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CHRACTARIZATION OF GRUMUSOLS IN MANNAR DISTRICT IN SRI LANKA AND THEIR APPLICABILITY TO AGRICULTURE

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The Great Soil Group, Grumusol covers about 17,000 ha in the Mannar and Jaffna Districts of Sri Lanka and has not been characterized in detail. Since these soils are heavily used for rice production in the recent past, there is a need for such information. Therefore, the objective of this research was to assess physical and chemical properties of Grumusols and their applicability to agriculture. This study was carried out at the Agricultural Research Station at Murunkan (AER DL4) in the year 2013. Landscape and soil profile were described in the benchmark site and the major horizons were identified. Soils collected from each horizon were assessed for physical and chemical properties according to the standard methods. Grumusols could be identified by the vertical cracks down to about 40 cm depth, the Gigi formation on the soil surface and slickensides in the sub soil. Soils with these characters are classified under order Vertisol in Soil Taxonomy. Four soil horizons were identified in the poorly drained soil profile as Apg (0-15 cm), B1g (15-35 cm), B2g (35-60 cm) and B3g (> 60 cm). The clay content varied from 53 to 60 % throughout the profile and textural class was clay. Wet bulk density varied from 1.41 to 1.49 Mg/m^3, while the dry bulk density varied from 1.6 to 1.9 Mg/m^3 within the soil profile. Saturated hydraulic conductivity (Ks) was very low. The soil plasticity index was more than 60 and the clay activity was higher than one. It indicates that the 2:1 clay minerals are dominant in the clay fraction. This soil could be classified as saline alkaline soil according to high pH (>7.5) and high electrical conductivity (>1.0 dS/m). The cation exchange capacities (CEC) ranged from 48.89 to 51.15 $cmol_{(+)}kg^{-1}$ showing the high ability to retain cationic nutrients. Calcium was the dominant cation in this soil. The soil physical and chemical properties provide evidence that these soils are saline / alkaline but difficult to reclaim due to poor drainage conditions. Therefore crop varieties tolerant to salinity and alkalinity should be cultivated. Crop cultivation is possible only when the soil is moist, as it is very hard when dry. This soil group has the highest clay content and highest amount of 2:1 clay minerals among Sri Lankan soils classified so far. It can retain plant nutrients better than many other soil groups. Leaching losses of nutrients are low since the Ks is very low. Grumusols is most suitable for rice production under rain-fed conditions in *maha* and with irrigation in *yala* season.

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