



## **Soil porosity in agricultural context: A review of measurement techniques at various scales**

Sarah Garré (1), Marie Chélin (1,2), Jeanne Luong (1), Nargish Parvin (1,2), Aurore Degré (1), and Benoit Mercatoris (1)

(1) Université de Liège, Gembloux Agro-Bio Tech, Department of Biosystems Engineering, Gembloux, Belgium (sarah.garre@ulg.ac.be), (2) Université de Liège, AgricultureIsLife.be, Gembloux, Belgium

Soil compaction was identified by European Commission as one of the eight main threats for agricultural soils. In order to address this issue, measurements of soil porosity are critical. However, there are as many techniques to measure as there are definitions of porosity. A single method is not sufficient to obtain a complete image of the soil porosity at various scales and encompassing different levels of complexity. Each existing method is characterized by a unique combination of a specific level of complexity, resolution and scale of measurement.

In this review, we started by defining the basic terms linked to soil porosity in an agricultural context. Then we give an overview of relevant measurement techniques, from classical methods to recent advances. We present their advantages and disadvantages, the scales of measurement, the resolution, the expected accuracy and the susceptibility to errors. This work aims at guiding the choice for the best (combination of) technique(s) to answer questions related to agricultural soil porosity, categorizing techniques according to the parameters they focus on: from total porosity over pore size distribution, structure and connectivity up to the quantification of spatio-temporal dynamics.