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SOILS OF THE OIL SEED EXPERIMENTAL STATION, TINDIVANAM.

An investigation to study the morphological characteristics of soils by examining the profiles and physical and chemical properties of soil by analysing the profile samples was undertaken in the Oilseed Experimental Station, Tindivanam. The soils were classified taxonomically. This study will be useful to lay out the various research experiments based on the soil characteristics.

The Oilseed Experimental Station, Tindivanam has a total farm area of 60.65 ha with an average annual rainfall of 1186.5 mm and a mean annual temperature of 29.5°C. The difference between the mean summer (32.3°C) and mean winter temperatures (27.8°C) is ess than 5°C and therefore the soil temperature of the farm is grouped under the sohyperthermic class. The soil being dry for more than 90 cumulative days in a year is grouped under ustic moisture regime.

MATERIALS AND METHODS

The morphological characteristics of the soils were studied as per the Guidelines prescribed in FAO (1966) for profile description. Soil samples were collected horizonwise and analysed for their mechanical composition, soil reaction, electrical conductivity, total calcium and potassium and cation exchange capacity as per the standard procedures outlined in soils analysis (Piper 1966). The soils were also classified taxonomically (USDA, 1975). The analytical data of the soil samples are furnished in Table 1 and the morphological, physical and chemical characteristics of the soils were discussed.

RESULTS AND DISCUSSION

The following three soil series were identified in the Oil Seed Experimental Station Tindivanam.

	Soil Name	Area	Percent
1.	Tindivanam series—1 (Coarse loamy, mixed, isohyperthermic, Paralithic Ustropepts)	36.65	60.43
2.	Tindivanam series—2 (fine loamy, mixed, isohyperthermic, Typic Ustropepts)	17.50	28.85

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3.	Tindivanam series—3 (fineloamy, mixed, isohyperthermic, Typic Ustropepts)	65.00	10.72

The morphological characteristics of the soils are described below:—

1. Tindivanam series—1

Coarse loamy, mixed, isohyperthermic, Paralithic Ustropepts).

Location : Field No. M9
Physiographic position : Plain with 1—2% slope
Draineage : Moderatley well drained.

Ap 0—13 cm Brown to dark brown (10 YR 4/3) moist; sandy loam; weak, medium, subangular blocky; loose dry, friable moist; sandy; common, fine and medium pores; rapid permiability; clear, smooth boundary; pH 6.7.

B_1 13—33 cm Dark yellowish brown (10 YR 4/4) moist; sandy clay subangular blocky; slightly hard dry; firm moist, slightly sticky and slightly plastic; few fine roots; common fine pores; moderately rapid permeability; clear; smooth boundary; pH 7.0.

BC 33—45 cm. Weathered gneiss mixed with soil.

2. Tindivanam series—2

(fine loamy, mixed, isohyperthermic, Typic Ustropepts)

Location : Field No. F3A
Physiographic position : Plain with less than 1% slope.
Drainage : Moderately well drained

Ap 0—19 cm Dark grayish brown (10 YR 4/2) moist; sandy clay loam; moderate, medium, subangular blocky; loose dry, friable, slightly sticky and slightly plastic; few fine irregular, conir; common, fine and medium roots; common, fine and medium pores; moderately slow permeability; clear, wavy boundary; pH 7.5.

B_{21} 19—52 cm Dark yellowish brown (10 YR 4/4) moist; sandy clay loam; strong, coarse subangular blocky; slightly hard dry, slightly firm moist, slightly sticky and slightly plastic; few, fine roots; common, fine and medium pores; moderately slow permeability; clear, smooth boundary; pH 7.9.

B_{22} 52—74 cm. Dark brown (10 YR 3/3) moist; sandy clay; strong, coarse, subangular blocky; very firm moist. sticky and plastic; common fine and medium pores; moderately slow permeability; abrupt, wavy, boundry; pH ,7 9.

C 74—80 cm Weathered gneiss.

3. Tindivanam series—3

(Fine loamy, mixed, isohyperthermic, Typic Ustropepts).

Location ; L 13

Physiographic position . Plain with 1—2% slope

Drainage : Well drained

Ap 0-16 cm Dark brown (7.5 YR 3/2) moist; sandy loam; moderate, medium. subangular blocky; loose dry, friable moist, slightiy sticky and slightly plastic; violent effervescence; common; fine and few, medium roots; common, fine and medium pores; moderately rapid permeability; clear, smooth boundary; pH 8.1.

B_{11} 16 — 55 cm Brown to dark brown (7.5 YR 4/4) moist; sandy loam. moderate, medium, subangular blocky; slightly hard dry, slightly firm moist, sticky and plastic; violent effervescence; few fine roots; common, fine and medium pores; moderately slow permeability; gradual, smooth boundary, pH 8 3.

B_{12} 55—93 cm Brown to dark brown (7.5 YR 4/4) moist, sandy clay; moderate, medium, subangular blocky: slightly hard dry, firm, moist, sticky and slightly plastic; violent effervescence; very few, fine roots; common, fine and medium pores; moderatley slow permeability; gradual, smooth boundary; pH 8.0.

B_{22} 93—120 cm Brown to dark; brown (7.5 YR 4/4) moist; sandy clay loam: strong coarse, subangular blocky hard dry, firm moist, sticky and plastic; violent effervescence; common, fine and medium pores; modreately slow permeability; abrupt wavy boundary; pH 8 1

Cca 120 + Gneiss mixed with Ca CO_3.

The soils belonging to Tindivanam series 1 are mederately deep, noncalcareous, well drained with coarse loamy texture and low organic carbon content. They are neutral in reaction thereby indicating the availability of applied nutrients to crops without much fixation in the soil. The low water holding capacity in the surface and medium capacity in sub surface soil is due to the sandy loam texture of the surface and the sandy clay loam texture of the sub surfaces oil. The soils are low in total calcium and medium in potassium status. The cation exchange capacity is in the range of low to medium. The soils need the addition of calcium for growing oilseed crops as reported by Ramanathan and Ramanathan (1982). The soils respond to the addition of nitrogenous fertilizers as the soils are low in organic carbon content. Owing to the light texture of the surface soil, split application of fertilizers and light irrigation are recommended.

The soils of Tindivanam series 2 are deep, calcareous, well drained with fine loamy texture. They are mildly alkaline in reaction with soluble salt content being normal. The soils respond to the application of nitrogenous fertilizers as the organic carbon content is low. The water holding capaicity of the surface and the medium capacity of the sub-

Table. 1 Analytical Data

Soil Name	Depth (cm)	pH	EC. (m. mhos/ cm.)	Organic Carbon (%)	Free $CaCo_3$ (%)	Clay (%)	Silt (%)	Sand (%)	Texture	WHC (%)	Total CaC (%)	Total K_2O (%)	CEC (me/10.0 g soil)
Tindivanam Series-1	0-13	6.7	0.13	0.46	0.20	13.13	1.20	85.88	Sl	17 76	0.34	0.03	10.54
	13-33	7.0	0.16	0 19	0 32	22 51	20.54	57 68	Scl	26 07	0.37	0.03	18.82
Tindivanam Series-2	0-19	7.5	0.37	0 34	1.44	32.75	5.15	64.06	Scl	17 32	0.63	0.02	39.17
	19-52	7.9	0.19	0.15	0.96	32.75	1.90	64.17	Scl	17.08	0.80	0 03	28.14
	52-74	7.9	0 26	0.09	1.14	38 28	5.19	56.47	Sc	20.93	0.11	0.03	45.69
Tirdivanam Series-3	0-16	8.1	0.25	0.31	1.84	10 20	10.20	79.25	Sl	31.00	1.07	0 09	21.18
	16-55	8 3	0.36	0.22	5 61	30 60	5.25	62.14	Scl	39.00	4.40	0.06	43.25
	55-93	80	1.00	0.18	5.90	41.20	2.40	61.39	Sc	36.70	4.76	0.07	36 72
	93-120	8.1	1.40	0 18	7.03	18 90	2 20	80.75	Scl	40.30	5.22	1.10	46.28

surface soil is attributed to the increased clay content. The soils contain fairly a good amount of calcium and potassium and they posess medium cation exchange capacity. The calcareous nature and the mild alkaline condition of the soils lead to the non-availability of P as the available P is converted into insouble forms. Therefore it is felt necessary to apply P in the water soluble form.

The soils of the Tindivanam series 3 are very deep, calcareous, well drained with fine loamy texture They are moderately alkaline in reaction with normal soluble salt content. The calcareous nature of the soils may favour the fixation of P besides hindering the availability of micro-nutrients like Zn, Fe and Cu. Therefore it is felt necessary to apply P in the water soluble form. The dustinq of S and the application of Fe pyrites may be resorted to solublise the insoluble calcium carbonate and thereby increase the availability of Ca to the crops. In addition, the soils are also well supplied with calcium. Further. the application of potassium will not depress the Ca uptake and that is attributed to the original Ca content of the Soils as reported by Loganathan and Krishnamoorthy (1978). The soils possess medium cation exchange capacity.

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REFERENCES

FAO, 1966. Guidelines for soil profile description FAO, Rome.

LOGANATHAN, S and K.K KRISHNAMOORTHY 1978. Uptake of calcium by groundnut plant during progressive stages of growth as affected by application of various forms and doses of calcium. Madras Agric. J. 95 (1) : 87 - 90.

PIPER C. S. 1966 Soil and plant analysis, Hans publishers, Bombay.

RAMANATHAN.S and G. RAMANATHNA 1982 Effect of calcium and sulphur application on the yield of dry matter, pod and kernal of POL. 2 groundnut in two soils. Collected from the major groundnut growing tracts of Tamil Nadu. Madras Agric. J. 69 (10) 660-666.

USDA, 1975. Soil Taxonomy, Hand Book No. 436. Washington, D.C.