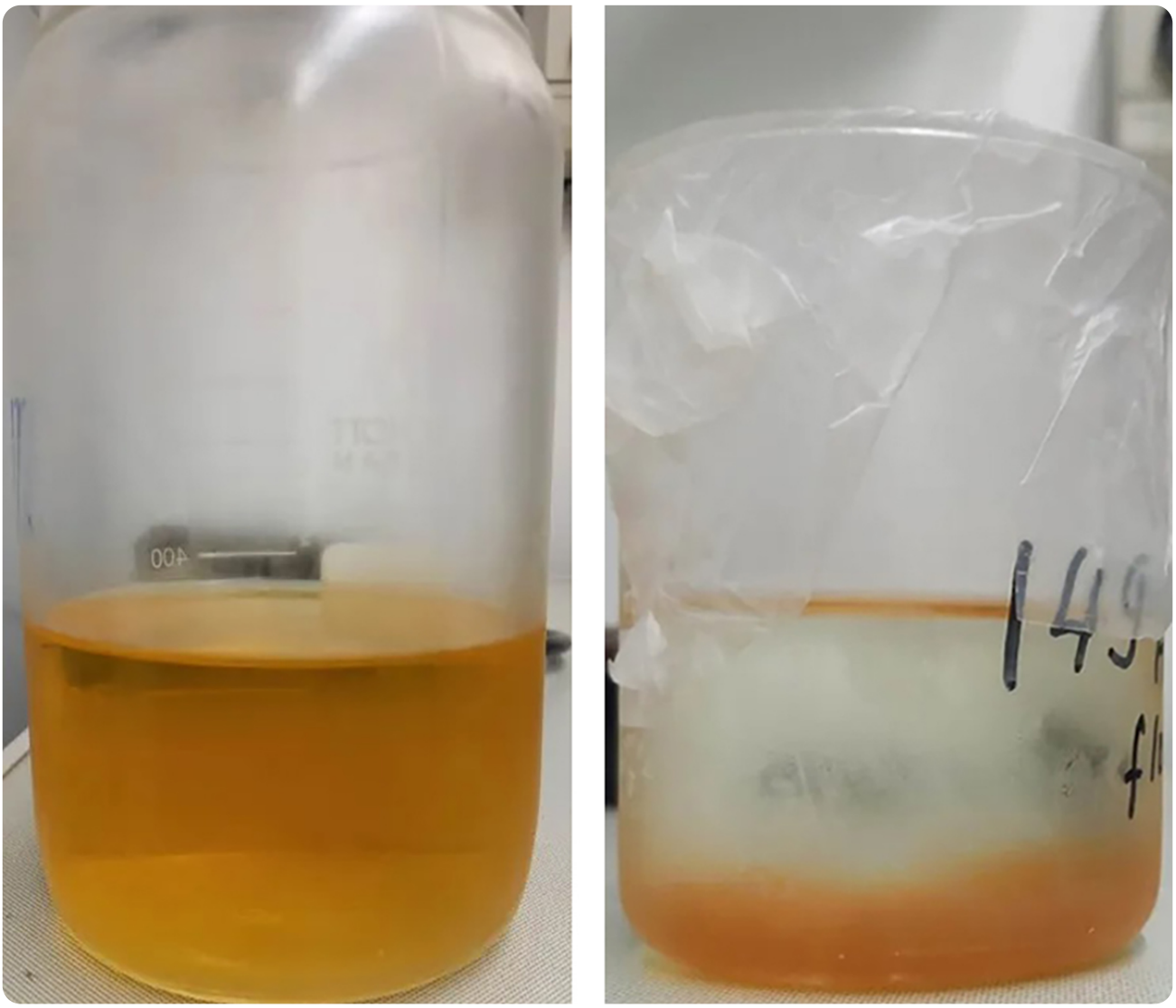
Science Societies

Oxalate-extractable aluminum in temperate soils—an indicator of aluminum hydroxides?

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Dissolved organic matter used to produce models of Al in organic association. Right: Dissolved organic matter flocculated with Al ions as a model of Al in organic association. Photos courtesy of Thilo Rennert, University of Hohenheim.

Various aluminum (Al) species such as Al^{3+} ions, Al hydroxides, or short-range ordered aluminosilicates react with soil organic matter (SOM) and stabilize it. Therefore, assessing SOM stabilization requires the quantification of these species.

However, the reaction products are difficult to identify in soil because they are X-ray amorphous. Oxalate has been frequently employed to quantify these species, but its completeness is still unknown.

A research team publishing in the *Soil Science Society of America Journal* investigated the release of Al from models of Al in organic association (Al adsorbed to organic soils; Al flocculated with SOM) and synthetic Al hydroxides. Oxalate completely dissolved the synthetic hydroxides and almost completely dissolved the organic models.

Aluminum associated with SOM may largely contribute to the total oxalate-extractable Al, particularly in subsoils. Therefore, the researchers consider the general presence of poorly crystalline Al hydroxides in soils of temperate latitude questionable, based on an approximation using classical methods. Thus, they recommend rethinking the frequently postulated importance of these hydroxides for stabilizing SOM in soils of temperate latitude, which is possibly due to misinterpretation of oxalate extraction data. They recommend interpreting Al species that dissolve during oxalate extraction as a continuum of organic and mineral X-ray amorphous pedogenic forms.

Dig deeper

Rennert, T., Antonova, S., & Dietel, J. (2026). Is selective identification of poorly crystalline aluminum hydroxides in soils of temperate latitude possible? *Soil Science Society of America Journal*, *90*, e70177. https://doi.org/10.1002/saj2.70177

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