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Water repellency and wet aggregate stability of soils under selected land uses

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Soil water repellency is a phenomenon that soils resist wetting when water is applied on the surface. Water repellency can be assumed to improve aggregate stability as it may reduce rapid wetting and slaking of aggregates. Soil organic matter (SOM) affects both of these properties by increasing or inducing water repellency, and improving aggregate stability of soils. The present study was conducted to find the existence of soil water repellency, aggregate stability, measured as the percentage of water stable aggregates, and any possible relationship between aggregate stability and soil water repellency in soils under different land uses in Matara District, Sri Lanka. The effects of other physical properties of soil such as SOM, clay content, and sand content on aggregate stability and soil water repellency was also observed. The soil samples were collected from different locations under different land uses (pine forest, pine grown together with other tree species, coconut plantation, and beach soil). Surface soils from 0 to10 cm depth were taken for the experiment. Soil water repellency was measured using the Water drop penetration time (WDPT) test. The wet aggregate stability was measured using two techniques. First technique was immersing the soil aggregates in distilled water overnight (Technique 1), and the second technique was oscillation of soil aggregates placed in a sieve through a vertical distance of 3 cm at a rate of 20 oscillations per minute for 2 minutes (Technique 2). Measurements were taken with three replicates. The other soil properties such as the amount of SOM, clay, and sand were measured using standard methods.

All the soil samples studied were found to be non- repellent (WDPT < 1s). However, the WDPT was found to be negatively correlated with SOM content. The clay and sand content did not show any correlation with the WDPT. There were no effect of SOM, clay or sand on aggregate stability observed using both technique 1 and 2. There was no clear relationship between the aggregate stability and WDPT.

Keywords: aggregate stability, soil water repellency, soil organic matter