

**EFFECTS OF INDUCED FIRE ON SOIL WATER
REPELLENCY IN THE PINUS (*Pinus sabiniana*) FOREST
IN WELIHENA, MATARA**



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2019

ABSTRACT

Soil water repellency is a reduction in the rate of wetting and retention of water in soil caused by the presence of hydrophobic coatings on soil particles. Numerous techniques have been developed to determine the water repellency of soil. The most common method is the water drop penetration time (WDPT) test and molarity of ethanol droplet (MED) test. The creation of water repellency in soils involves both physical and chemical processes. The main aim of this study was to determine the effect of induced fire on soil water repellency in Welihena pinus forest, Matara. The study area is located in the Welihena pinus forest, Matara. The region is a wet zone with a mean annual precipitation of 2500- 3000 mm and a mean annual temperature of 25 °C. The samples were taken within 1 ha which represent the whole area. Study area (1ha) was divided in to 100 grids (10m*10m) and 10 grids were used for collecting 120 soil samples for further analyze. Samples at different depth layers of 0-2cm, 2-4cm, 4-6cm, 6-8cm, 8-10cm, 10-13cm, 13-16cm, 16-19, 19-22cm, 22-25cm, 25-28cm and 28-31cm were collected at selected sampling points. According to the soil textural analysis, the type of the soil is confirmed as clay in a study site. The terrain characters such as soil pH, electrical conductivity, soil texture, vegetation type, soil moisture content (volumetric water content), bulk densities, particle densities, soil organic carbon were measured.

The pH of soil layers from 0-2cm to 22-25cm varies from 5.8-6.7 indicating slightly acidic in nature. Further, the EC, particle density, bulk density and volumetric moisture content varies in between 0.06 dS/m-0.14 dS/m, 1.9342 g/cm³-2.8089 g/cm³, 0.8681 g/cm³-1.6199 g/cm³ and 10.08%- 33.81%, respectively. The organic carbon ranges between 0.02% to 1.82%.

The WDPT of soil layers from 0-2cm to 22-25cm at field condition varies from 3.05s to 1.48 s. The maximum WDPT (3.05s) was observed at the soil surface whereas the minimum (1.48s) at the deepest soil layer of 22-25cm. The WDPT of soil layers from 0-2cm to 22-25cm at air dried soils ranges from 5.14 s to 1.82 s and the WDPT of soil layers of oven dried soils ranges from 6.21 s to 2.87 s. Induced fire experiments were done to determine the effect of fire intensities on SWR. Different amounts (50g, 100g and 200g) of pinus litters were added on the surface of the experimental plots and burnt. The time taken to complete the fire were 3.29 minutes, 5.43 minutes, 8.72 minutes of 1st, 2nd and 3rd fire, respectively. The moisture content of soil layers from 0-2cm to 4-6cm for 1st, 2nd and 3rd fires varies in between 15.96%-17.06%, 15.07%-16.71%, 14.36%-16.56% respectively. The moisture content decreases gradually from 0-2cm layer to 4-6cm layer when the intensity of fire increases from 3.29 minutes to 8.72 minutes. The WDPT of surface soils were 43.86s, 162.5s and 415.2s for 1st, 2nd and 3rd fires, respectively. And the WDPT of the soil layers (0-2cm to 4-6cm) for 1st, 2nd and 3rd fires varies between 1.18 s-5.89 s, 1.14 s- 7.57 s, 1.2 s-4.76 s, respectively. According to the results of WDPT, the soil surface becomes severely water repellent from wettable/slightly water repellent when the intensity of fire increases from 0 to 8.72 minutes. In addition to this, the soil water repellency of soil layers of 0-2 cm, 2-4, 4-6 cm become slightly water repellent from wettable water repellent when the intensity of fire increases from 0 to 8.72 minutes.

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