Geophysical Research Abstracts
Vol. 18, EGU2016-11695, 2016
EGU General Assembly 2016

Influence of plant roots on electrical resistivity measurements of cultivated soil columns

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Electrical resistivity methods have been widely used for the last 40 years in many fields: groundwater investigation, soil and water pollution, engineering application for subsurface surveys, etc. Many factors can influence the electrical resistivity of a media, and thus influence the ERT measurements. Among those factors, it is known that plant roots affect bulk electrical resistivity. However, this impact is not yet well understood. The goals of this experiment are to quantify the effect of plant roots on electrical resistivity of the soil subsurface and to map a plant roots system in space and time with ERT technique in a soil column. For this research, it is assumed that roots system affect the electrical properties of the rhizosphere. Indeed the root activity (by transporting ions, releasing exudates, changing the soil structure,...) will modify the rhizosphere electrical conductivity (Lobet G. et al, 2013). This experiment is included in a bigger research project about the influence of roots system on geophysics measurements.

Measurements are made on cylinders of 45 cm high and a diameter of 20 cm, filled with saturated loam on which seeds of Brachypodium distachyon (L.) Beauv. are sowed. Columns are equipped with electrodes, TDR probes and temperature sensors.

Experiments are conducted at Gembloux Agro-Bio Tech, in a growing chamber with controlled conditions: temperature of the air is fixed to 20°C, photoperiod is equal to 14 hours, photosynthetically active radiation is equal to 200 μmol $m^{-2}s^{-1}$, and air relative humidity is fixed to 80 %. Columns are fully saturated the first day of the measurements duration then no more irrigation is done till the end of the experiment.

The poster will report the first results analysis of the electrical resistivity distribution in the soil columns through space and time. These results will be discussed according to the plant development and other controlled factors. Water content of the soil will also be detailed.

Reference

Lobet G, Hachez C, Chaumont F, Javaux M, Draye X. Root water uptake and water flow in the soil-root domain. In: Eshel A and Beeckman T, editors. *Plant Roots. The Hidden Half*. Boca Raton (US):CRC Press,2013. p. 24-1—24-13.