with kind regards
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A Note on the Nutrient Removal By Ginger and Turmeric Rhizomes

Ginger (*Zingiber officinale* R.) and rmeric (*Curcuma longa* and *Curcuma omatica* L.) are the important rhizomi-rous spice crops and their cultivation South India is mainly concentrated in rala and Andhra Pradesh. The crops e generally known to make heavy de-ands for plant nutrients. At the time harvest, it is the usual practice to g out these crops to collect their zomes and put back their shoot-por-ns in the soil itself. Specific infor-ation on the soil nutrient depletion by e rhizomes is lacking, particularly der the typical Kerala conditions and the case of certain popular com-rcial varieties of the crops grown in e State. Hence it is considered ex-dient to present preliminary results these aspects in this note.

The rhizomes of ginger and turme-collected and analysed were typical mposite samples from healthy and ature plants grown in the laterite soils the Institute of medium nutrient tus ($<$ 224 Kg/ha. Av. N; $<$ 22 Kg/ Av. P_2O_5; and $<$ 140 Kg/ha. Av. O). China, Maran, Wynad local, Rio-janiero and Narasapattam were the e ginger varieties and Duggirala, ayapasuppu, Armoor, Tekurpetta (all ga types) and Kasturi (aromatica type) re the five turmeric varieties selected. e crops received the general manures d fertilizers (cattle manure at the rate 30 tonnes/ha for turmeric at the time planting and fertilizers at the rate of for ginger and 30 Kg N, 30 Kg P_2O_5 and 60 Kg K_2O/ha for turmeric. Dry matter and major nutrients were assessed by standard methods on oven dry basis (Jackson, 1967) and the results are presented in the Table I. The trends of nutrient removal by the rhizomes on hectare basis are shown in Fig. I and II for ginger and turmeric respectively.

The results showed that the ginger and turmeric rhizomes were mainly K and N exhausting while Mg and P removals were intermediary. Ca removal was the least. Fertilizer trials by Gollifer (1972) also have borne out the beneficial effect of N and K for ginger and K for turmeric on the coral limestone soils of British Solomon Islands.

Under an experimental provision of 0.30 M x 0.30 M inter-spacing between plants, a total number of 1, 11, 111 plants may be accounted for in an hectare of effective planted area. On this basis figures I and II would show heavy depletion of soil nutrients by the rhizomes. The shoot portions also depleted considerable amounts of nutrients but were usually returned to the soil. For example, a study made on the nutrient uptake by the shoot-portions of "Wynad local" ginger variety revealed that its shoot would exhaust 76 Kg K, 66 Kg N; 27 Kg Mg; 22 Kg Ca and 12 Kg P/ha. So also, it was found that the shoot-portions of 'Tekurpetta' variety of turmeric would remove 51 Kg K; 44 Kg N; 40 Kg

Fig. 1. Nutrient removal by Ginger rhizomes.

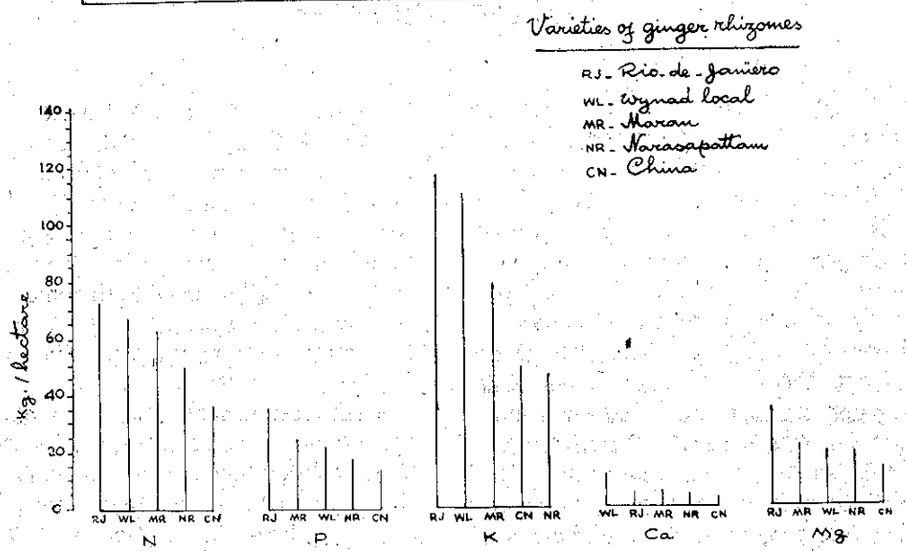

Fig. 2. Nutrient removal by turmeric rhizomes

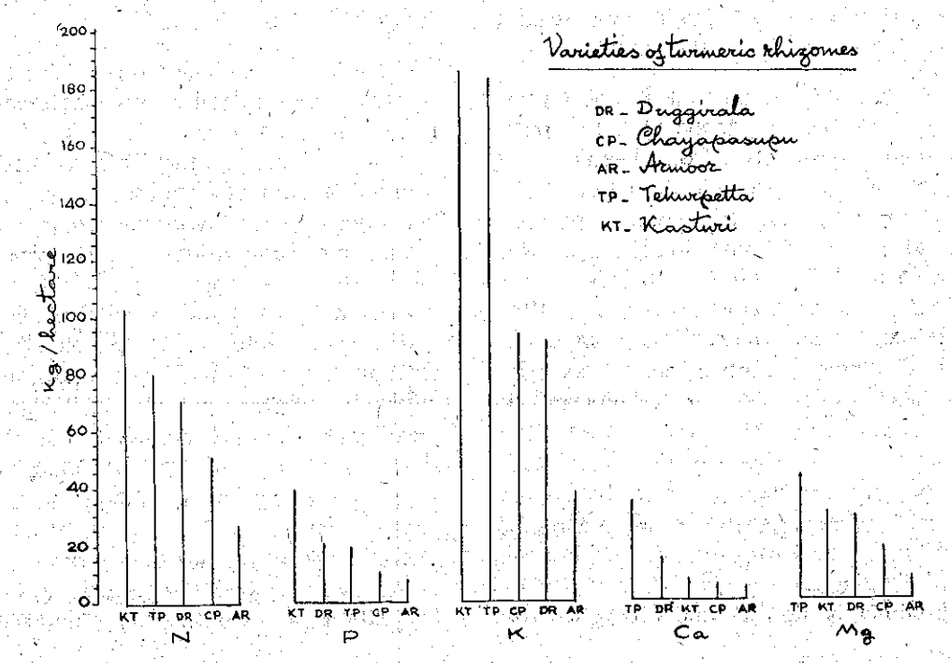

TABLE I. N, P, K, Ca and Mg contents of ginger and turmeric rhizomes

Plant/Rhizome/Variety	Percentage contents of					Rhizome dry matter/plant (g)
	N	P	K	Ca	Mg	
Ginger rhizome						
China	1.36	0.485	1.88	1.20	0.535	23.7
Maran	1.48	0.574	1.88	0.123	0.535	37.7
Wynad Local	1.50	0 475	2.50	0.241	0.444	40.0
Rio-de-Janiero	1.57	0.750	2.50	0.111	0.748	42.1
Narasapattam	1.34	0.450	1.25	0.130	0.523	33.6
Turmeric rhizome						
Duggirala	0.98	0.290	1.25	0.200	0.412	65.4
Chayapasupu	1.36	0.290	2.50	0.150	0.505	33.6
Armoor	1.36	0.415	1.88	0.261	0.410	18.0
Tekurpetta	1.63	0.435	3.75	0.701	0.888	44.3
Kasturi	1.40	0.530	2.50	0.100	0.410	67.0

TABLE II. The trends of nutrient removal by ginger (var. Wynad local) and turmeric (var. Tekurpetta)

Plant/ Component	Nutrients removed in Kg/ha.						Percentage proportion of nutrient removal by components				
	N	P	K	Ca	Mg		N	P	K	Ca	Mg
1. Ginger 'Wynad local'											
Shoot	66	12	76	22	27	Shoot/Rhizome	90	57	68	200	135
Rhizome	67	21	111	11	20	Shoot/Total	50	36	41	67	57
Total	133	33	187	33	47	General Sequence	Ca>	Mg>	N>	K>	P
General sequence	K>	N>	Mg>	Ca>	P						
NPK, Ca, Mg ratio	1:0. 25:1. 41:0. 25:0.35										
2. Turmeric 'Tekurpetta'											
Shoot	44	9	51	38	40	Shoot/Rhizome	55	43	28	192	91
Rhizome	80	21	185	35	44	Shoot/Total	35	30	22	52	48
Total	124	30	236	73	84	General sequence	Ca>	Mg>	N>	P>	K
general sequence	K>	N>	Mg>	Ca>	P						
NPK, Ca, Mg ratio	1:0. 24:1. 90:0. 59:0.68										

corresponding nutrient exhaust values by ginger and turmeric rhizomes (Table II) it would seem that by putting back into the soil the ginger and turmeric shoot-portions the farmers may compensate substantially Mg (more than 100%) and N (99%) more than three-fifth of K (68%), half of P (57%) and return twice the quantity of Ca removed by its rhizome. Of the total nutrient removal by the crop, the return of Ca was maximum (67%), followed by that of Mg (57%), N (50%), K (41%) and P (36%) being the least. Turmeric shoot portions may replenish substantially Ca (more than 100%) and Mg (91%), more than of N (55%), two-fifth of P (43%) and one-fourth of K (28%) removed by its rhizome. Of the total nutrient removal by the crop, the return of Ca was maximum (52%), followed by that of Mg (48%), N (35 per cent), P (30%) and K (22%) being the least. The trends of varietal demands for nutrients are also depicted in figures I and II. Among the different turmeric varieties 'Kasturi' appears to remove proportionately, more NPK than others. 'Rio-de-Janiero' variety of ginger seems to be a heavy feeder of N, P, K and Mg than others.

The results of this study provide a guide line for fertilizer application for ginger and turmeric with respect to varieties, quantity and proportion of nutrient elements.

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REFERENCES

GOLLIFER, D.E. 1972. Effect of applications of potassium on annual crops soils of the Dala series in Malaita, British Solomon Islands. *Trop, Agric.* (Trinidad), **49**: 261-67.

JACKSON, M.L. 1967. *Soil Chemical. Analysis.* Prentice Hall of India Private Ltd., New Delhi.