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Plants need no phosphorus fertilizer above environmentally critical values

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Annbjörg Øverli Kristoffersen, first author of the article in the Journal of Environmental Quality. Photo by Unni Abrahamsen.

Optimizing phosphorus (P) application to agricultural soils is fundamental to crop production and water quality protection. Soil P tests and P sorption characteristics describing crop yield response to P application can also be used in predicting environmentally critical soil P status.

In an article recently published in the *Journal of Environmental Quality*, Norwegian researchers report on P response to P application in barley grown in pot experiments with 45 soils of different P status. The soil P status was measured by four soil P analyses, and the P sorption properties were determined by three methods.

All soil P analyses and two of the P sorption characteristics showed a nonlinear and significant relationship with yield response to P application and manifested a threshold value above which no P response was observed. Readily releasable P in soil reflects the risk of P loss to runoff and also had a nonlinear relationship to soil P analyses and P sorption characteristics. The threshold for yield response coincided with the environmentally critical values determined from the degree of P saturation.

The results support the conclusion that soil P levels for which no P application is needed also have an elevated risk of P loss to runoff.

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Kristoffersen, A.Ø., Krogstad, T., & Øgaard, A.F. (2020). Prediction of available phosphorus in soil: Combined use for crop production and water quality protection. *Journal of Environmental Quality*, 49, 1575–1584.

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