

DIAGNOSIS AND CHARACTERISTICS OF THE TYPICAL OILSEEDS GROWING SOILS OF THE NORTH EASTERN ZONE OF TAMIL NADU

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The soils of the Regional Research Station, Vridhachalam, a substation of Tamil Nadu Agricultural University which is a typical representation of the north eastern zone oilseed growing area were investigated for their diagnostic and physico-chemical characteristics. The studies were carried out by analysing profile and surface soil samples from individual fields. The soils have been found to come under the order 'Alfisols' in the soil taxonomy group. The absence of salinity and sodicity problems and also the lateritic nature was brought out. The soils were found to be poor in N & P and medium to high in available K, while the status of Fe and Mn can be considered as satisfactory, the availability of Zn and Cu appear to be critical.

With the expanded activities of the Tamil Nadu Agricultural University, a number of regional research stations were established and the Regional Research Station at Vridhachalam represents the north eastern region of Tamil Nadu concentrating research work on the development of oilseeds. The farm extends over an area of 57 hectares. With a view to evaluate the suitability and production potential of oilseed crops in this region, a detailed investigation of the soil samples and exami-

nation of the profiles were taken up during 1980-83, the results of which are presented and discussed in this paper.

MATERIALS AND METHODS

The surface soil samples were collected from all the 91 fields and analysed for their important physico-chemical characteristics (Jackson, 1967). Fifteen profiles were also examined as per the procedures suggested by the Soil Survey Manual (1970).

RESULTS AND DISCUSSION

Characteristics of the Profiles

A typical profile description is given below:

<i>Horizon</i>	<i>Depth</i>	<i>Description</i>
A	0-15 cm	Reddish brown (2.5 Yr 5/4) sandy loam, moderate to medium granular, dry friable, slightly sticky and plastic, moderately permeable, few roots, no concretions, wavy boundary, pH 5.8
B-1	15-60 cm	Reddish (2.5 YR 5/6) sandy loam, hard when dry and sticky when moist sub-angular, slowly permeable, few roots, medium pores, iron mottlings were seen, clear boundary pH 5.0

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B-2	60-120 cm	Reddish (2.5 YR 4/6), sandy loam, moderately permeable, no roots, hard when dry, sticky when moist, pH 5.0
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The analytical data in respect of pH, EC and fertility parameters of some of the representative profiles are furnished in Table 1.

The analytical results showed that the soils are sufficiently deep with solum extending to more than 120 cm. The pH of the soils both at the surface and in deeper layers remains within the range of 6 to 7 indicating that they are ideally suited for most agricultural crops. The available N status in no case exceeded 280 kg/ha indicating the poor status of nitrogen of the whole farm. This is to be expected since the soils are situated in a highly tropicalised climate and any organic matter gets burnt readily and quickly and the build up of N is a difficult task in the whole area. The status of available P ranged from 10 to 16 kg/ha and still lower for the deeper horizons. Being lateritic soils, there appears to be a severe problem of phosphorus fixation. The decrease in available P with depth may be ascribed to greater fixation of phosphorus by Fe and Al in the lower horizons. Thus, all the farm fields fell under the category of low P and P fertilization warrants much greater consideration. The status of available K may be graded as medium to high and the distribution of available K was almost the same throughout the profile.

The data on availability of micronutrients revealed the deficiency of Zn and Cu uniformly in all the surface soils of the profiles investigated. Being

lateritic in nature, the soils were found to contain relatively high degree of availability of Fe and Mn. Thus in the fertilizer programming of micronutrients, Zn and Cu fertilization assumes greater significance.

With the background of the soil test data of these profiles, the soils can be grouped as alfisols.

Characteristics of the surface soils and recommendations

The fertility parameters of the surface soil samples are presented in Table 2.

The soil reaction was neutral to acidic with a pH range of 5.0 to 7.2. The electrical conductivity was less than 1 millimhos/cm in all the cases. This suggests that there is complete absence of salinity and sodicity hazards. Since the soils are situated in a fairly high rain fall area, there is considerable loss of bases and the soils are tending towards lateritic. Since the soil pH is neutral to acidic, lime may be applied at appropriate dosage depending on soil pH to bring the same around neutrality. The available nitrogen status of the soils is low due to very poor organic matter status. The soil has low to medium available phosphorus and medium to high available potassium owing to continuous fertilization of these cultivated fields, the available K status seems to have been built up, seen from the medium to high soil test values for K. The availability

Table 1. Fertility status of some representative profile samples

Profile	Depth (in cm)	pH	Available macronutrients				Available micronutrients			
			EC	(kg/ha)			(ppm)			
				N	P	K	Fe	Mn	Zn	Cu
A Block	0-15	6.8	0.20	260	10	190	21.67	38.0	2.00	0.67
	15-30	6.6	0.20	257	10	185	13.67	20.0	0.85	0.83
	30-60	6.5	0.20	247	9	190	21.00	47.0	2.35	0.67
	60-90	6.9	0.10	245	8	188	16.67	40.0	1.75	0.67
	90-120	7.1	0.10	223	8	175	23.33	31.0	3.40	1.00
B Block	0-30	6.5	0.10	218	10	125	10.00	12.0	1.00	0.17
	30-60	6.8	0.10	195	10	120	16.00	24.0	1.25	0.50
	60-90	6.4	0.10	200	9	118	3.00	2.0	0.10	—
	90-120	6.2	0.10	185	8	120	1.00	1.0	0.10	—
G Block	0-30	6.6	0.10	158	12	125	21.00	30.0	1.35	0.67
	30-60	6.5	0.10	156	10	135	23.33	36.0	1.50	0.67
	60-90	6.4	0.10	142	10	130	21.33	30.0	1.50	0.67
	90-120	6.2	0.10	137	9	125	23.33	31.0	1.00	0.50
Old Block	0-30	6.0	0.10	247	16	178	32.67	58.0	1.70	0.83
	30-60	5.9	0.10	238	15	168	3.33	1.0	2.50	—
	60-120	5.9	0.10	240	15	172	10.00	18.0	0.90	0.33

of P may be ascribed to fixation by sesquioxides of the lateritic soils.

The availability of Zn and Cu was found to be less than 1 ppm in almost all soils and profitable responses could be obtained though rationalised application of Zn and Cu. Regular application of FYM @ 12 tonnes/ha must be resorted to all the fields before raising every kharif and summer groundnut crops. Pressmud should be applied to all the fields in the kharif season @ 5 tonnes/ha after properly curing with superphosphate. At least one green manure crop like Kolinji which is suited for soil with surface encrustation or daincha may be raised and ploughed insitu before sowing. Green

leaf plant like *Glyricidia maculta* should be planted all along the sides and outer boundary of the field and the green matter obtained from them may be periodically used for field application. The soils are marked by crust formation in surface affecting germination and crop growth and needed to be deeply ploughed by tractor drawn disc plough besides incorporation of the above mentioned FYM, pressmud and green manure etc.

Until these soils are properly reclaimed, deep rooted pulses like redgram, cowpea etc may be grown instead of groundnut or gingelly for experimental purposes. Tapioca can also be grown under irrigated conditions. Specific bacterial culture for different

Table 2. Fertility status of surface soil samples

Field No.	pH	EC	Available macronutrients (kg/ha)			Available micronutrients (ppm)			
			N	P	K	Fe	Mn	Zn	Cu
New Area									
A Block	6.4	0.10	245	10	225	15.5	28.5	1.2	0.55
B "	6.5	0.10	255	12	285	21.3	82.0	1.0	0.72
C "	5.7	0.20	245	10	265	24.5	43.5	1.0	0.65
D "	5.8	0.10	195	13	290	37.5	72.0	1.4	0.83
E "	7.2	0.10	225	18	295	20.0	42.5	0.9	0.83
F "	7.0	0.20	175	9	145	18.0	38.5	1.8	0.83
G "	6.8	0.15	185	10	160	27.5	40.0	1.1	0.78
H "	6.5	0.10	210	12	175	21.5	26.0	1.5	0.83
I "	6.5	0.20	195	13	165	18.0	28.0	0.9	0.72
Old Block									
1	5.5	0.10	265	10	195	12.5	47.0	0.9	0.80
2	5.7	0.10	255	7	200	14.0	8.0	0.8	0.65
3	5.8	0.10	245	10	250	40.5	49.0	0.8	0.70
4	5.0	0.10	250	8	285	8.7	10.0	0.9	0.80
5-A	5.5	0.10	265	11	225	18.6	36.0	0.6	1.50
5-B	5.3	0.10	250	9	255	20.5	52.0	0.8	0.80

pulses and groundnut may be used for seed treatment before sowing.

The following is the recommended crop rotation for this zone.

<i>Kharif</i> (July-October)	<i>Rabi</i> (November-December)	<i>Summer</i> (January-May)
1. Groundnut (or)	1. Kolinji (or)	1. Groundnut (or)
2. Gingelly	2. Cowpea (or)	2. Gingelly
	3. Black gram (or)	
	4. Green gram	

These are well suited to the entire South Arcot District of Tamil Nadu especially to Panruti, Gingee, Tindivanam and Vridhachalam areas.

REFERENCES

- ANONYMOUS, 1970. Soil Survey Manual. All India Soil and Land Use Survey Organisation, New Delhi
- JACKSON, M. L. 1967. *Soil Chemical Analysis* Prentice Hall of India (Pvt) Ltd., New Delhi.