



Assessment of Potential Water Repellency of Litter Components in *Casuarina equisetifolia* Plants

TDP Liyanage ^{a*} and DAL Leelamanie ^a

^a Department of Soil Science, Faculty of Agriculture, University of Ruhuna, Sri Lanka.

Abstract

Water Repellency (WR) appears on low-energy surfaces and the magnitude varies with the types of vegetation in the surrounding area. The WR is most commonly associated with certain evergreen tree species with considerable amounts of resins, waxes or aromatic oils such as Eucalyptus, Japanese Cypress, and Pines. *Casuarina* (*Casuarina equisetifolia*) is a main exotic species established in Sri Lankan coastal sand dunes as shelterbelts. The soils in contact with *Casuarina* litter are found to produce strong water repellent conditions. However, the potential WR of *Casuarina* litter components is less studied. Therefore, this study was conducted to identify the potential WR of different components of the *Casuarina* plantation litter. Plant samples (dry and fresh leaves, flowers, wood, and bark) were collected from *Casuarina* tree species and ground into fine powder. The persistence and the degree of WR were determined by the Water Drop Penetration Time (WDPT) test and the sessile drop contact angle method in triplicates. The organic matter content was determined using the loss on ignition method. Data were statistically analyzed using ANOVA at the 0.05 probability level. Significantly highest WDPT values (>7200 s) and soil water contact angles ($>120^\circ$) were shown by dry leaves, flowers, and bark being extremely water repellent. The higher WR may be attributed to the high organic matter content (%) of these components (89.91 ± 0.23 , 95.7 ± 0.06 , and 94.9 ± 0.22 respectively). There might be direct impacts of hydrophobic chemical substances available in the plant parts such as bark. The wood and fresh leaves showed significantly low WDPT values (≤ 400 s) and soil water contact angles ($\leq 111^\circ$), compared to those of other parts. The low WR in fresh leaves might be due to the high moisture content. The low WDPT values which were reported in wood might be due to significantly low organic matter content ($76.96 \% \pm 0.98$). The dry leaves, flowers, and bark of the *Casuarina* litter seem to contribute to the WR in higher levels while the fresh leaves and wood have minimal impacts. The soils in contact with *Casuarina* litter might create impacts on processes such as infiltration and runoff depending on the potential WR of each component. However, comprehensive studies such as analyzing the chemical substances in the litter components are required to achieve concrete conclusions.

Key words: *Casuarina equisetifolia*, Litter, Sessile drop contact angle, Water Drop Penetration Time, Water Repellency

*Corresponding Author: liyanage@soil.ruh.ac.lk