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Modeling gas diffusion in aggregated soils

March 30, 2020



Lead author of the article, Navodi Jayarathne, prepares samples for gas diffusivity measurement.

Agricultural soilatmosphere interface is primarily controlled by diffusion and explained by soil gas diffusivity. Since experimental determination of soil gas diffusivity can be expensive and time consuming, predictive models are commonly used to estimate diffusivity from easy-to-measure soil properties like soil total porosity and soil air content.

New research in the *Soil Science Society of America Journal* introduces a descriptive soil gas diffusivity model. Presented as a two-region model, it was developed based on measured gas diffusivity data taken from two agricultural soils from Peradeniya, Sri Lanka under different soil density conditions.

Researchers identified that the pore network in agricultural soils exhibits two distinct pore regions: inter-aggregate and intra-aggregate. As such, they constitute a bimodal pore structure. The two-region model could adequately parameterize and characterize the soil gas diffusivity in selected bimodal soils outperforming the conventional models.

The two-region model provides a tool to accurately estimate gas diffusion in aggregated soils, thus allowing for the gas exchange between the soil and atmosphere with respect to different land use and water management practices.

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Jayarathne, J., Deepagoda Thuduwe Kankanamge, C., Clough, T.J., Thomas, S., Elberling, B., & Smits, K. (2020). Gas-diffusivity based characterization of aggregated agricultural soils. *Soil Science Society of America Journal*, *84*. **https://doi.org/10.1002/saj2.20033**

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