HARDNESS VARIATIONS IN PUDDLED LOWLAND SOILS DURING THE GROWTH PERIOD OF RICE IN DESIGNING FARM MACHINERY (CASE STUDY IN ANURADHAPURA)

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This experiment was carried out in *Maha* 2013/14, season at research field of Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura. Soil hardness is the most critical factor in machinery designing. Because there is no reliable empirical data source of soil compression strength in lowland puddled soil. This study was aimed to estimate the variations in soil hardness of the puddled lowland rice soils during the growth period of rice (*Oryza sativa* L. *var*. BG 358). Soil hardness was measured at depths of 0, 5, 10, 15, 20, 25 and 30 cm using a cone penitrometer. Soil physical properties such as soil moisture content, bulk density, true density, porosity and soil texture were determined by oven dry method. Core sampler method, pycnometer method and pipette method were used respectively for these purposes. Growth parameters; plant height, number of tillers per plant, shoot and root biomass, soil organic matter content were determined by Walkely and Black method. Plant biomass of weed were measured using oven dry method weekly. Yield was determined by yield components and net plot yield. Harvest index, root biomass, shoot biomass, shoot length and root length were also determined. Four treatments were used according to Random Complete Block Design with three replicates namely; T1 (bare land), T2 (no weed controlling), T3 (chemical weed controlling) and T4 (weed managed with wooden clog). Treatments and time (week) have affected on the dependent variables of soil compression strength. Result revealed that, weed growth parameters and plant growth parameters have significantly affected treatment and time. Bulk density, moisture content and porosity were the factors that significantly affected the soil compression strength. Accordingly, soil hardness could be estimated using bulk density and moisture content variation of lowland puddled soil which could be used for farm machinery design aspects.

Keywords: Soil hardness, Soil physical properties, Yield component