https://doi.org/10.29321/MAJ.10.A02986

Madras agric. J. 66 (8): 526–531, Aug., 1979

Classification of Soils of Madurai Agricultural College Farm

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The morpology of the soils of the Agricultural College, Madurai was studied. Occurrence of two soils series viz. Vylogam and Madukkur were identified and described. Textural variation erosion hazard, depth and slope of land were found to influence the characterisation of the two series. A soil map is suggested for efficient management of these soils.

An attempt is made to study the morphology of the soils of Agricultural College, Madurai and classify them into recognised series and finally to draw a soil map. The data will be useful in gathering information about the depth of cultivable soils, topography of the land and to draw a suitable cropping programme for efficient management of the soils. Mayalagu (1973) working on these soils indicated that the topography of the area has influenced the clay content of various horizons and in turn the physical properties. Mahalingam (1976) suggested that these soils are immature and accumulated as colluvial deposit of 'Yanamalai' rock. The above concepts are critically reviewed and the soils are classified.

PHYSIOGRAPHY

Total area of the College farm is 184 acres and the land is gently sloping from north to south. The elevation of the northern portions is between 450 and 500 feet above MSL and Southern portion is between 400 and 500 feet above MSL.

CLIMATE

The annual rainfall ranges from 800–850 mm. and nearly three fourth of it is received during north-east monsoon season. The climate is mainly dry and the evaporation is more than the precipitation. The maximum temperature ranges from 28°C to 43°C and the minimum temperature ranges from 19°C to 33°C.

GEOLOGY

The parent material is mostly weathered gneissic rock. Much of laterization has proceeded in the past as seen from the last quantities of ferrugenous gravels. However, the lateritic parent material has been transformed to other soil types later on due to drastic climatic changes.

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MATERIAL AND METHODS

Eighteen profile pits were examined as per standard soil survey pattern at required places in the campus and two series were identified. Profile samples were analysed for physical properties viz. apparent and absolute specific gravity; maximum water holding capacity and pore space. The profile descriptions of the series are as follows:-

I. VYLOGAM SERIES (Vyg):

Yellowish red to dark red, brown to greyish brown, moderately deep to deep, fine loamy to non-calcareous sandy loam; moderately well drained soil with quartz mixed with iron. Soils occur at the near base of Yanaimalai rock.

Typifying pedon — Vyalogam sandy loam - cultivated.

Horizon	Depth in Cm	Macromorphology
Ap	0–16	Very dark greyish brown (10 YR 3/2) moist; Sandy clay loam; weak, fine subangular blocky; firm moist; slightly sticky and slightly plastic common fine pores; few fine and common very fine roots; very few fine ferro-magnesium concretions; rapid permeability; clear smooth boundary pH 8.0.
B2-1	16-33	Dark brown (7.5 YR 4/4) moist; common, fine distinct iron, manganese, mottlings (10 YR 2/1): clay loam; massive, breaking to weak fine sub-angular blocky; very firm moist slightly sticky and slightly plastic: fine iron and manganese concretion; very fine and very fine pores; very thin patchy pressure faces on ped surfaces; moderately rapid permeability; clear smoothy boundary; pH 8.2.
B2-2	33-60	Dark brown (7.5 YR 4/4) moist; common fine prominent iron and manganese mottlings; dark red yellowish brown (2 5 YR 3/6 - 10 YR 5/4); gravelly clay loam; weak fine sub-angular blocky sticky and plastic; common fine, prominent iron and manganese concretions; few fine pores and roots; moderate permeability; abrupt smooth boundary; pH 8.4.
B-3	60-99	Red (2.5 YR 3/4) moist; common fine, prominent iron and manganese mottlings, dark red, yellowish brown (2.5 YR 3/6, 10 YR 5/4-2.5 YR 2/0); gravelly clay-loam; weak fine

subangular blocky; very firm, moist, slightly sticky; slightly plastic; common fine, prominent iron and manganese concretions; few fine pores; few fine roots; slow permeability; abrupt smooth boundary; pH 9.0.

C1 99-114 + Dark yellowish brown (10 YR 4/4) moist; gravelly clay loam; common fine, prominent iron-manganese mottlings, yellowish brown (10 YR 5/4); massive; slightly sticky and slightly plastic; common fine prominent iron-manganese concretions; few very fine pores; few fine roots; slow permeability; pH 9.3.

MADUKKUR SERIES (Mdk)

Dark yellowish brown to yellowish brown, deep to very deep, fine loamy to fine non-calcareous, moderately well drained soil. Occurs on very gently slopy lands with iron-manganese concretions.

Typifying pedon : Madukkur sandy loam cultivated.

Horizon Depth in Cm Macro-morphology

Ap 0-17 Dark brown (10 YB 3/3); moist; sandy loam weak, fine subangular blocky breaking to crumb; slightly hard, firm moist, non-sticky and non-plastic; fine, many round to irregular iron-manganese concretions; common fine and very fine pores; common fine few coarse and common very fine roots; rapid permeability; clear smooth boundary; pH 8.1.

B1 17-29 Dark yellowish brown (10 YR 4/4) moist; coarse sandy loam; weak fine crumb; few fine mottlings; friable, moist non-sticky non-plastic few fine, round to irregular iron-manganese concretions; common fine pores; common fine and few very fine roots; rapid permeability; clear smooth boundary; pH 8.3.

B2-1 29-52 Dark yellowish brown (10 YR 4/4) moist; sandy clay loam; weak fine, subangular blocky breaking to crumb; common fine, distinct reddish brown and black (5 YR 4/4 - 5 YR 2/1) mottlings; firm, moist, slightly sticky and slightly plastic; round to irregular few iron-manganese

TABLE Physical characteristics of soil series

Profile	Soil depth Cm	Soil colour	Hue/Value/Chroma	Apparent density gm/Cm	Absolute sp. gravity	Percentage of pore-space	Water holding capacity	Volume expansion of 100 g. of soil
Vyg.	0-16	Greyish brown	10 YR 3/2	1.54	2.53	48.35	35.13	12.34
	16-33	Dark brown	7.5 YR 4/4	1.32	2.45	49.28	43.29	13.29
	33-60	-do-	7.5 YR 4/4	1.30	2.46	48.35	42.20	13.15
	60-99	Red	2.5 YR 4/4	1.58	2.35	45.75	28.92	7.35
	99-114	Dark yellowish brown	10 YR 4/4	1.56	2.32	45.32	29.25	7.50
	0-17	Dark brown	10 YR 3/3	1.52	2.49	56.1	32.05	8.30
Mdk.	17-29	Dark yellowish brown	10 YR 4/4	1.56	2.50	59.1	31.25	8.03
	29-52	-do-	10 YR 4/4	1.30	2.49	48.35	42.20	10.25
	52-70	Dark brown yellowish	7.5 YR 4/4	1.56	2.50	58.1	30.25	8.50
	70-87		10 YR 5/4	1.58	2.52	43.2	30.50	8.60
	80-105	Brown	10 YR 5/3	1.46	2.50	42.0	28.40	7.80
	105-147+	yellowish brown	10 YR 5/4	1.59	2.52	43.0	25.43	7.50

throughout the profile suggests the laterization is more pronounced in these soils. Vylogam and Madukkur series established in Pudukottai and Thanjavur districts respectively, were mainly developed from the same lateritic genetic material and the latter is non-calcareous. The Madukkur series occuring in these soils shows calcareous concretions in isolated patches eventhough the colour, the cementing character and the presence of iron and manganese concretions. Hence Madu-Madukkur series is fixed omitting the calcareous character. The pockets of calcium carbonate might have been accumulated as secondary deposits due to disturbance of the profile in the later stages.

Generally the soils are *in situ* nature and are developed over lateritic material mixed with weathered gnessic granite. The occurance of kaolin clay material below twenty feet shows that the parent material is lateritic in origin (the college well in field No. 58). The present study suggests that the soils are *in situ* formations and not colluvial deposits as suggested by Mahalingam (1976). The increasing clay content with the depth indicates leaching and deposition of clay in the lower depression from the upper reaches aided by undulating topography. The high pH observed in the layers below 50 Cm also be attributed to the accumulation of bases in the depression from the upper reaches.

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