

Study of the Profile Morphology of Multiple Profiles

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ABSTRACT

The profile morphology of multiple profiles-black soil overlying red material in Coimbatore and Dharmapuri districts were studied to predict the possible reasons for the formation of such multiple profiles. The study of the two series-Periyanaickenpalayam series and Jayapuram series, having multiple profile characters reveal that the black soil is of transported origin and the black soil profile developed on the transported material whereas the red soil is of *in-situ* origin. On correlation it is suggested that the two series could be merged. The Jayapuram series can be given the name of the previously established series of Periyanaickenpalayam.

INTRODUCTION

The occurrence of black soil material over red material, a peculiar phenomenon is not uncommon in Tamil Nadu. Black soil over red material was described in the Periyanaickenpalayam series of Coimbatore district (Anon, 1972). Ramanathan and Krishnamoorthy (1973) reported the occurrence of this type of multiple soil profiles round about Coimbatore and Udumalpet areas. Literature available on such multiple soil profiles are limited. Therefore, attempt was made to describe some of the profile characteristics of the multiple soil, sampled at Harur taluk and an attempt is made to interpret the possible reasons for such an occurrence.

MATERIALS AND METHODS

Profile characters of Jayapuram series at Harur taluk: Profile No. 1. Location—Mallapuram.

0-11 cm. Very dark greyish brown (10YR 3/2) moist; dark greyish brown (10 YR 4/2) dry; clayey; strong, medium to coarse, crumb; sticky and plastic, friable moist; hard dry; common, fine to medium, irregular conca; slight effervescence; abundant, fine to medium roots; moderate permeability; abrupt, smooth, boundary; pH 8.2.

11-37 cm. Very dark greyish brown (10 YR 3/2) moist; dark greyish brown (10 YR 4/2) dry; clayey (Heavy); strong, coarse, subangular blocky; sticky and plastic, firm moist, very hard dry; continuous, thick clay films on ped faces; many, fine to medium, conca; slight effervescence; few, fine roots; moderate permeability; clear, smooth boundary; pH 8.2.

37-51 cm. Very dark greyish brown (10 YR 3/2) moist; dark greyish brown (10 YR 4/2) dry; fine sandy clay; weak, medium to coarse, subangular

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blocky; sticky and plastic, firm moist, very hard dry; patchy, thin, clay films on ped faces; common medium to coarse conca, few fine to medium conir; violent effervescence; very few, fine roots; sand deposits seen; moderate permeability; clear, smooth boundary; pH 8.1.

51-104 cm. Very dark grey (10 YR 3/1) moist; dark greyish brown (10 YR 4/2) dry; clayey; moderate; medium to coarse, subangular blocky, sticky and plastic, friable moist, very hard dry; patchy, thin, clay films on ped faces; common, medium to coarse conca; common, few to medium, conir; slight effervescence; very few, fine roots; moderate permeability; clear, wavy boundary; pH 8.2.

104-125 cm. Dark brown (7.5 YR 4/4) moist; gravelly sandy clay; moderate, coarse, subangular blocky; sticky and plastic, friable moist; few to many medium, conca; common, few to medium conir; violent effervescence; moderately rapid permeability; clear, smooth boundary; pH 8.5.

125-168⁺ cm. Dark brown 7.5 YR 4/4) moist; clay loam; weak, coarse, subangular blocky; sticky and plastic, friable moist; many, medium to coarse, conca; few, fine to medium conir; violent effervescence; moderately, rapid permeability; pH 8.5.

Profile No. 2. Location — Pappi-reddipatty.

0-12 cm. Very dark grey (10 YR 3/1) moist; dark grey (10 YR 4/1) dry; clayey; strong, medium to coarse,

crumb; sticky and plastic, very friable moist, hard dry; few, fine to medium, irregular conca; common, fine to medium roots; moderately rapid permeability; clear, smooth boundary; pH 7.6.

12-47 cm. Black (10 YR 2/1) moist, very dark grey (10 YR 3/1) dry; clayey; medium, coarse, angular blocky; sticky and plastic, friable moist, hard dry; patchy, thin clay films on ped faces; few, fine to medium, irregular conca; common, fine to medium roots; moderate permeability; abrupt, smooth boundary; pH 7.6.

47-87 cm. Black (10 YR 2/1) moist; black (10 YR 2/1) dry; clayey; strong, coarse, angular blocky; sticky and plastic, firm moist, hard dry; continuous, thin clay films on ped faces; prominent, intersecting slickensides; few, fine to medium, irregular conca; slight effervescence; few, fine to medium roots; moderately slow permeability; abrupt, smooth boundary; pH 8.2.

87-128 cm. Calcium carbonate nodules mixed with little amount of black soil; violent effervescence; broken boundary.

128-170⁺ cm. Yellowish red (5 YR 4/8) moist; strong brown (7.5 YR 5/6); sandy loam to sandy clay loam; massive or granular; slightly sticky and non-plastic; friable, slightly hard dry; violent effervescence; rapid permeability; pH 8.2.

Profile No. 3. Location — Kethi-reddipatty village.

0-17 cm. Very dark grey (10 YR 3/1) moist; very dark greyish brown, (10 YR 3/2) dry; clayey; moderate, medium to coarse, crumb; sticky and plastic, moist friable, slightly hard dry; common, fine to medium, irregular conca; violent effervescence; abundant, fine to medium roots; moderately rapid permeability; clear, smooth boundary; pH 8.5.

17-76 cm. Very dark grey (10 YR 3/1) moist; clayey; moderate, coarse, prismatic; sticky and plastic; firm moist; distinct, intersecting, slickensides; common, fine to coarse irregular conca; effervescence violent, few, fine roots; moderate permeability; clear, smooth boundary; pH 9.1.

76-113 cm. Very dark grey to black (10 YR 2.5/1) moist; clayey, moderate, coarse, subangular blocky and plastic, firm moist; common, fine to coarse, irregular conca; violent effervescence; very few, fine roots; moderately slow permeability; abrupt, smooth boundary; pH 9.4.

113-180⁺ cm. Dark brown (7.5 YR 4/4) moist; clay loam; weak, coarse, subangular blocky; sticky and plastic, friable moist; many, fine to coarse, irregular conca; violent effervescence; powdery lime deposits; very few, very fine roots; moderately rapid permeability; pH 9.4.

Profile characters of Periyanaickenpalayam series at Coimbatore district. Profile No. 5. Location—Periyanaickenpalayam.

0-40 cm. Dark brown (10 YR 4/3); clay loam; fine, moderate, subangular

blocky; slightly sticky, slightly plastic, firm moist, slightly hard dry; few, small calcium carbonate concretions; abundant roots; gradual to diffuse, wavy boundary; pH 8.4.

40-75 cm. Reddish brown (5 YR 4/4); sandy loam; medium, moderate, granular, non-sticky and non-plastic, friable moist, soft dry; many, calcium carbonate concretions; plentiful roots; gradual to diffuse, wavy boundary; pH 8.4.

75 cm. Lime concretions.

RESULTS AND DISCUSSION

The profiles occurring around Harur taluk (Jayapuram series) Jpm series, Dharmapuri district and Periyanaickenpalayam area (Periyanaickenpalayam series) Pyk series of Coimbatore district can be taken as typical profiles of black soils overlying red material. Jpm series differs from Pyk series in that Jpm series is deeper than Pyk and Jpm series occurs in valley bottoms and Pyk series may be *in-situ* or transported. In Pyk series the black layer is underlined by red material followed by kankar nodules (Anon, 1972; Ramanathan and Krishnamoorthy, 1973). In Jpm series some of the profiles have black soils over kankar nodules followed by red material and in others as in Pyk series (black layer over red material followed by kankar nodules).

Concretions of calcium carbonate occurred in almost all the horizons of both the series. The texture of the black soil layer was medium to heavy and that of red material below was

light textured. Clay movement was observed in almost all the profiles of Jpm series which indicates the *in-situ* profile development or development after deposition of black material followed by leaching.

Jpm series occurs mostly in valley bottoms and in association with black and red calcareous soils. It is presumed that the red calcareous material might have been present in places where Jpm series is located and in the course of time black soil which occurs in a higher elevation might have been deposited due to erosion by wind and water over the red soil leading to the formation of the multiple profile. The red soil in this series is strongly cemented compared to the red material in Pyk series.

Ramanathan and Krishnamoorthy (1973) reported that in all the multiple profiles examined, there was a clear line of demarcation between the zones of black soil and red material and that might account for the super-imposition of black soil over red material in the present instance. Desai (1945) observed that the black soils were regarded either residual or cumulose.

The 1st profile Jpm series and the typical profile of Pyk series are having wavy boundary which may suggest the possible profile formation in the transported material. In 2nd profile of Jpm series it is observed that black soil is not directly deposited over red material but over calcium carbonate nodules below which the red material is observed. This may also add to the value that the black soil is also a developed profile over red material.

The study of the two series reveal that the black soil is of transported origin and the black soil profile developed from the transported material, whereas the red soil is of *in-situ* origin. On correlation both the series can be merged and grouped as Periyanaickenpalayam series.

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