

Efficient and cost-effective in situ measurement of growth-related soil parameters

Field of application

To obtain best quality and quantity results for plant growth in soils and substrates, knowledge of the water and ion content of the soil and thus the dosage of irrigation and fertilizer is fundamental. This is particularly true when we want to support sustainability and the preservation of resources, but also wish to increase yield.

The technology described here now allows for determining the water content, suction tension and ion content of a soil, directly on site.

State of the art

Conventional measurement of single parameters, such as the water content or soil suction tension, is done by means of dielectric sensors or tensiometers. Those sensors generally require complex calibrations and do not allow you to determine the salts present in the soil.

So far, the nitrogen content in soils could only be determined by taking selective samples to the lab and applying methods such as UV spectroscopy. This method is time-consuming, expensive, and the fertilization recommendations obtained are not even sufficiently precise.

Accordingly, irrigation and fertilization are still largely based on intuition. In times of climate change, growing population, and a reduction in farmland, this is no longer an up-to-date solution.

Innovation

At the Institute of Agricultural Engineering of the University of Hohenheim a technology has been developed that eliminates the above-mentioned disadvantages. Multiple probes are inserted into the soil to create a network of measurement support points. The probes contain a porous, hydrophilic matrix whose material and pore size can be adjusted to the growth-relevant parameters to be measured (e.g. soil suction tension, nitrates, phosphates, etc.). One or multiple laser diodes generate a laser light that radiates into the porous, hydrophilic matrix. The growth-relevant parameters cause a light scattering that is proportional to their concentration. The extent of the scattering is optically detected and converted into signals by image processing, which can then be evaluated and processed further. Signal transmission and the evaluation can be performed telemetrically or via cable, on-site or remote.

Your benefits at a glance

- ✓ Soil water content, suction tension and salt content can be measured simultaneously
- ✓ Measurement takes place on site, not in the lab
- ✓ Low calibration efforts
- ✓ Number of measuring probes can be varied depending on the field size
- ✓ Cost-effective measurement procedures via laser diodes
- ✓ No spectroscopy, no wet chemistry required

Technology transfer

Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and assists companies in obtaining licenses.

Patent portfolio

German patent application is pending.

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