



Mapping soil-available phosphorus with scanning electron microscopy

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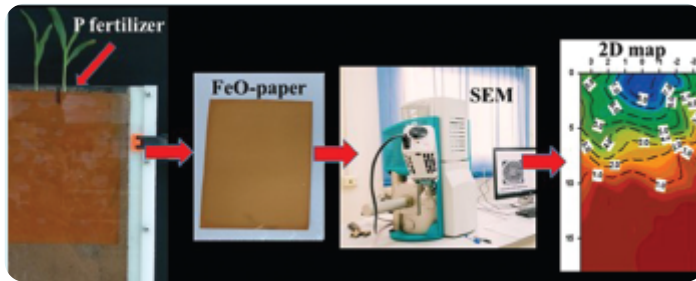


Illustration of the method developed for generation of a two-dimensional labile phosphorus map.

Phosphorus (P) is an essential element for plants. Due to complex chemical reactions in soils, most P is rapidly fixed in a form that is unavailable for plants to utilize. To study the dynamic between P mobility and fixation, it is essential to assess the available P fraction.

Traditional soil P tests are based on aggressive extractions that are destructive and applied at coarse resolution while most P reactions occurs in sub-centimeter scale.

Phosphorus-fixing resin was proven to be an excellent indicator for soil P availability. The common practice is to shake a soil suspension with the resin and then extract the absorbed P.

Authors of an article soon to be published in the *Soil Science Society of America Journal* used the P resin approach (FeO paper) with a modified quantification procedure. The FeO paper is placed directly on moist soil for several hours. The labile P is strongly sorbed to the FeO paper, creating two-dimensional (2D) “footprints” of soil-extractable P. Later, the researchers used a scanning electron microscope that probes with an electron beam to determine P level on the FeO surface.

In this way, a 2D map of P availability in the soil was created. This procedure allows repeated measurements of P mobility and availability over time. The authors found an excellent correlation between the Olsen and Mehlich-III method to the new indirect method. This procedure has the potential to evaluate various P fertilizers, additives, and management practices to find optimal P fertilizer management.

Dig Deeper

Li, Q., & Erel, R. (2020). Generating a high-resolution map of labile soil P using FeO-impregnated paper combined with scanning electron microscopy. *Soil Science Society of America Journal*, 84. <https://doi.org/10.1002/saj2.20027>

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