



Effect of Roots on Infiltration Process around a Tree – an Application of Tension-TDR Probes

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The infiltration process around a tree is usually complex because of preferential pathways around roots. In order to clarify the effect of tree roots on the infiltration process, we simultaneously measured volumetric water content (θ) and metric potential (ψ) with a high-density installation of Tension-TDR probes, which could provide in situ soil-water characteristic curves in a small area around tree roots. A tension-TDR probe includes a coiled time domain reflectometry (TDR) probe around the porous cup of a standard tensiometer. The investigation was carried out around a Taiwanese cedar (*Taiwania cryptomerioides*) in a mixed coniferous forested stand. There were 24 soil moisture sensors and 12 Tension-TDR probes installed in different depths of two soil profiles, respectively. The result suggested that the Tension-TDR probe is better to determine the occurrence of preferential flow around tree roots than soil moisture sensors. Woody roots promoted the occurrence of lateral flows and caused rapid increases of θ in the deeper soil layers. Soil porosity was high in the area with fine roots where infiltration was dominated by vertical flows. We also compared the difference between the field and laboratory soil-water characteristic curves, which were determined by the θ and ψ datasets from the field and the measurement using the pressure plate method in a laboratory, respectively.