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VARIETAL VARIABILITY IN MINERALS CONTENT OF GROUNDNUT

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The mineral composition of leaves of different varieties of groundnut under different habits of growth analysed during the crop growth period indicated that both cations and anions augered well for high yielding potentiality which was singular chracteristics of the high yielding varieties in each habit of growth. An accumulation of high calcium in leaves at flowering, pod setting and pod filling stages enhanced the pod yield in high yielding varieties. High potassium—calcium ratio was associated with high yielders under each habit of growth.

Productivity in crop plants largely centres on source-sink relationship and also governed by limitation of one or the other. Even in crop plants with satisfactory source potential and sink size, the translocatory regulation is an important factor. While the distribution of dry matter is rather refractory for each genotype a certain degree of manipulation is possible with a modification of environment that may induce the availability and uptake of minerals (Epstein 1972).

The availability, uptake and content of plant nutrients at different physiclogical growth stages of plant are considered as the most important factors in deciding the yielding potentiality of the crops besides their genetic potential. The significance requirement and role of minerals for groundnut has been reported by Burkhart and Collins (1942), Middleton *et al.*, (1945) and Colwell and Brady (1945).

MATERIALS AND METHORDS

Twelve variets of groundnut comprising six in bunch (TMV 2, TMV 9, B 131, Ah 8068, Gangapuri and Pollachi Red), three in each of semi-spreading (TMV 6, TMV 8 and TMV 10) and spreading (TMV 1, TMV 3 and TMV 4) were used as the experimental materials. The experiment was laid out in a randomised block design provided with three replications in a red loamy soil at Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore during kharif season, 1977. The NPK Fertilizer was applied by broadcast @ 15:30:45 kg/ha. respectively before sowing.

The plant samples were drawn at frequent intervals of ten days during the crop growth period for mineral analysis. The leaf content of phosphorus was analysed by Colorimetric method, calcium and magnesium by Versenate Titration method and potassium by Flame Photometric method described by Jackson, (1962). The

potassium - calcium ratios were calculated by dividing potassium values by calcium values.

RESULTS AND DISCUSSION

The results are furnished in tables 1-5. Though not much difference was noticed among the varieties and habits with regard to phosphorus content, but an increasing trend especially during flowering and pre-pod setting stages was evident and the high content of phosphorus in leaves could have been utilized for the synthesis of proteins and nucleic acids which inturn translocate to the developing pods as reported by Smartt (1976) in groundnut and other tropical legumes. In this regard, the high values of phosphorus in high yielding varieites viz., TMV 2, TMV 9, B 131, Ah 8068 among bunch, TMV 6 among semi-spreading and TMV 3 among spreading was clear and amply support the views made by the author.

The analysis if leaf content of three cations viz., calcium, magnesium and potassium revealed that calcium accounted for a larger proportion compared to magnesium and potassium level was lower than magnesium in all three habits of growth. The decline in values of potassium at the maturity stage and high accumulation of calcium at flowering, pod setting and pod developing stages amply supported the results obtained by Smartt *Loc. cit.* Burkhart *loc. cit.* and Middleton *et. al. Loc. cit* and it might have been due to the movement of potassium to the developing pods as it regulates translocation. The presentation of low values of calcium at vegetative stage and a slow and steady increase with the maturity of crop, coincided with the views made by Colwell and Brady *Loc. cit.* where author noted the significant role of calcium for the development of pods and the antagonistic relationship between the two nutrients and with the decrease of potassium, the calcium uptake was more. Magnessium content of leaf showed a wider variation than other cations among the habit and its role in the synthesis of chlorophyll molecules as a component of it needs no explanation and it was high in the high yielding varieties.

The ratio between potassium and calcium as the former maintains the rate of translocation of source to the developing sink (pods) and the latter is required for building up cells in the developing pods, was worked out to predict the roles played by these two cations in determining the yielding potentiality of the varieties in each habit of growth. It was evident that TMV 2, TMV 9 and B 131, among bunch possessed higher ratios and more potassium than calcium augured well for yielding potentiality. This trend was considerably more impressive in semi-spreading with particular reference to TMV 10 and to some extent TMV 6 also maintained high values.

Table 1 Potassium content of leaf (mg/g) in varieties of Groundnut

Varieties	Days after sowing											
	15	30	40	50	60	70	80	90	100	110	120	130
						BUNCH						
TMV 2	4.8	5.1	5.4	5.5	5.7	5.7	5.5	5.5	5.0			
TMV 9	3.9	4.8	4.9	5.2	5.5	5.3	5.1	5.0	4.9			
B 131	4.0	4.4	4.7	4.9	5.2	5.2	5.0	4.9	4.9			
Ah 8068	5.7	5.9	6.0	6.2	6.4	6.1	6.0	5 9	5.4			
Gangapuri	5.7	5.8	5.9	5.9	6.1	6.0	5.9	5.9	5.7			
Pollachi Red	5.7	5.6	5.9	6.0	6.2	6.1	6.0	5.9	5.7			
						SEMI SPREADING						
TMV 6	5.0	5.1	5.4	5.6	5.7	5.4	5.4	5 2	5.2	5.1	5.0	
TMV 8	5.9	5.2	5.5	5 5	5.6	5.3	5.2	5.0	4.9	5.0	5.0	
TMV 10	5.0	5.2	5.6	5.6	5.7	5.3	5.1	4.9	4 8	4.9	4.9	
						SPREADING						
TMV 1	5.0	5.1	5.5	5.9	6.1	6.0	6.0	5.9	5.7	5.5	5.3	5 2
TMV 3	5.0	5 3	5.7	5.9	6.2	6.1	6.0	5.8	5.7	5.1	5.1	5.1
TMV 4	4 9	5.1	5.8	6.0	6.5	6.1	6.1	5.9	5.4	5.1	5.2	5.3

TABLE 2 Calcium Content of Leaf (mg/g) in Varieties of Groundnut.

						BUNCH						
TMV 2	15.0	16.4	17.6	16.9	17.1	18.5	18.9	17.5	17.1			
TMV 9	15.9	16.1	16.8	16.4	16.9	17.3	17.9	17.0	16.9			
B 131	16.2	17.3	19.3	18.1	18.9	19.5	19.8	18.9	18.1			
Ah 8068	15.9	16.2	17.6	17.0	17.9	18.4	18 9	18.0	17.8			
Gangapuri	18.1	19.4	20.6	19.2	20.3	20.6	20.7	19.8	18.9			
Pollachi Red	16.3	17.4	18.7	18.2	18.9	19.1	19.5	18.8	18.0			
						SEMI SPREADING						
TMV 6	15.8	16.6	17.6	16.1	16.0	15.8	15.4	15.1	15.7	15.6	15.3	
TMV 8	16.3	17.4	18.8	16.5	16.1	15.9	15.2	14.9	15.4	15.2	15 2	
TMV 10	15.9	16.9	17.8	15.7	15.5	15.1	14.8	14.3	15.8	15.6	16.4	
						SPREADING						
TMV 1	16.3	17.0	18.3	16.1	16.0	15.8	15.0	14.8	15.2	15.0	15.1	15.2
TMV 3	16.4	17.6	18.1	16.8	16.7	16.1	15.9	15.1	15.4	15.2	15.2	15.2
TMV 4	16.0	16.9	17.1	16.4	16.1	15.9	15.1	14.7	15.6	15.5	15.4	15.3

Varieties	15	30	40	50	60	70	80	90	100	110	120	130
						BUNCH						
TMV 2	5.3	5.9	6.8	8.2	7.9	7.5	7.8	7.7	6.3			
TMV 9	5.1	5.9	6.3	7.4	6.9	6 6	6.9	6.7	6.0			
B-131	5.9	6.4	7.0	7.9	7.2	6.9	7.3	7.0	6.2			
Ah 8068	6.3	6.9	7.5	7.9	7.3	6.8	7.1	6.9	6.0			
Gangapuri	6.5	6.6	7.9	7.9	7.3	7.0	7.7	7.0	6.1			
Pollachi Red	6.7	7.2	8.3	8.7	7.9	7.4	7 8	7.1	6.2			
						SEMI SPREADING						
TMV 6	6.1	6.6	7.3	8.2	7.8	7.6	7.9	7.4	6.4	9.6	6.0	
TMV 8	5.9	5.9	6.7	8.1	7.7	7.5	7.9	7.2	6.9	6.2	5.9	
TMV 10	5.9	6 1	6.8	8.6	8.1	7.9	8.2	7.9	7 0	6.6	6.0	
						SPREADING						
TMV 1	6.0	6.3	7.2	8.5	7.9	7.6	7.9	7.1	6.8	6.2	5.9	5.2
TMV 3	5.9	6 0	6.2	8.8	8.2	7.8	8.2	7.2	6.9	6.1	5.7	5.1
TMV 4	5.9	6.4	6.7	8.1	7.6	7.3	7.7	7.0	6.6	6 1	6.6	5.1

TABLE 4 Magnesium Content of Leaf (mg/g) in Varieties of Groundnut..

						BUNCH						
TMV 2	6.2	7.2	8.2	8.6	8.4	8.5	8.8	8.5	8.1			
TMV 9	9.9	10.2	11.0	11.2	10.9	10.9	1.11	10.9	9.9			
B 131	7.6	7.9	8.2	8.9	8.6	8.9	8.9	8.2	7.9			
Ah 8068	8.8	9.0	9.4	9.8	9.7	9.7	9 9	9.5	9.0			
Gangapuri	6.9	7.3	7.8	7.9	7.7	7.9	8.0	7.8	7.1			
Pollachi Red	10.7	10.9	11.2	11.9	11.5	11.6	11.8	10.6	10.1			
						SEMI SPREADING						
TMV 6	9.6	9.8	10.2	11.0	11.2	11.2	10.9	10.8	10.5	10.2	9.9	
TMV 8	8.6	8.7	9.1	9.7	9.7	9.7	9.5	9.3	9.0	8.9	8.5	
TMV 10	11.2	11.7	12.8	12.9	12.9	12.8	12.6	12.5	12.2	11.6	10.8	
						SPREADING						
TMV 1	7.3	7.4	8.4	8.6	8.7	8.7	8.5	8.4	8.1	7.9	7.0	7.0
TMV 3	10.1	10.5	11.0	11.3	11.6	11.5	11.4	11.3	11.0	10.8	10.0	8.6
TMV 4	9.9	10.1	10.6	10.8	10.8	10.7	10.7	10.5	10.2	9.7	9.1	8.4

Table 5 Potassium calcium ratio of leaf (mg/g) in varieties of Groundnut

Varieties	Days after sowing											
	15	30	40	50	60	70	80	90	100	110	120	130
						BUNCH						
TMV 2	0.35	0.36	0.38	0.48	0.45	0.40	0.41	0.43	0.36			
TMV 9	0.32	0.36	0.37	0.45	0.40	0.38	0.38	0.39	0.35			
B 131	0.36	0 36	0.36	0.43	0.37	0.35	0.37	0.36	0.33			
Ah 8068	0.39	0 42	0 42	0.46	0.40	0.37	0.37	0.38	0.33			
Gangapuri	0.35	0.33	0.38	0.41	0.35	0.34	0.36	0.35	0.31			
Pollachi Red	0.40	0.41	0.44	0.47	0.41	0.38	0 40	0.37	0.34			
						SEMI SPREADING						
TMV 6	0.38	0.39	0.41	0.50	0.48	0.48	0.51	0 48	0.40	0.39	0.39	
TMV 8	0.36	0.34	0.35	0.49	0.47	0.46	0.51	0.48	0.45	0.40	0.39	
TMV 10	0.37	0.36	0.38	0.54	0.52	0.52	0.55	0.56	0 44	0.42	0.38	
						SPREADING						
TMV 1	0.37	0.36	0.39	0.52	0.49	0.47	0.53	0.48	0.44	0.41	0.38	0.34
TMV 3	0.36	0 34	0.34	0.52	0.48	0.48	0.57	0.47	0.45	0.39	0.37	0.33
TMV 4	0 36	0.37	0.39	0.49	0.46	0 46	0.50	0.47	0 41	0.39	0.43	0.32

In this regard TMV 3 among spreading varieties maintained higher ratios than other varieties. The importance of these two cations for the metabolism of groundnut and its effect on yield was much emphasised by Fageria (1974) and the high values of ratios between these two nutrients obtained in high yielding varieties are amply supported.

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