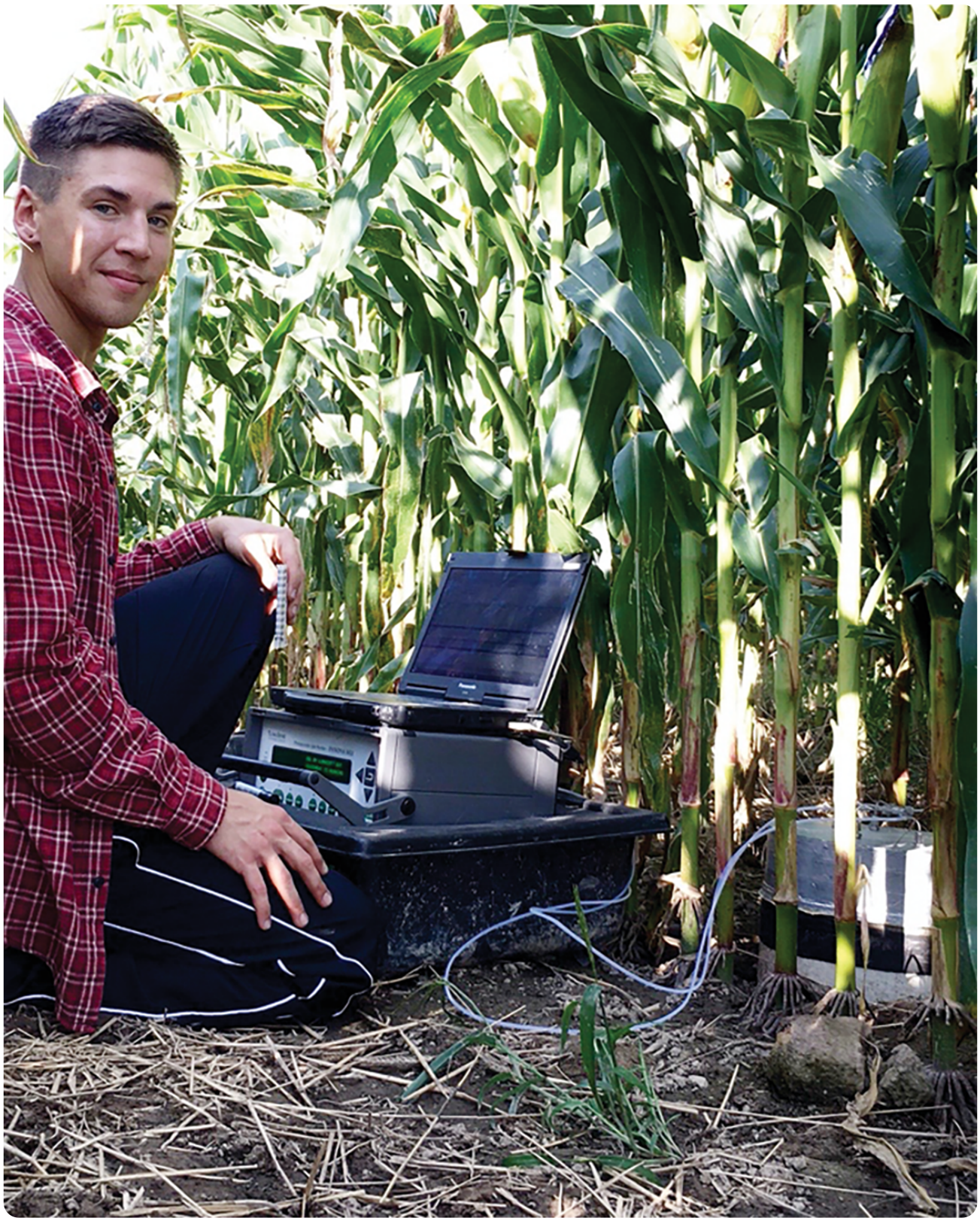
Science Societies

Examining trade-offs among sustainable soil management practices

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Kyle M. Dittmer capturing greenhouse gas fluxes with a photoacoustic multi-gas analyzer from a corn silage system located in Alburgh, VT. Photo courtesy of Kyle Dittmer.

No-till and manure application methods, such as manure injection, can enhance nutrient retention, but both may also increase emissions of nitrous oxide, a powerful greenhouse gas. Therefore, a critical question is whether there are agricultural management practices that can attain the multiple management goals of increasing yields, preventing nutrient losses, and suppressing greenhouse gas (GHG) emissions.

Few studies have investigated the interacting effects of combining reduced tillage and alternative manure application methods. Even fewer have quantified trade-offs among nutrient retention, GHG emissions, and crop quality and yields.

In an article published in the *Journal of Environmental Quality*, researchers from the University of Vermont provide one of the first looks at how manure application methods and tillage regimes combine to affect multiple management goals. The team found that manure injection increased soil mineral nitrogen retention but also increased GHG emissions relative to broadcast application. They also found that no-till reduced carbon dioxide emissions relative to vertical-till without enhancing nitrous oxide emissions.

As no-till and manure injection did not reduce crop yields or quality, the team's results suggest that these best management practices are viable options to reduce soil organic carbon losses and nutrient pollution while providing stable crop production.

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Dittmer, K.M., Darby, H.M., Goeschel, T.R., & Adair, E.C. (2020). Benefits and tradeoffs of reduced tillage and manure application methods in a *Zea mays* silage

system. *Journal of Environmental Quality, 49*. https://doi.org/10.1002/jeq2.20125

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