



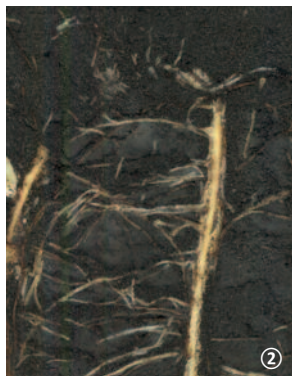
Advantages of the apparatus

- ▶ Automated high resolution image collection
- ▶ In situ, non-destructive observation
- ▶ Multi-scaling (from 21 cm X 30 cm to 50 μm)
- ▶ Images may be post-processed by any image analysis software to quantify pores size, roots length, roots growth rate, soil porosity ...



Pictures obtained by **SOILINSIGHT®**:

- ① Soil inside the cosm at the start of the experiment (real size of images 21 x 29.7 cm)
- ② View of root system
- ③ Processed image for quantification of biological parameters



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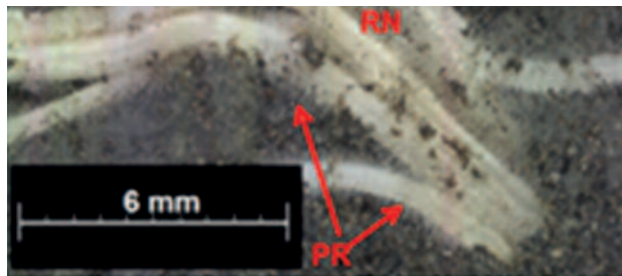


Soilinsight®

www.ugt-online.de

APPARATUS FOR MONITORING DYNAMICS OF SOIL STRUCTURE BY AUTOMATED IMAGE COLLECTION

How to observe a living soil? Not only on the surface, but its thickness! In environmental sciences the observation of biological processes is essential for their understanding. Furthermore biological agents such as soil, plants and wildlife, are known to have a strong impact on the quality of soils. Therefore, how to view and measure these impacts within an underground setting which is by definition inaccessible? How do the roots grow in the soil? How fast do they grow? What is the strategy of displacement of earthworms in the soil? To answer this, scientists usually conduct samplings within defined volumes of soil over time. **SOILINSIGHT®** developed by the LSE laboratory of the Université de Lorraine and distributed by UGT proposes a new approach based on non-destructive observation of the soil. Soil and biological elements like plants and earthworms are placed inside cosms (boxes). An apparatus has been developed for automated image collection of this cosm. The device collects images of the physical structure and of the biological agents (plant roots, earthworms...) of the soil. Contrary to traditionally used structural stability tests and soil sampling methods, which can not maintain soil structure, this new device allows observation of a soil in-situ. Images showing the evolution of the soil during a given period of time are combined into a movie which allows to better study the dynamics of aggregation (zooming, fast forward...).



Root detail - Zooming features on root system

SOILINSIGHT® makes it possible to observe and measure root growth throughout the growing cycle of the plant and follow the formation / destruction earthworms burrows, thus evaluating over time the impact of these biological agents on soil structure.



General view of the apparatus



Systems showing several cosms



Plants grow inside a cosm