

Researchers develop new realtime soil nitrate sensor

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Credit: Mick Lissone/public domain

Ben-Gurion University of the Negev (BGU) researchers have developed



a new nitrate sensor that will provide real-time and continuous measurement in soil to better detect water pollution and measure conditions for higher agricultural productivity.

Natural nitrate levels in groundwater are generally very low. However, excess application of fertilizers in agriculture often results in leaching of nitrate from the <u>soil</u> to <u>water</u> resources. Increased levels of nitrate in water is one of the main reasons for disqualification of drinking water, causing a worldwide environmental problem.

The new optical nitrate sensor is based on absorption spectroscopy. It enables continuous, real-time measurement of nitrate and can detect nitrate concentrations in the range of tens to hundreds of parts per million (ppm), which is the range relevant to growing crops. Its ability to continuously monitor soil nitrate levels produces a highly detailed portrayal of the rapidly changing concentrations of nitrate in the soil solution. The new sensor is also highly resistant to harsh chemical and physical soil conditions.

The invention was developed by Prof. Ofer Dahan of the BGU Zuckerberg Institute for Water Research, Prof. Shlomi Arnon of the Department of Electrical and Computer Engineering, and Elad Yeshno, Ph.D. student at the Zuckerberg Institute.

"Current methods for measuring soil nitrate are cumbersome, laborintensive and do not provide real-time indication on the actual concentration of nutrients in the soil," says Prof. Dahan.

"Our invention, which enables <u>real-time</u> monitoring of soil <u>nitrate</u> levels, can supply farmers with valuable data on the amount of nutrient availability for crops," Prof. Arnon says. "It also optimizes fertilizer application, thus preventing over-fertilization, economizes irrigation and reduces <u>water resources</u> pollution."



According to Shirley Sheffer Hoffman, senior vice president of business development for water, energy and agriculture at BGN Technologies, BGU's technology-transfer company, "This is another example of the cutting-edge multidisciplinary research preformed at the BGU Jacob Blaustein Institutes for Desert Research, in collaboration with BGU's engineering faculty. This promising project received funding from the Israel Innovation Authority, and now BGN Technologies is seeking an industry partner for its further development and commercialization."

Provided by American Associates, Ben-Gurion University of the Negev

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