

Soil Water Repellency in Heat-Treated Volcanic Ash Soils

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Water repellency in soil is a widespread phenomenon with considerable environmental impact. It can induce hydrological problems such as preferential flow in soils and reduced water infiltration rate which in turn can lead to surface runoff and erosion. Water repellency is known to be caused by the hydrophobic organic coating on the soil particles which are formed from the soil organic matter (SOM). Although, the relation between the soil water content and water repellency have been found out in some studies, not much is known about the effect of heat pre-treatment on soil water repellency. We investigated the effect of heat pre-treatment for 2mm size sieved soil samples from different depths (0 to 25cm) of a single volcanic ash soil profile. Soil samples were oven dried at different temperatures of 60, 80, 105, 125, 150 and 200 degree for a period of 24 hours after which they were kept at constant room temperature of 20 degree for 48 hours to gain equilibrium. Water repellency was determined by the molarity of ethanol droplet (MED) test. Water repellency was observed in the samples with soil organic carbon (SOC) content 12%. The water repellency increased from a drying temperature of 60 degree until 105 degree where the water repellency was maximum. After 150 degree, water repellency decreased rapidly until it became negligible. This heat pre-treatment dependence might be caused due to the melting of the hydrophobic lipids or waxes at some particular temperatures and thereby resulting in the reorientation of the soil organic matter. At very high temperatures, the SOC could be partially burnt, thus showing negligible water repellency.