Research content for the short video Soil-Nose Utopia 2025

"IMAGINE a FUTURE...

where soil is healthy again"

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Soil-Nose: The breakthrough device smells harmful microbes early and enables sustainable crops.

Green Utopian: Morten Streblow (TU Graz)

Video-Team Institute for Design & Communication - FH Joanneum: Peter Verhounik, Noah Bonevie, Don Dobruna, Nina Schmid

High-performance peat-free fertilizers and growth substrates made from agricultural by-products and waste products

The **SPIN-FERT** project aims to develop new soil management strategies for horticulture. The aim is to process various agricultural by-products and waste products to produce high-performance fertilizers and growth substrates without peat. Peat is widely used in horticulture because its light and airy texture makes it ideal for supplying air and water to plant roots. However, peat is not a renewable resource (at least not in meaningful quantities), as it takes around 1,000 years for a 1-meter-thick layer of peat to form. Peat cutting also destroys and drains important biotopes in the form of moors. These ecosystems also serve as airtight carbon stores, meaning that carbon dioxide is “locked away” in wetlands for the long term. If these are now drained, the previously stored carbon can escape as CO2 and enter the atmosphere. Moorland conservation is therefore not only extremely relevant for species protection, but also of great importance for climate protection.
Our vision is to develop alternative substrates that work at least as well (ideally better) than peat-based substrates without having a harmful impact on the environment. As microbiologists at UBT, we are particularly interested in the plant-promoting properties of various microorganisms and how we can incorporate them into the substrate. The aim here is to enable these plants (e.g., tomatoes, lettuce, or blueberries) to grow faster in horticulture, be more resistant to various pathogens, and deliver better yields with better nutritional values. These parameters are known to be significantly influenced by the plant microbiome, and we want to specifically promote, control, and observe this. To this end, various tools are to be developed that enable quick and easy monitoring, including a cost-effective electronic nose that enables soil health diagnosis based solely on the scent signature.
Soil microorganisms synthesize various volatile organic compounds (VOCs). These should be identified and assigned to specific harmful or beneficial microorganisms in order to quickly and easily assess the health of the soil. The early detection of pests and the targeted enrichment of beneficial organisms can thus be carried out on site without

great effort and, in the future, even by AI-supported robots. Environmental and climate protection aspects are particularly relevant here. The e-nose can certainly be presented well, showing the “bad” smells of diseased soils and plants, the intervention of farmers and scientists, and the “better” scent under healthy conditions, which is reflected in better products.

Research at the site:

- **SPIN-FERT**: Consortium, the project funded by the European Commission under Horizon Europe, aims to revolutionize soil management in horticulture. It transforms agricultural by-products into high-quality fertilizers and peat-free substrates, promoting eco-friendly farming: https://spinfert.eu/