Deep ploughing adversely affects on soil water conservation in light soils

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Abstract

Deep ploughing is the one of options to alleviate soil compaction and upgrade low productive lands for better crop production. However, deep ploughing should be implemented with the knowledge of land characters. Field experiments were conducted to evaluate the effect of deep ploughing on soil water conservation in light soils in the Intermediate climatic zone of Sri Lanka. Soil compaction of different soil series was evaluated using bulk density and penetrometer resistance, through which selected the suitable soil series to evaluate deep ploughing on soil water conservation. Soil water storage with respect to deep ploughing was monitored during the dry and rainy seasons using neutron scattering technique. Evaluation of soil physical properties showed that the range of mean values of bulk density (BD) and soil penetration resistance (SPR) in the surface soil (0-10 cm depth) of major soil series in coconut lands was from 1.38 ± 0.02 to 1.57 ± 0.07 g/cm^{3}and 55 ± 10 to 315 ± 16.4 N/cm^2 respectively. The total available water fraction increased with clay content of soil as a result of high micropores. However, due to soil compaction, ability of soils to conserve water and to remain aerated was low for those series. Deep ploughing during the rainy and dry periods in highly compacted soils (BD >1.5 g/cm^3 and SPR >250 N/cm^2) greatly increased conserved soil water in the profile, while in less compacted light soils (BD <1.5 g/cm^3 and SPR <250 N/cm^2) conserved water content was adversely affected. Soil water retention in bare soils of both highly and less compacted light soil series was higher than that of live grass-covered soil. In addition, deep ploughing even in the effective root zone with live grass-covered highly compacted soils around coconut tree was favorable for soil water retention compared to that of live grass covered less compacted soils.

Keywords: Effective root zone; Mulching; neutron scattering technique,Penetrometer resistance, Soil compaction, Soil water retention