

Automated Soil Pore Water Sampling and Nitrate Detection System

Tech ID: 34142 / UC Case 2025-416-0

ABSTRACT

Researchers at the University of California, Davis have developed a sophisticated soil nitrate sensing system designed to accurately measure soil pore water nitrate concentrations, enhancing sustainable agriculture and environmental monitoring.

FULL DESCRIPTION

This technology encompasses a comprehensive soil nitrate sensing system that integrates a suction lysimeter, a soil moisture sensor, a spectrometer, and a controller. The system measures soil moisture, acquires soil pore water samples based on this estimation, and uses a spectrometer to accurately measure nitrate concentrations in these samples, facilitating precision agricultural practices and environmental monitoring.

APPLICATIONS

- ▶ Agricultural fields for optimized fertilizer application.
- ▶ Environmental monitoring to track nitrate movement and prevent pollution of groundwater and surface water sources.
- ▶ Advanced research in soil science, agronomy, environmental science, and hydrology.
- ▶ Smart farming solutions integrating data analytics for soil management.

FEATURES/BENEFITS

- ▶ Accurately estimates and measures soil nitrate levels.
- ▶ Integrates a suction lysimeter with multiple probes for water sampling from diverse locations.
- ▶ Uses a spectrometer, including UV-Vis, for broad spectrum analysis.
- ▶ Minimizes the effects of Dissolved Organic Carbon on nitrate measurements.
- ▶ Computer-implemented methods for real-time data processing and analysis.
- ▶ Improves accuracy in real-time soil nitrate measurement, crucial for optimal fertilizer application.
- ▶ Reduces environmental impact by minimizing fertilizer leaching and pollution.
- ▶ Enhances agricultural productivity through precision soil management and fertilizer management.
- ▶ Addresses the lack of real-time soil nitrate level monitoring.

PATENT STATUS

Patent Pending

CONTACT

Victor Haroldsen

haroldsen@ucdavis.edu

tel: 530-752-7717.



INVENTORS

- ▶ Bonfil, Cassandra
- ▶ Kisekka, Isaya

OTHER INFORMATION

KEYWORDS

agriculture,

environmental

monitoring, nitrate

measurement, soil

suction lysimeter, soil

moisture sensor, soil

nitrates, spectrometer,

suction lysimeter, UV-Vis

spectrometer

CATEGORIZED AS

- ▶ **Agriculture & Animal Science**
 - ▶ Chemicals
 - ▶ Devices
- ▶ **Biotechnology**
 - ▶ Other
- ▶ **Environment**

- ▶ Sensing
- ▶ **Sensors & Instrumentation**
- ▶ Analytical
- ▶ Environmental Sensors
- ▶ Scientific/Research

RELATED CASES

2025-416-0

**University of California, Davis
Technology Transfer Office**

1 Shields Avenue, Mrak Hall 4th Floor,
Davis,CA 95616

Tel: 530.754.8649

© 2025, The Regents of the University of California

techtransfer@ucdavis.edu

[Terms of use](#)

<https://research.ucdavis.edu/technology-transfer/>

[Privacy Notice](#)

Fax: 530.754.7620