

Characterization and classification of red soils from Tamil Nadu

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ABSTRACT

Four typical pedons representing agriculture, forage and tree crops land uses were studied in red soil region (Kutturavupatti village of Sivagangai district) of Tamil Nadu during 2005-06. Soils were characterized for important morphological, physical and chemical characteristics to define limitations for vegetation establishment at village level. Based on soil characteristics four soil series viz., Sivagangai (P_1), Melapoongudi (P_2), Tamarakki (P_3) and Keelapoongudi (P_4) were identified and named. All the soils were found deep in depth and have subangular blocky structure in surface and sub surface. The soils texture varied from loamy sand to clay. Among the pedons, more than 70% gravels were recorded in pedon 1, whereas more than 10 % free CaCO_3 and high pH of 8.3 was found in pedon 3. The bulk density, available soil moisture, organic carbon and cation exchange capacity ranged from 1.11 to 1.33 Mgm^{-3} , 4.2 to 16.2%, 0.11 to 0.60% and 8.79 to 41.47 c mol (p+) kg^{-1} , respectively. The order of dominance of exchangeable bases was $\text{Ca}^{2+} > \text{Mg}^{2+} > \text{Na}^+ > \text{K}^+$. The soils were classified into alfisol (pedon 1 and 4) and Inceptisol (pedon 2 and 3) as per USDA system of classification.

Key words : Characterization, Classification, Red soils

A proper land use is essential to realize maximum benefit out of it. As a source for production system, it serves as a store house of water and nutrients and provide environment required for plants and living organisms. For sustainable development and higher production, regional approach in agricultural development planning have not received the due attention in the past and therefore, the location specific needs of various regions remain neglected (Kadrekar, 1993). In India, the availability of cultivated land is shrinking day by day, and hence, its proper management on sustainable basis has to be considered as the development strategy on priority at the smallest unit level (say village level) to meet out increasing demands. Out of 13 million ha geographical area in state of Tamil Nadu, nearly 62 % of the soils are red. To define the limitations for establishment of vegetation, characterization of the area is must. Hence, to determine the potential of soils for growing field, forage and tree crops in red soil region on sustainable basis, characterization was attempted at village level in the present study.

MATERIALS AND METHODS

The study area, lies between $78^{\circ}25'$ and $78^{\circ}30'$ E longitude and $9^{\circ}55'$ and $10^{\circ}00'$ N latitude in Kutturavupatti village of Sivaganagai district in red soil region of Tamil Nadu. The average elevation of the study area is 105 m (a msl). The area receives mean annual rainfall of 1012 mm and mean air temperature ranges from 20°C to 38°C . Soils were characterized for morphological, physical and chemical properties and individual pedons were

described as per FAO, (1990). The area qualifies for ustic soil moisture regimes and isohyperthermic soil temperature regimes. The geology of the area comprises mainly gneiss in uplands, calcic gneiss and kankar nodules in the lowlands. Soils were classified upto family level as per guidelines given in USDA soil taxonomy (Soil survey staff, 1998). Soils samples were collected from each pedons horizon wise. The physical properties such as bulk density, available soil moisture, and chemical properties like pH, EC, OC, Free CaCO_3 and CEC were determined by adopting standard methods.

RESULTS AND DISCUSSION

Morphological characteristics:

Site and morphological characteristics of soils are given in Table 1. Pedon 1, 2 and 3 recorded solum depth of 150 cm, while it was upto 145 cm in pedon 4. The moist colour of surface soil horizons of pedons 2 was yellowish brown (7.5 YR 4/3) and pedon 3 was dark brown (10YR4/2) whereas it was dark reddish (2.5YR3/6) in profile 1 and 4. The variations are attributed due to nature and type of soil forming processes, which has also been earlier reported by Mohekar and Chella (2000). The soil texture varied from loamy sand to clay. In all the pedons soil structure was observed moderate medium sub angular in surface horizons and strong coarse subangular blocky in sub surface horizons. Moist consistency of ped was friable to firm and wet consistency was slightly sticky to moderately sticky and plastic in surface horizons whereas in sub surface horizons were mostly very firm to very friable and moderately sticky to plastic. This may be due