Fire effects on persistence of Soil Water Repellency in Eucalyptus grown Soils in Upcountry Sri Lanka

Piyaruwan, HIGS[1*], Leelamanie, DAL[1]
[1]Department of Soil Science, Faculty of Agriculture, University of Ruhuna

Soil Water Repellency (SWR) is a well-known character, which retards spontaneous penetration of water into soil matrix. It can enhance environmental risks on natural habitats and agricultural lands. There are many factors that affect SWR. Temperature, or the heat, is one of those factors that is identified to as enhancing or destroying SWR. Fire-induced SWR causes detrimental effects on forest ecosystems around the world and its importance is reported in past few decades. Wildfires are not usually observed in Sri Lanka. Still, anthropogenic forest fires are common in up country plantation forests. This study examines the effects of different temperature treatments range from 50°C to 250°C with different exposure times on the persistency of water repellency in soils from different depths of the profile under laboratory conditions. Samples were collected from 0–5, 5–10 and 10–15 cm depths of a water-repellent Eucalyptus forest in Diyathalawa. Samples were subjected to heating at six temperature levels (50, 70, 100, 150, 200, 250 °C) for five durations (20, 40, 60, 90 and 120 min). The changes in SWR were measured using water drop penetration time (WDPT) test. Soil water repellency has increased from 50°C to100°C, but exhibited decreasing trend after 150°C. Further, SWR showed decreasing trend with increasing exposure time period. The possible reason could be the removal of water repellent organic compounds in the soil. However, heat treatment at 250°C exhibited remarkable increment of SWR in 20 and 40 min time periods. This may probably due to formation of pyrolyzed compounds in the soil at very high temperatures. We observed some soil erosion evidences in the areas where slope percentage is greater than 65. Hence, there is a risk of fire induced SWR leading to increased rate of soil erosion in Eucalyptus grown forests in upcountry especially during rainy season.

Keywords: Eucalyptus, Soil water repellency, Fire effect, Time, Water drop penetration time

Author Biography

Name: HIGS Piyaruwan and DAL Leelamanie
Research Interest: Social Media
Email ID: sandunp@agri.ruh.ac.lk, leelamaniee@yahoo.co.uk

**Corresponding author E-mail*: sandunp@agri.ruh.ac.lk