

## A Note on the Nutrient Removal By Ginger and Turmeric Rhizomes

Ginger (*Zingiber officinale* R.) and turmeric (*Curcuma longa* and *Curcuma aromatica* L.) are the important rhizomiferous spice crops and their cultivation in South India is mainly concentrated in Kerala and Andhra Pradesh. The crops are generally known to make heavy demands for plant nutrients. At the time of harvest, it is the usual practice to dig out these crops to collect their rhizomes and put back their shoot-portions in the soil itself. Specific information on the soil nutrient depletion by the rhizomes is lacking, particularly under the typical Kerala conditions and in the case of certain popular commercial varieties of the crops grown in the State. Hence it is considered expedient to present preliminary results on these aspects in this note.

The rhizomes of ginger and turmeric collected and analysed were typical composite samples from healthy and mature plants grown in the laterite soils of the Institute of medium nutrient status ( $< 224$  Kg/ha. Av. N;  $< 22$  Kg/ha. Av.  $P_2O_5$ ; and  $< 140$  Kg/ha. Av.  $K_2O$ ). China, Maran, Wynad local, Rio-de-janiero and Narasapattam were the five ginger varieties and Duggirala, Chayapasuppu, Armoor, Tekurpetta (all *longa* types) and Kasturi (*aromatica* type) were the five turmeric varieties selected. The crops received the general manures and fertilizers (cattle manure at the rate of 30 tonnes/ha for turmeric at the time of planting and fertilizers at the rate of 60 Kg N, 60 Kg  $P_2O_5$  and 120 Kg  $K_2O$ /ha

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 Mg; 38 Kg Ca and 9 Kg P/ha. From the

Fig. 1. Nutrient removal by Ginger rhizomes.

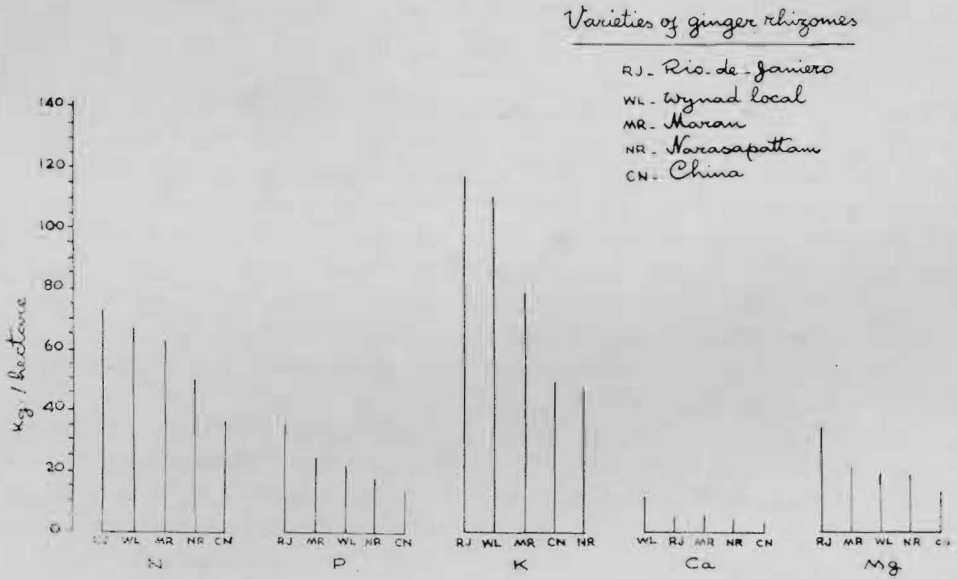


Fig. 2. Nutrient removal by turmeric rhizomes

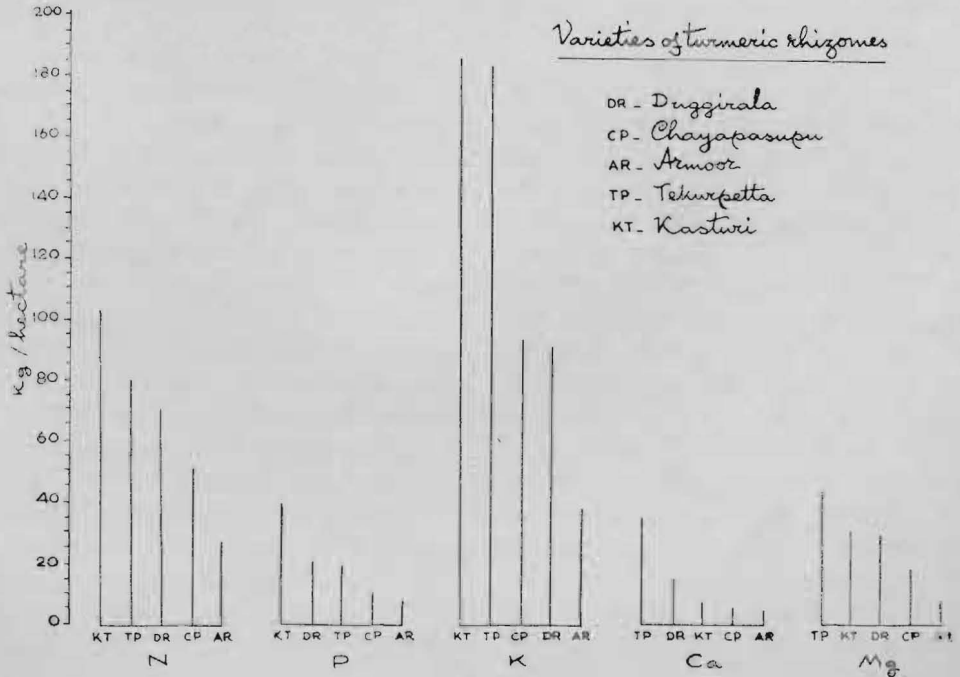


TABLE I. N, P, K, Ca and Mg contents of ginger and turmeric rhizomes

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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ERRATA

" A note . . . . . Rhizomes" (Madras Agric. J. 66(1):  
56-59, Jan., 1979)

<u>Context</u>	<u>For</u>	<u>Read</u>
p. 56, par.2, 1, 16	...30 tonnes/ha for turmeric	...30 and 40 tonnes/ha for ginger and tur- meric respectively...
Table 1. Ca Col.		
Ginger - China	1.20	0.120
" - Maran	0.123	0.120
" 'Percentage . . . . . .Components'		
Ginger....shoot/Rhizome } N Col.	90	99
Turmeric....shoot/Rhizome } Ca Col.	192	109
" 'Nutrients .... kg/ha.		
Ginger...Genl.Seq.	<del>K) N) Mg) Ca) P</del>	<del>K) N) Mg) Ca = P</del>
p.59, par. 5 l, 24 ... 1,36 &37	the farmers... ... more than of N (55%) . . . .	.... the former ... ... More than half of N (55%) . . . . .
" 1st ref: .. annual crops soils .....		... Annual crops grown on soils . . . . .

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