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Vegetation cover and land use impacts on soil water repellency in an Urban Park located in Vilnius, Lithuania

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It is strongly recognized that vegetation cover, land use have important impacts on the degree of soil water repellency (SWR). Soil water repellency is a natural property of soils, but can be induced by natural and anthropogenic disturbances as fire and soil tillage (Doerr et al., 2000; Urbanek et al., 2007; Mataix-Solera et al., 2014). Urban parks are areas where soils have a strong human impact, with implications on their hydrological properties. The aim of this work is to study the impact of different vegetations cover and urban soils impact on SWR and the relation to other soil variables as pH, Electrical Conductivity (EC) and soil organic matter (SOM) in an urban park. The study area is located in Vilnius city (54°.68' N, 25°.25' E). It was collected 15 soil samples under different vegetation cover as Pine (Pinus Sylvestris), Birch (Alnus glutinosa), Penduculate Oak (Quercus robur), Platanus (Platanus orientalis) and other human disturbed areas as forest trails and soils collected from human planted grass. Soils were taken to the laboratory, air-dried at room temperature and sieved with the <2 mm mesh in order to remove the coarse material. Subsequently were placed in petri dishes and exposed to a controlled laboratory environment (temperature of 20C and 50% of air relative humidity) for one week to avoid potential impacts of the atmospheric conditions on SWR (Doerr, 1998). The persistence of SWR was measured using the water drop penetration time (WDPT) (Wessel, 1998). The classification of WDPT was according to Bisdom et al. (1993) <5 (wettable), 5-60 (slightly water repellent), 60-600 (strongly water repellent), 600-3600 (severely water repellent) and >3600 (extremely water repellent). The results showed significant differences among the different vegetation cover (Kruskal-Wallis H=20.64, p<0.001). The WDPT soil median values collected under Pine, Birch, Penduculate Oak, forest trails and soils from planted grass were significantly higher than Platanus soil. The soils from Pine, Birch, Penduculate Oak, forest trails and planted grass were majorly severely water repellent, while Platanus soils were mostly strong water repellent. Soil water repellency of Pine soils had a significant negative correlation with pH (-0.52, p<0.05) and a significant negative correlation with SOM (0.69, p<0.01) and EC (0.53, p<0.05). In relation to Birch soils, SWR had a significant negative correlation with pH (-0.88, p<0.001) and significant positive correlation with SOM (0.78, p<0.001). In relation to the other species no significant correlations were observed between SWR and pH, EC and SOM.

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