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Plant Biology Colloquium | What Controls Soil Carbon Responses to Environmental Change? Jan. 31

Ohio University College of Arts & Sciences

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Dr. Michael Weintraub

The Environmental & Plant Biology Colloquium Series presents **Dr. Michael Weintraub** on "What controls soil carbon responses to environmental change" on Friday, Jan. 31, at Porter 104.

Weintraub is a professor in the Department of Environmental Sciences at the University of Toledo. He received his Ph.D. in Biology from the University of California, Santa Barbara in 2004, and then worked as a postdoctoral research associate at the University of Colorado before coming to the University of Toledo's Dept. of Environmental Sciences in 2006.

Weintraub and his lab study basic processes in the soil, such as decomposition and nutrient cycling, to learn how ecosystems function and how they might respond to disturbances such as climate change. Much of his research since 1996 has been in the Alaskan Arctic, an area already experiencing dramatic changes in climate. More recently he has also been studying nutrient cycling and runoff near his home in Toledo, Ohio, where nutrient runoff into Lake Erie has been causing harmful algal blooms and impairing water quality.

Abstract: The soil organic carbon (SOC) pool is roughly double the atmospheric carbon (C) pool, and increased decomposition with warming may cause soils to act as a significant CO2 source. Surprisingly, in many cases we do not understand the mechanisms controlling C and nutrient cycling well enough to predict the magnitude or even direction of changes in response to disturbances. Because soil microorganisms regulate C and nutrient cycling, we need a better understanding of the controls on their activities to predict how decomposition will respond to warming and other perturbations. A deeper understanding of the interactions between microbial activity, environmental conditions, and organic matter chemistry is needed to improve our ability to predict future fluxes.

While our knowledge of the controls on SOC decomposition and sequestration is improving, many questions remain, and important new ones have arisen. Critical future research areas include disentangling the complex controls on the temperature responses of microbial decomposers, especially at low temperatures relevant to the world's most C-rich soils; improving our understanding of the biophysical controls on microbial SOC breakdown; and incorporating mineral interactions into our conceptual and predictive models of decomposition. Addressing these key knowledge gaps will provide new insights into how terrestrial ecosystems function and help predict how they will respond to disturbances but will require interdisciplinary collaborations and advanced technical capabilities.