

# ORGANIC CARBON, pH, AVAILABLE PHOSPHORUS, POTASSIUM AND MAGNESIUM STATUS OF RUBBER GROWING SOILS OF KANYAKUMARI DISTRICT

A. Ulaganathan, M. Karthikakuttyamma, A. N. Sasidharan Nair,  
S. Sheela, and Mini J. Palliparambil.

**K**anyakumari district in Tamil Nadu comprises of four taluks viz., Kalkulam, Vilavancode, Thovalai and Agatheeswaram. This district has Indian Ocean as southern boundary and Arabian Sea on the western side. Northern boundary is Thiruvananthapuram district of Kerala and eastern side is Tirunelveli district of Tamil Nadu. Recent soil survey conducted by NBSS & LUP has showed that the soil of this region is driven on khondalite landform. Soil of this region has been classified as Ultisols (NBSS & LUP). Main crops of this district are coconut, banana, tapioca, rubber, rice and arecanut. Large scale cultivation of rubber is being done by the state government and private companies. In the small holder sector, there are 12000 rubber holdings comprising of an area of 18000 hectares. Major clones cultivated are PB 28/

59, Tjir-1, RR11-105, and GT-1. Rubber is cultivated mainly in Vilavancode, Kalkulam and part of Thovalai taluks. In Agatheeswaram, soils are mostly sandy clay and not suited for cultivation of rubber. This article contains a brief description of the fertility status of rubber growing soils of Kanyakumari district.

## Climate

**Temperature :** Temperature recorded in experimental station at Parailar during 1994 is given in Table 1.

There is much variation between maximum and minimum temperature. The highest maximum temperature 36.5°C was recorded during March and the lowest minimum temperature (20.8°C) was recorded during December. Mean maximum and mean minimum temperature months are March, April and December respectively.

## Rainfall

Both south west and North East monsoon are obtained in this district. Rain obtained in Kanyakumari district is

Table I : Mean atmospheric temperature

Month	Maximum (0°C)	Minimum (0°C)	Mean (0°C)
January	32.6	22.1	27.4
February	34.8	22.3	28.6
March	36.5	22.0	29.3
April	34.8	23.8	29.3
May	32.4	24.5	28.5
June	31.0	24.8	27.9
July	30.3	24.2	27.3
August	31.0	24.0	27.5
September	31.0	23.4	27.2
October	31.4	23.1	27.3
November	30.9	22.0	26.7
December	30.6	20.8	25.7

Table II : Rainfall from 1978 to 1993 in Kanyakumari district

Year	Total rainfall in mm	Number of rainy days	Average rainfall in mm
1978	1864	71	155
1979	1880	94	157
1980	1582	97	132
1981	2459	122	205
1982	1922	94	160
1983	1546	79	129
1984	1792	113	149
1985	1920	100	160
1986	1500	88	125
1987	2388	126	199
1988	1722	106	144
1989	2075	109	173
1990	1996	104	166
1991	2110	106	176
1992	2668	113	122
1993	2187	112	182
Mean over 16 years	1976	102	165

shown in Table II. Maximum rainfall of 2668 mm was obtained in 1992 at a spell of 113 days. Minimum

of 1500 mm was obtained in 1986 at a spell of 88 days. Most of the rain obtained only during north east

monsoon. Average rainfall for the district is 1976 mm and number of rainy days is 102.

### **Discriminatory fertilizer recommendation for rubber**

Discriminatory fertilizer recommendation for rubber in the small holding sector become popular after the setting up the Regional soil testing laboratory in 1986 at Nagercoil by the Rubber Board. The estates in this district and limited number of small holding were given fertilizer recommendation from the Rubber Research Institute of India. The Regional Laboratory had a mobile soil testing facility also. Table III shows the number of samples

Table III : Mobile soil testing camp sites

Year	Taluk	Village	Camp site	Number of sample tested
1987	Kalkulam	Thiruvattar	Kulasekharam	99
	Vilavancode	Arumanai	Uthracode	13
1988	Vilavancode	Kaliyal	Kadayalamoodu	15
	Kalkulam	Thuckalay	Thuckalay	41
1989	Vilavancode	Arumanai	Manjalumoodu	28
	Kalkulam	Thiruvattar	Kulasekharam	7
1990	Vilavancode	Mancode	Puliyoursala	17
	Vilavancode	Arumanai	Manjalumoodu	71
	Vilavancode	Kaliyal	Kaliyal	61
	Kalkulam	Mecode	Kumarankudy	16
	Vilavancode	Palugal	Palugal	28
1991	Vilavancode	Kaliyal	Kaliyal	66
	Kalkulam	Mecode	Kumarankudy	15
	Vilavancode	Arumanai	Arumanai	14
	Kalkulam	Thiruvattar	Kulasekharam	18
	Kalkulam	Velimalai	Kumarapuram	15
	Vilavancode	Arumanai	Manjalumoodu	50
1992	Vilavancode	Kaliyal	Kaliyal	69
1993	Vilavancode	Kaliyal	Arukani	48
	Vilavancode	Kaliyal	Kaliyal	6
	Kalkulam	Mecode	Kumarankudy	6
Total				703



analysed in the mobile soil testing laboratory from 1987 to 1993 in the Vilavancode and Kalkulam taluks, together with details of village and camp sites etc. Data obtained from soils from the small holdings and estates were utilised for preparation of fertility map.

### Soils

Deep red loam soils occupy the district. When iron oxide as hematite, the colour of the soil is red. When it occurs in the hydrated form as limonite, the soil gets a yellow colour. Soil testing camps were conducted in places suggested by Rubber Producers' Societies (RPS). Requests for the services of the mobile soil testing laboratory were also sent by Rubber Producers' Societies. Soil samples were collected at two depths 0-30 cm to 30-60 cm. Samples were dried in shade, sieved

through 2 mm sieve and analysed for percentage of Organic Carbon, available Phosphorus, available Potassium, available Magnesium and soil pH. The samples were classified as low, medium and high as per the critical limit (Table IV). Recommendations were given from the Rubber Board Regional Laboratory.

703 soil samples were analysed during 1987 to 1993 from the small holdings and 1308 samples from estate sector. Fertilizer recommendation for estate are being given from R. R. I. I.

Nutrient indices were worked out as described by Karthikakutty amma *et al* (1991) District with a nutrient index value 1.67 is considered as low, between 1.67 and 2.33 as medium and above 2.33 as high. Nutrient index values for Kanyakumari district is given in Table V.

Fertility map of Kanyakumari district is shown in the figure 1.

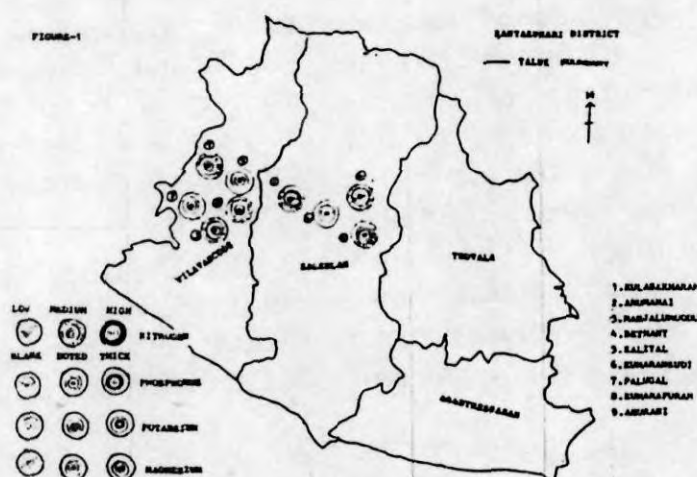




Table IV : Critical limit for soil nutrient

Levels	Organic Carbon (%)	Available Phosphorus (mg/100g)	Available Potassium (mg/100 g)	Available Magnesium (mg/100g)
Low	below 0.75	below 1.00	below 5.00	below 1.00
Medium	0.75-1.50	1.00 - 2.50	5.00 - 12.5	1.00 - 2.50
High	above 1.50	above 2.50	above 12.5	above 2.50

Fertility index shows that soils of both Kalkulam and Vilavancode taluks are

Aluminium content present in soil which fix Phosphorus as Iron and Aluminium

small holdings of Kalkulam and Vilavancode taluks of Kanyakumari district.

Table V : Nutrient index values of Kanyakumari district

Taluks	Organic Carbon	Available Phosphorus	Available Potassium	Available Magnesium
Kalkulam	1.807 (M)	1.280(L)	1.657 (L)	2.667 (H)
Vilavancode	1.847 (M)	1.411 (L)	1.596 (L)	2.604 (H)

M- Medium; L - Low; H-High.

maintaining medium status for percentage of organic Carbon and high status for available Magnesium. Only low index values are obtained for available Phosphorus and Potassium. The satisfactory level of percentage of organic Carbon shown by soil may be due to the cover crop establishment in the rubber holdings. The low Phosphorus status shown by soil test values are due to the high Iron and

Phosphates. The low Potassium status shown by these soils may be due to removal of trees at the end of each plantation cycle. Kaolinite type of clay in rubber growing soils of Kerala and Kanyakumari district of Tamil Nadu may also be another reason for the low potassium status.

The fertility index obtained indicates the necessity of manuring with N, P and K fertilizer in rubber

## References

1. Karthikakutty Amma *et al.* Rubber Board bulletin vol. 26 No.4. p. 28-32. Fertility status of the rubber growing soils of Kerala.
2. Ratnam. C. Soundararajan. R., Durairaj. J., (1972). Soils of Tamil Nadu p. 250.
3. Report on resource soil survey and mapping of rubber growing soils of Kerala and Tamilnadu, National bureau of soil survey and land use planning, Nagpur, 1999.