Science Societies

Studying roots using their electrical properties

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Lead author Solomon Ehosioke inspecting plants in the aeroponics growth chamber. Photo by Maxime Phalempin.

Understanding how the root systems function is useful to improve crop yield in the face of growing population and climate change impacts.

Studying roots in the field is usually challenging because the roots are hidden in the soil with limited access. Electrical methods have been proposed to overcome these limitations because they are relatively cheap, easy to use, and applicable at various spatial scales ranging from laboratory to the field.

In a new *Vadose Zone Journal* article, the authors discussed a range of electrical methods for root investigations. The authors also provided a comprehensive overview of all of the active electrical methods (based on electric excitation) for root studies, used by different research communities at various spatial scales.

Initial studies focused on resistance and capacitance measurements at a specific frequency, whereas recent studies have increasingly focused on impedance measurements at several frequencies; this approach allows both conduction and polarization effects to be studied simultaneously, giving more information on roots at different time and spatial scales. Future studies should focus on the use of multi-frequency impedance measurements to understand the variability of root electrical properties in time and space and across species and genotypes.

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Ehosioke, S., Nguyen, F., Rao, S., Kremer, T., Placencia-Gomez, E., Huisman, J.A., … & Garré, S. (2021). Sensing the electrical properties of roots: A review. *Vadose Zone Journal*, *19*, e20082. **https://doi.org/10.1002/vzj2.20082**

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