209/B

Mild water repellency effects on hydraulic properties of hydrophobic organic matter incorporated animal manure amended soils

T D P Liyanage and D A L Leelamanie*
Department of Soil Science, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya

Water repellent soils, which are also known as hydrophobic soils, reduce spontaneous wetting when water is applied on the surface. Soils become hydrophobic due to direct impacts on reducing wetting rates caused by organic matter. Soil hydrophobicity is reported for adverse effects on infiltration, erosion and hydrologic balance of soils, and seedling emergence and seedling survival. In contrast, some studies revealed that water repellency bears some favorable effects towards stabilizing soil aggregates. Incorporation of hydrophobic materials with animal manure is found to improve aggregate stability compared to amendments with animal manure alone. However, the effects of mild water repellency induced by locally available animal manure on soil hydraulic properties are less explored. Therefore, the objective of this study was to identify the effects of mild water repellency on hydraulic properties of soils amended with hydrophobic organic matter incorporated animal manure. Soils were collected from the Research and Training Facility of Faculty of Agriculture, University of Ruhuna. The air-dried and sieved soils were amended with 5% cattle manure and goat manure with 2% and 5% of hydrophobic organic matter (*Cassuarina equisetifolia* (CE) leaf-powder). Initial hydrophobicity was tested by the water drop penetration time (WDPT) test. Water entry value, water retention and saturated hydraulic conductivity were tested by standard laboratory methods. All animal manure and CE amended samples showed slight water repellency (WDPT=1–10 s) with control (no organic amendment) showing non-repellency. Samples with 2% CE showed lower hydrophobicity (WDPT<5 s) compared to those with 5% CE (WDPT≤10 s). All the animal manure and CE amended samples had higher water entry values compared to the control, restricting water entry with induced mild water repellency. Samples incorporated with 5% CE had water entry values higher (2–4 cm) than those with 2% CE (1–2 cm). Saturated hydraulic conductivity of animal manure and CE amended samples were lower than that of the control. The samples with 2% CE showed lower water retention compared to those with 5% CE, which might be a result of high hydraulic conductivity. The results revealed that induced mild water repellency by incorporating 2% CE with animal manure had a slight effect on soil hydraulic properties with low detrimental effects. Therefore, if farmers can incorporate small amounts of hydrophobic materials with the animal manure in the fields, favorable effects of improved aggregate stability can be achieved with low detrimental effects on soil hydraulic properties.

Keywords: Water repellency, hydraulic properties, animal manure added soils

leelamaniee@yahoo.co.uk Tel: +94 41 2292200 / +94 71 8614380