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AVAILABLE NUTRIENT STATUS OF RUBBER GROWING SOILS IN THE LOWER BRAHMAPUTRA VALLEY OF ASSAM

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The status of nutrients in rubber *(Hevea brasiliensis)* growing soils of lower Brahmaputra valley of Assam was studied for understanding the soil fertility. The soils were acidic to strongly acidic in nature and majority of them were medium in organic carbon, low in available phosphorus and medium in potassium. Wide variation in fertility ratings indicates that these soils require specific management measures to maintain fertility depending on the age of the rubber plantation.

Key words: Assam, *Hevea brasiliensis*, North East India, Nutrient status.

The rubber (*Hevea brasiliensis*) cultivation in Assam is mainly confined to lower Brahmaputra valley with total area of about 20,222 sq. km. comprising 25.75 per cent of the state. Entisols (new alluvium), alfisols (mountainious valley) and ultisol (laterised red soils) are the major soils present in the valley. The present note reports on the nutrient status of rubber growing soils of the lower Brahmaputra valley of Assam.

One thousand five hundred and ninety eight soil samples collected during 1997 to 2000 for advisory purpose have been utilised for evaluation of fertility status. The samples were air dried, pulverised and passed through 2 mm sieve before analysis. Standard methods were followed for determining soil pH (1:2 soil : water suspension), organic carbon (OC), available phosphorus (P) and potassium (K). The soils were categorised into low, medium and high status considering the critical limits as suggested by Pushpadas and Ahammed (1980).

Nutrient index values for OC, P and K were calculated by multiplying the percentage of soil samples (out of total number of soil samples analyzed for a given area) falling into low category with respect to any nutrient by a factor 1, those falling into medium category by 2 and those from high category by 3. The sum of this is divided by 100 and the value obtained is the nutrient index for that area with respect to that particular nutrient (Parker *et al.*, 1951). For interpretation of nutrient indices, the limits suggested by Ramamoorthy and Bajaj (1969) were adopted. An area with a nutrient value of 1.67 or less is considered as low, between 1.67 and 2.33 as medium and above 2.33 as high.

In general, the soils were very acidic to strongly acidic and the pH values varied from 3.95 to 5.99 (Table 1). This indicates that these soils have developed from non-calcareous parent materials under conditions of high rainfall. Majority of the soils were

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Table 1. **Soil pH, organic carbon, available phosphorus and potassium content of the rubber growing soils of lower Brahmaputra valley in Assam**

Location	No. of samples	pH (1:2.5)	OC (%)	P (mg/100g)	K (mg/100g)
Gandhinagar	70	4.71 (4.40-5.22)	1.08 (0.41-3.04)	0.14 (0.01-0.60)	9.77 (5.00-14.50)
Sonapur	110	4.91 (4.37-5.70)	0.86 (0.30-1.94)	0.15 (0.01-1.71)	10.00 (2.20-19.80)
Nortap	66	4.88 (4.36-5.27)	1.36 (0.65-2.75)	0.09 (0.01-0.39)	9.62 (4.00-19.70)
Gariaghuli	70	4.86 (4.15-5.65)	0.84 (0.26-1.29)	0.15 (0.01-0.50)	7.85 (3.50-14.90)
Agia	76	4.81 (3.95-5.32)	0.95 (0.22-1.79)	0.30 (0.01-2.30)	10.80 (5.10-26.50)
Dwaraka	106	4.85 (4.25-5.90)	0.97 (0.23-2.37)	0.17 (0.01-1.66)	7.30 (1.80-18.10)
Bordamal	80	4.77 (4.06-5.43)	0.87 (0.30-1.67)	0.17 (0.01-0.46)	9.74 (3.30-19.60)
Lemakona	88	5.03 (4.43-5.99)	1.03 (0.24-3.13)	0.25 (0.01-2.42)	10.91 (4.70-26.00)
Panisali	90	4.67 (4.33-5.05)	0.76 (0.31-1.18)	0.16 (0.01-0.61)	6.72 (2.50-10.80)
Thorko	112	4.95 (4.10-5.93)	1.02 (0.37-2.25)	0.29 (0.01-2.16)	9.54 (2.60-32.50)
Noksigree	98	4.65 (4.30-5.13)	0.92 (0.41-2.30)	0.06 (0.01-0.30)	8.80 (4.20-31.50)
Hatigaon	100	5.13 (4.33-5.96)	1.50 (0.63-3.21)	0.25 (0.02-2.07)	13.78 (4.00-35.00)
Suarmari	76	4.69 (4.31-5.89)	1.10 (0.55-2.48)	0.18 (0.04-1.62)	9.95 (4.20-20.50)
Meselkhowa	70	4.92 (4.37-5.88)	1.38 (0.84-2.28)	0.26 (0.03-1.81)	11.75 (4.20-24.60)
Bordak	72	4.69 (4.21-5.58)	1.10 (0.53-2.12)	0.20 (0.02-1.05)	10.26 (5.50-25.60)
Dudhnoi	66	4.75 (4.38-5.13)	0.92 (0.31-1.90)	0.27 (0.01-0.94)	7.46 (3.00-17.40)
Darangiri	68	4.76 (4.15-5.25)	1.00 (0.49-2.40)	0.38 (0.01-2.40)	8.73 (3.90-25.50)
Nayekgaon	58	4.86 (4.18-5.81)	1.14 (0.72-1.52)	0.14 (0.03-0.90)	3.24 (2.10-6.50)
North Salmara	68	5.01 (4.57-5.83)	0.73 (0.15-1.40)	0.26 (0.01-1.43)	3.23 (1.60-15.90)
Deohati	54	5.01 (4.15-5.82)	0.61 (0.11-1.40)	0.36 (0.01-1.54)	4.07 (1.60-10.80)
Mean		4.85 (3.95-5.99)	1.01 (0.11-3.21)	0.21 (0.01-2.42)	8.68 (1.60-35.00)

Figures in parentheses indicate ranges

medium in organic carbon content, varying from 0.11 to 3.21 per cent with mean value of 1.01 per cent. About 13, 22, 16, 33 and 24 per cent of the soils from Gandhinagar, Nortap, Thorko, Hafigaon and Meselkhowa respectively were higher in organic carbon. Maintenance of leguminous cover during immature phase and good management practices may be the reasons for build up of organic matter in these areas. Moreover, the slow pace of oxidation inside the closed canopy of rubber plantation helps to maintain the high organic matter status (Krishnakumar and Potty, 1990). The age of the rubber plantation also caused variation in soil organic matter due to the variation in amounts of leaf litter added.

Most of the soils were low in available phosphorus which could be due to their high P fixing capacity under strongly acid soil environment resulting in the prevention of P availability in the soil solution (Satisha *et al.*, 2000). The available potassium content of the soils varied from1.6 to 35.0 mg/100g with mean value of 8.68 mg/100g. Majority of the soils were medium in available K except soils from Nayekgaon, North Salmara and Deohati, where 90 per cent were low (Table 2).

Nutrient index values for organic carbon varied from 1.13 to 2.31 (Table 2). In majority of the areas the organic carbon content was in the medium range. For available phosphorus, the nutrient index values ranged from 1.00 to 1.13. Available potassium content of soils has shown wide variation in nutrient index values as well as fertility ratings. Nutrient index values for available potassium content ranged from 1.06 to 2.48. Fertility ratings for available potassium content of the soils ranged from low to high. From a similar study, Choudhury *et al.* (2001) reported that the rubber growing soils of Tripura are low to medium in organic carbon, low in available phosphorus

Table 2. **Per cent distribution of soil samples under different nutrient classes and nutrient indices**

Location	Fertility class*									Nutrient index		
	OC			P			K					
	L	M	H	L	M	H	L	M	H	OC	P	K
Gandhinagar	25	63	13	100	0	0	38	48	15	1.88	1.00	2.15
Sonapur	27	73	0	100	0	0	6	85	10	1.73	1.00	2.05
Nortap	3	75	22	100	0	0	8	78	14	2.19	1.00	1.78
Gariaghuli	38	62	0	100	0	0	18	82	0	1.62	1.00	1.82
Agia	27	64	9	100	0	0	0	71	29	1.82	1.00	2.29
Dwaraka	25	67	9	99	1	0	34	84	12	1.84	1.01	1.82
Bordamal	31	66	3	100	0	0	10	73	18	1.71	1.00	2.08
Lemakona	32	68	0	100	0	0	0	96	5	1.68	1.00	2.05
Panisali	50	50	0	100	0	0	12	96	2	1.50	1.00	1.90
Thorko	24	60	16	100	0	0	14	71	14	1.92	1.00	2.00
Noksigree	36	61	3	100	0	0	4	87	9	1.67	1.00	2.05
Hatigaon	2	65	33	99	1	0	4	56	40	2.31	1.01	2.48
Suarmari	17	73	11	99	2	0	2	77	21	1.94	1.02	2.20
Meselkhowa	0	76	24	99	1	0	1	67	31	2.24	1.01	2.30
Bordak	7	94	0	100	0	0	0	92	8	1.94	1.00	2.08
Dudhnoi	27	70	4	100	0	0	7	88	5	1.77	1.00	1.98
Darangiri	29	63	8	92	3	5.3	16	63	21	1.79	1.13	2.06
Nayekgaon	4	86	11	100	0	0	93	7	0	2.07	1.00	1.07
North Salmara	50	50	0	92	8	0	94	6	0	1.50	1.08	1.06
Deohati	88	13	0	100	0	0	92	8	0	1.13	1.00	1.08

* Fertility class : L = Low; M = Medium; H = High

and low to medium in available potassium. Since there is wide variation in the organic carbon, available P and K status in different rubber growing regions of the lower Brahmaputra valley of Assam, soil should be tested at least once in two to three years for better productivity and profitability.

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