Impact of Combustion Temperature on Water Repellency of Burned Litter in Japanese Cedar *(Cryptomaria Japonica*) and Japanese Cypress (*Chamaecyparis Obtuse*) Forests

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Abstract

Water repellency (WR) prevents the spontaneous penetration of water into soil and limits almost all hydraulic movements. It is primarily caused by organic matter and is highly dependent on vegetation and litter material. Forest fires burn the forest litter biomass, reducing it to ash and charred debris on the forest floor. This transforms the organic matter of litter, altering the water-repellent levels of the surface litter cover. There is a lack of information regarding how litter WR alters with different heat levels that can be caused by fire events. This study aimed to examine the impact of different heating temperatures on the WR level of burnt forest litters of two Japanese coniferous plant species: Japanese Cedar – CED (Cryptomaria japonica) and Japanese Cypress – CYP (Chamaecyparis obtuse). Litter samples were exposed to heat at 100, 200, 300, 400, 500, and 600°C in a muffle furnace for 20 min, and the resulting ash and charred materials were left to stand for 24 hours. The WR of heated litter was assessed in triplicate using the water drop penetration time (WDPT) test. With increasing temperature, WR of litter material increased up to 200°C (WDPT > 5 h) and decreased up to 600°C (WDPT = ~40 s). Results revealed that the WR of litter increased with increasing heating temperatures up to 200°C and decreased beyond that. The increased WR with increasing temperature could be a result of the melting and reorientation of organic substances, whereas the decreased WR could be a result of the complete burning of organic substances at high temperature levels.

Keywords: *Water Repellency, Combustion Temperature, Forest Litter, Cryptomaria Japonica, Chamaecyparis Obtuse*