FERTILITY STATUS OF THE RUBBER GROWING SOILS OF KERALA

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Optimum nutrient supply to any crop can be ensured only through judicious fertiliser application and a knowledge of the nutritional status of soil is vital in economic and efficient use of fertilisers. Although many techniques are available to determine the nutrient requirements of crops, soil testing has emerged as the procedure most often utilised in established cropping systems. In our country several soil testing laboratories have been set up during 1960's and the Soil Test Crop Response Correlation Coordination Unit of the Indian Agricultural Research Institute, New Delhi, has prepared fertility maps showing the available nitrogen, phosphorus and potassium status of Indian Soils. (Ramamoorthy & Bajaj 1969).

Soil testing service for rubber cultivation was initiated in the Rubber Research Institute of India (RRII) from 1965 onwards. The laboratory however had only limited facilities and was capable of handling only limited number of samples too insufficient to meet the demands from the large number of growers. But this unit also could cover only a small portion of the total number of holdings and as a result three more laboratories with mobile soil and tissue testing unit were started at Kozhikode, Muvattupuzha and Nagercoil during 1986. Five more laboratories have been set up at Mangalore, Taliparamba, Trichur, Palai and Punalur in 1990-91, extending soil testing service to more areas. The laboratory at the RRII serves as the Central Laboratory co-ordinating the activities of the mobile and regional units. For collection of samples the services of field staff of Rubber Production Department is also utilised. Soil samples received in these laboratories are processed and analysed for diagnostic purpose. Fertility status of rubber growing soils in Kerala is discussed in this communication in the light of data generated in these laboratories on soil samples collected from small holdings.

In routine soil testing for advisory purpose, the samples are tested for their reaction (pH), available P, K and Mg. For available nitrogen, the assessment is made through the estimation of organic carbon. Fertiliser recommendation offered were based on soil test crop response correlation studies carried out along with the soil testing work in respective regions. The periodical progress in soil test programme is given in Table 1. During the period 1986 to 1990 the total number of soil samples analysed and fertiliser recommendations issued were 43701 and 22558 respectively. After analysing these samples the soil test values were classified as low, medium and high for organic carbon, available phosphorus, potassium and magnesium. The nutrient rating followed in the present work are reproduced in Table 2.

The soil test data collected during 1989 and 1990 were summarised districtwise and soil test summaries for individual districts were prepared based on 19,000 samples. The nutrient indices in respect of organic carbon, available P, K and Mg were prepared as follows:-

The percentage of samples (out of the total number of samples analysed for a district) falling into low category with respect to any nutrient is multiplied by a factor 1, those falling into medium category by 2 and those falling into high category by 3. The sum of these is divided by 100 and the value obtained is the nutrient index for that particular district with respect to that particular nutrient.

For mapping the nutrient status of soils of a district, the nutrient index value was taken as a basis. A district with a nutrient index value of 1.67 is considered low, between 1.67 and 2.33 as medium and above 2.33 as high.

The soil test values for individual nutrients in different districts are

summarised in Table 3. For Kottayam district, talukwise summaries were also prepared. (Table 4). Fertility map for organic carbon, available P available K and available Mg was also drawn for Kottayam district (Figure 1 - 4).

ORGANIC CARBON STATUS

A review of the soil test summaries (Table 3) reveal that Organic Carbon is high for soils of Kasargod, Kannur, Kozhikode, Idukki and Kottayam districts. The index values for organic carbon for these districts was found to range from 2.77 for Kasargod to 2.36 for Idukki district. Organic Carbon status is in the medium range for Malappuram, Palakkad, Trissur, Eranakulam, Kollam and Trivandrum. The annual recycling of nutrients through leaf fall and establishment of cover crop in early years may be attributive to the medium to high organic matter status in rubber growing soils. Approximately 45 - 90 Kg N, 3 - 7 Kg, P, 10 - 20 Kg K and 9 - 18 Kg Mg is added through annual leaf, branch and fruit fall in one hectare of rubber plantation. The total amount of nutrients returned to soil by different cover crops over five years of immaturity period is reported to be 226 - 253 Kg nitrogen, 18 - 27 Kg phosphorus, 85 - 131 Kg potash and 15 - 27 Kg magnesium, whereas nutrient removal through latex from a hectare of rubber plantation having an yield of 1400 kgs of dry rubber is only 9.4 kg N, 2.3 kg P, 8.3 kg K and 1.7 kg Mg (Planters Bulletin, 120).

AVAILABLE P STATUS

Soils of rubber in general are deficient in available P. (Table 3). This may be due to the lateritic nature of the rubber growing soils and correction of this condition may be more difficult due to the high P fixation capacity of these soils.

TABLE 1

Progress in soil testing of rubber growing soils of Kerala

Year	No. of soil samples analysed	No. of fertiliser recommendation
1986	3280	1750
1987	7742	3985
1988	8372	4216
1989	13885	7145
1990	10422	5462

AVAILABLE K STATUS

Out of eleven districts, where the study was conducted, only the soil in Trichur district has medium levels of available K. All other districts show low K status. High rainfall together with kaolinitie type of clay mineral and the presence of lattice and organic bound K which are not available to plants may be attributed to the low K status in rubber growing soils. The necessity of applying potassic fertilisers to rubber plants is evident from the low potassium status observed.

AVAILABLE MG STATUS

For Mg the index values are high for Kasargod,Kannur, Kozhikode, Malappuram, Palakkad and Trichur districts. In Eranakulam, Idukki, Kottayam, Kollam and Trivandrum available Mg status is in the medium range. Since the soils of northern districts are having high levels of available Mg, it is evident that Mg requirement of rubber plants in these districts will be met from soil itself.

FERTILITY STATUS FOR KOTTAYAM DISTRICT

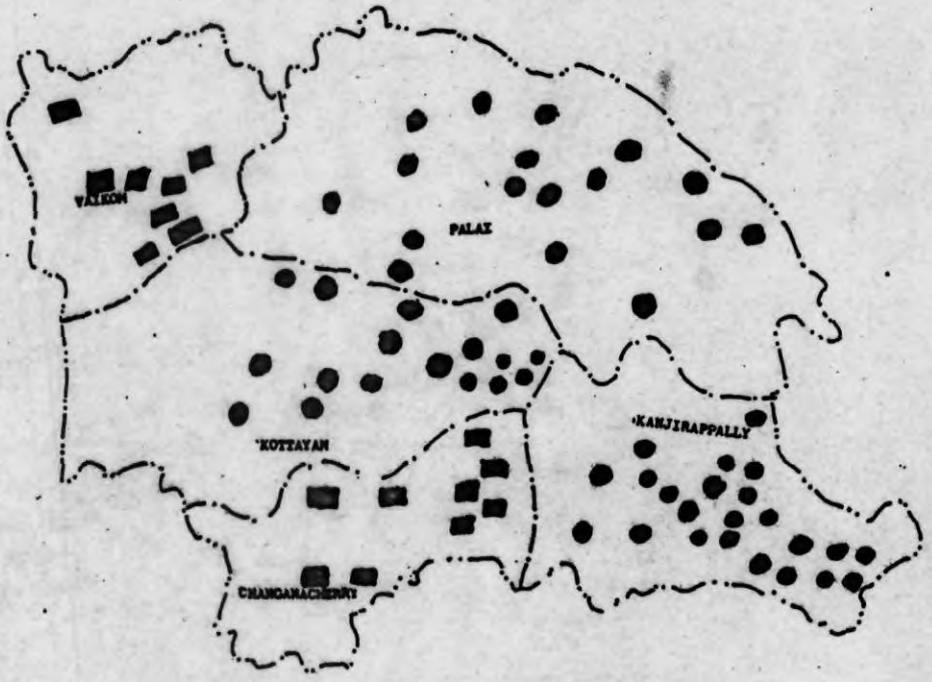
For Kottayam district index values were worked out for all the Taluks (Kottayam, Vaikom, Meenachil, Kanjirappally and Changanacherry) with a view to explore the possibility of taluk-wise fertiliser recommendation. In Kottayam, Meenachil and

TABLE 2

Fertility rating for classifying soil into low, medium and high

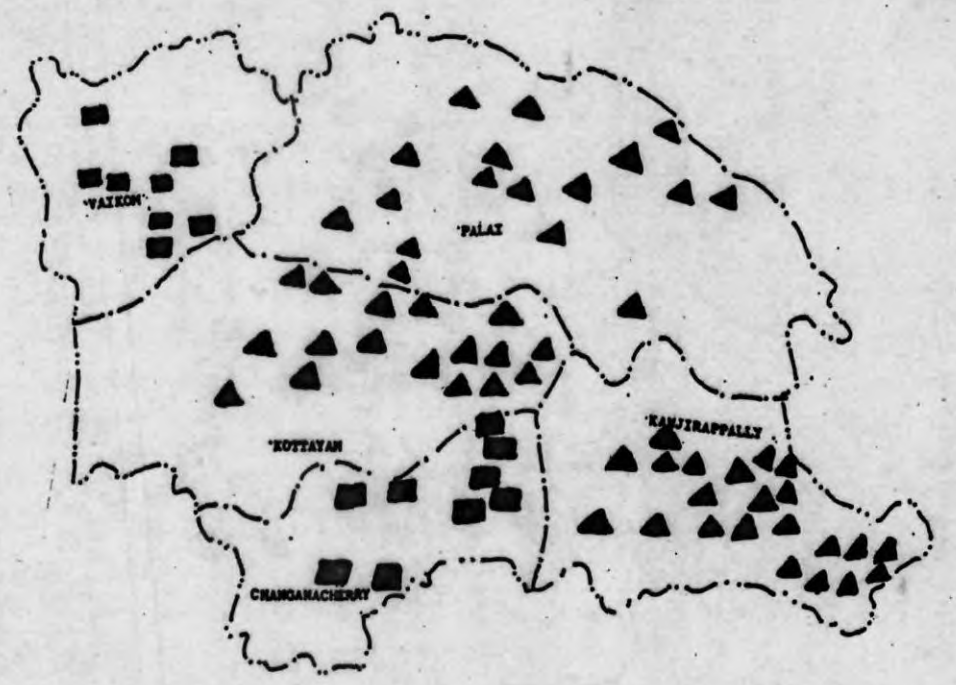
Element	Medium values
Organic Carbon (%)	0.75 - 1.5
Available P & Mg mgm/100 gm soil	1.00 - 2.5
Available K mg/100gm soil	5.00 - 12.5

(Hand book on Natural Rubber Cultivation 1980)



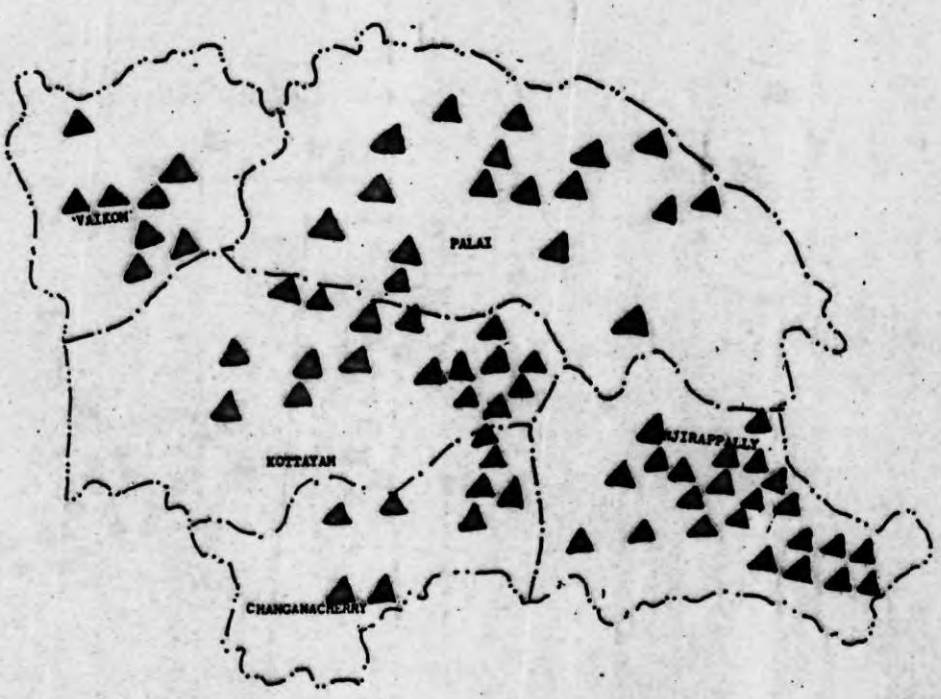
▲ Low
■ Medium
● High

Fig. 1 OrganicCarbon



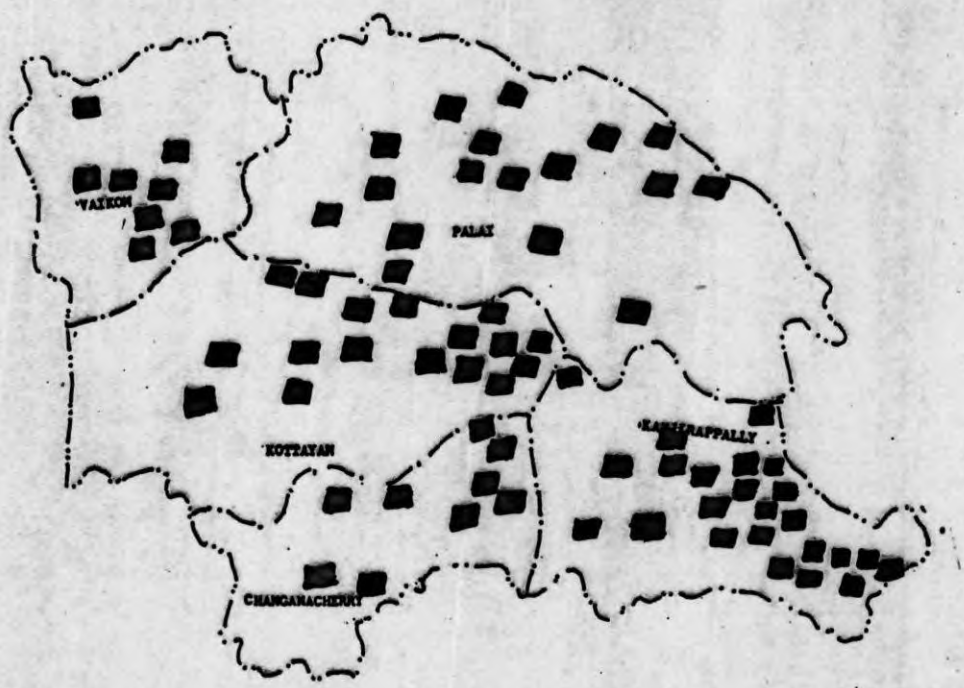
▲ Low
■ Medium
● High

Fig. 2 Available P



▲ Low
■ Medium
● High

Fig. 3 Available K



▲ Low
■ Medium
● High

Fig. 2 Available Mg.

TABLE 3

Nutrient Index of rubber growing districts of Kerala

District	No. of samples	%OC	Av.P.	Av.K	Av.Mg
Kasaragod	497	2.71 (H)	1.14 (L)	1.53 (L)	2.88 (H)
Kannoor	2973	2.61 (H)	1.17 (L)	1.29 (L)	2.76 (H)
Kozhikode	1404	2.60 (H)	1.15 (L)	1.43 (L)	2.51 (H)
Malappuram	994	2.30 (M)	1.10 (L)	1.27 (L)	2.73 (H)
Palakkad	1037	2.15 (M)	1.13 (L)	1.48 (L)	2.71 (H)
Trissur	1054	2.11 (M)	1.26 (L)	1.84 (M)	2.88 (H)
Eranakulam	1848	1.91 (M)	1.36 (L)	1.36 (L)	2.27 (M)
Idukki	550	2.36 (H)	1.18 (L)	1.29 (L)	1.76 (M)
Kottayam	3432	2.38 (H)	1.55 (L)	1.43 (L)	2.05 (M)
Kollam	4111	1.98 (M)	1.37 (L)	1.43 (L)	2.15 (M)
Thiruvananthapuram	1550	2.09 (M)	1.23 (L)	1.36 (L)	1.96 (M)

TABLE 4

Talukwise nutrient index values of Kottayam District

Taluk	% Organic Carbon	Av.P	Av.K	Av.Mg
Kottayam	2.38 (H)	1.55 (L)	1.43 (L)	2.05 (M)
Vaikom	2.03 (M)	1.69 (M)	1.34 (L)	2.31 (M)
Meenachil	2.40 (H)	1.47 (L)	1.50 (L)	2.08 (M)
Kanjirappally	2.47 (H)	1.46 (L)	1.43(L)	1.97 (M)
Changanacherry	2.27 (M)	1.89 (M)	1.34 (L)	1.97 (M)

Kanjirappally taluks organic carbon status is found to be high while it is medium in Vaikom and Changanacherry. Available P status is found to be low in Kottayam, Meenachil and Kanjirappally and medium in Vaikom and Changanacherry taluks. Available K status is medium in all the five taluks. For available Mg, medium levels are obtained in all the taluks.

SUMMARY

Available nitrogen and magnesium status of soils of rubber small holdings of Kerala is found to be maintained at medium levels. In available K status, only low levels are observed and hence application of phosphate and potassic fertilisers is required. The information on fertility status of rubber growing areas will be useful guide for reference.

REFERENCE

B. Ramamoorthy and J.C. Bajaj (1969)

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