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TABLE I Genetic Variability in Semi spreading groundnut

Character	Year	Range	Mean	F value (treatment)	S. E.	Genetic coefficient of variation	Heritability (%)	Genetic advance (% of mean)
Height of main axis (cm)	1970	21.3-38.0	25.4	8.50**	1.64	17.71	88.23	35.55
	1971	19.0-28.7	24.5	1.97	2.10	8.45	49.48	10.71
	1972	20.7-35.7	28.1	2.21*	2.48	9.68	54.05	14.87
Number of nodes on main axis	1970	17.7-24.3	20.1	6.70**	0.83	9.90	85.01	18.85
	1971	17.0-25.0	20.9	3.02**	1.10	8.90	67.00	15.00
	1972	23.0-27.7	24.9	5.17**	0.52	4.43	80.73	8.11
Number of primary branches	1970	4.3-6.7	5.7	1.92	0.40	6.84	47.92	9.47
	1971	5.0-6.7	5.5	1.38	0.37	4.18	27.81	4.54
	1972	5.3-8.0	6.5	1.27	0.71	5.70	21.17	5.40
Number of secondary branches	1970	10.3-20.0	15.1	1.65	1.56	8.26	33.26	10.66
	1971	11.0-17.7	14.9	1.65	1.35	7.31	39.40	9.40
	1972	10.3-18.3	14.9	2.68**	1.59	13.76	32.66	12.00
Number of flowers produced	1970	44.3-116.0	69.7	3.20**	11.17	23.76	68.76	40.60
	1971	34.0-70.3	47.6	4.09**	5.22	19.28	75.55	34.51
	1972	52.3-75.0	65.2	1.58	10.99	12.85	36.73	16.01
Number of matured pods	1970	7.7-13.7	10.3	2.33**	1.18	14.37	57.18	22.42
	1971	6.3-15.7	11.1	1.62	2.46	16.67	35.10	20.45
	1972	6.3-12.3	9.4	1.73	1.23	12.23	41.18	16.17
Yield of pod (gm)	1970	3.7-17.3	10.8	3.60**	1.83	27.31	72.18	48.61
	1971	18.7-26.0	17.9	3.48**	2.25	19.88	71.30	34.60
	1972	5.0-13.3	8.8	1.81	1.57	16.16	44.91	22.73
1000 pod weight (gm)	1970	256.7-483.3	355.0	2.27*	12.01	38.17	56.04	58.83
	1971	247.3-490.1	361.2	3.17**	12.62	30.21	53.21	59.23
	1972	249.2-484.1	351.2	3.03**	9.22	27.02	50.13	48.64
1000 kernel weight (gm)	1970	120.0-230.0	170.4	7.33**	11.84	47.46	86.39	90.52
	1971	119.8-232.1	174.2	6.23**	12.23	41.21	80.16	91.61
	1972	121.4-242.1	169.3	5.49**	14.22	39.22	79.42	89.24
Shelling out-turn (Percentage)	1970	66.0-77.3	70.6	1.74	1.79	2.20	42.70	2.95
	1971	64.0-77.7	69.4	2.01*	1.62	1.92	40.19	1.94
	1972	67.2-76.9	71.2	1.94	1.92	2.01	41.23	3.14

* Significant at 5 per cent probability,

** Significant at 1 per cent probability,

expected genetic advance was estimated after Johnson *et al* (1955). The method suggested by Hayes *et al* (1955) was adopted for calculating the phenotypic correlation coefficients.

RESULTS AND DISCUSSION

The genetic coefficient of variability, heritability and genetic advance for the different characters are presented in Table-I.

Considering the range and mean values for the different attributes, the maximum extent of variability was for 1000-pod weight followed by 1000 kernel weight, number of flowers produced, height of main stem, number of mature pod and yield of pod. The variation was narrow in the case of number of primary branches and shelling out-turn. Dixit *et al* (1971) recorded low variation in the number of primary branches. The differences among the varietal means for number of nodes, 1000-pod weight and 1000-kernel weight were statistically significant for all the years, while significant for one year alone for height, number of flower, produced and yield for two years and shelling out-turn. In the case of number of branches, it was not significant during all the years.

The genetic coefficient of variation was high in the case of 1000-kernel weight, 1000-pod weight, yield of pod, number of flowers produced and number of mature pods. A high genetic

coefficient of variation for yield of pod was observed by Dixit *et al* (1971) in bunch and spreading groundnut varieties. The other characters viz., shelling out-turn, number of primary branches, number of nodes on main stem and number of secondary branches gave low estimates of genetic coefficient of variation. Majumdar *et al* (1969) recorded low value for shelling out-turn. Estimates of heritability were high for height and number of nodes on main stem, number of flowers, yield of pod, 1000-pod weight and 1000-kernel weight and moderate to low for other characters. Majumdar *et al* (1969) recorded high heritability value for 1000-pod weight and number of nodes. In the present investigation the highest genetic advance (89.24 to 91.61%) was observed for 1000-kernel weight, followed by 1000-pod weight, (48.64 to 58.83%), yield of pod (22.73 to 48.61%) and number of flowers (16.01 to 40.60%). The lowest genetic advance recorded was for shelling out-turn (1.94 to 3.14%). This character also had the lowest genetic coefficient of variation. This is in conformity with the findings of Majumdar *et al* (1969). The values observed were relatively higher for heritability and genetic advance in respect of 1000-pod weight, 1000-kernel weight, yield of pod and number of flowers produced, while high heritability with moderate genetic advance was encountered in height and number of nodes on main stem. The study has revealed that among the

TABLE II Phenotypic correlation Co-efficients in semi-spreading groundnut

Characters	Height of main axis	No. of nodes on main axis	No. of primary branches	No. of secondary branches	No. of flowers produced	No. of matured pods	1000 pod wt.	1000 Kernel wt.	Shelling Percentage
Yield of pod (gm)	-0.2672	+0.1021	-0.2713	-0.2891	-0.4292	+0.5356*	+0.2162	-0.2382	-0.0894
Height of main axis		+0.4692	-0.0402	-0.1952	-0.2163	+0.1061	+0.6091*	+0.5553*	+0.3675
Number of nodes on main axis			+0.2914	-0.1195	+0.3867	+0.0273	-0.1385	-0.0283	+0.1817
Number of primary branches				-0.0286	+0.6102**	0.0954	-0.0823	-0.0772	+0.0164
Number of secondary branches					+0.0723	+0.2132	-0.1194	-0.0204	-0.0413
Number of flowers produced						-0.4593	-0.3206	-0.2795	+0.0416
Number of matured pods							+0.0374	-0.0996	+0.1244
1000 pod weight (gm)								-0.0057	+0.0415
1000 kernel weight (gm)									-0.1634

* Significant at 5 per cent level of probability.

** Significant at 1 per cent level of probability.

TABLE IV Morphological characters of CO. 3 and Co. 2 Onion

Characters	CO. 3	CO. 2
Plant height - cm	40	28.6
Number of shoots/clump	6 to 8	7 to 9
Number of leaves/clump	37.5	20.6
Leaf colour	Green	Green
Leaf shape	Cylindrical	Cylindrical
Number of bulbs/clump	8 to 10	9 to 10
Bulb colour	Pink	Red
Bulb weight/clump - gm	75	60
Single bulb weight - gm	7 to 9	6 to 7
Plant weight - gm	110	93
Bulb length - cm	3.5	3.4
Bulb girth - cm	8.3	6.8

Apart from yield, this variety can be stored up to 120 days without sprouting under good ventilation and also without much reduction in the size of bulbs as compared to CO. 2 onion, in which the bulbs will keep well only for 80 to 90 days and the size of the bulbs gets reduced during that period. CO. 3 onion is moderately tolerant to thrips attack as compared to CO. 2.

The morphological characters and the chemical characters of bulbs of CO. 2 and CO. 3 onions are given in Tables IV and V. The CO. 3 onion plants are robust, with 8 to 10 bulbs per clump as compared to 7 to 9 bulbs in CO. 2. The bulbs are pink in colour, bigger in size with an average bulb weight of 75 gm per clump, which is 25 per cent over CO. 2. Regarding the chemical constituents, the bulbs of CO. 3 onion contain 17.5 per cent dry matter, 0.53 per cent sulphur and 13.0 per cent total soluble solids. Not much variations were noted between the two varieties in respect of chemical constituents.

TABLE V Chemical characters of CO. 3 and O. 2 Onion bulbs

Characters	CO. 3	CO. 2
Moisture - per cent	82.5	84.4
Dry matter - per cent	17.5	15.6
Nitrogen - per cent	2.05	1.95
Phosphorus - per cent	0.37	0.31
Potassium - per cent	2.82	2.26
Calcium - per cent	1.48	1.50
Magnesium - per cent	0.43	0.41
Sulphur - per cent	0.52	0.48
Iron - per cent	0.82	0.81
Copper - ppm	42.0	37.5
Manganese - ppm	35.0	38.0
Total soluble solids - per cent	13.0	10.3
Acidity - per cent	0.205	0.200
Reducing sugars - per cent	1.280	1.100
Total sugars - per cent	5.130	4.425
Ascorbic acid - mg/100 g	10	8

On account of the desired characters as high yield, bigger size bulbs short duration, long storage capacity high dry matter, sulphur and T.S.S content, the variety CO. 3 was approved as a new strain for cultivation Tamil Nadu.

The economics of cultivation of the variety is given in Appendix I.

APPENDIX I

Yield of bulbs tonnes/ha	—	15.6
Value of produce per hectare at Rs. 600.00 per tonne	—	Rs. 9360.0
Cost of cultivation	—	Rs. 4000.0
Net profit per hectare	—	Rs. 5360.0

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