

Research team using NSF grant for development of soil sensor

When addressing the ongoing global problem of food scarcity, a key element toward ensuring a successful crop yield is healthy soil conditions.

The need exists for a sustainable method of attaining real-time data on soil health to aid farmers in making better decisions related to food production. In response, the combined efforts of a group of scientists and engineers at Kansas State University are expected to produce a sensor that will provide the agricultural community with continuous measurements of needed data such as soil moisture content, available nutrients and microbial activity.

The team, headed by [Stephen Welch](#), professor of agronomy, has recently been funded by a National Science Foundation Early-concept Grants for Exploratory Research, or EAGER, award of \$300,000 to develop such a sensor.

"Our sensor will be unique as it will be powered by microorganisms that already exist in the soil," said [Stacey Kulesza](#), assistant professor of civil engineering and co-investigator for the EAGER. "And if successful, its use will help farmers to make more informed decisions about agricultural practices."

Other researchers in the two-year project titled "Sustainable Biosensor Integration for Precision Management of Agricultural Soils" are Prathap Parmeswaran, assistant professor of civil engineering; Ganga Hettiarachchi, professor of agronomy; and Ryan Hansen, assistant professor of chemical engineering.

The anticipated result of the funded work will be twofold. First is the development and validation of an impedance spectroscopy sensor powered by a subsurface microbial fuel cell. Then additional data provided by the sensor and fuel cell will be used to create a continuous-time, mathematical/computer simulation model for predicting valuable soil data relevant to crop growth.

"This project will strengthen the collaboration among engineers and agronomists by establishing this new multidisciplinary team to address the issue of global food shortages," Kulesza said.

"A team goal is to be among the leaders in generating new knowledge about tomorrow's challenges facing farmers in Kansas and farmers worldwide," she said.

