

Comparing in-situ ion- exchange resins and laboratory methods for assessing net N fluxes in soils

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Chemical indices and laboratory incubation methods are frequently used for assessing the net N mineralization rates in soils. However, there are some uncertainties regarding the extrapolation of laboratory derived mineralization

values to the field, because the N mineralization process is affected by a number of dynamic and site specific factors. For this reason, N mineralization rates are increasingly assessed by using in-situ devices, such as ionexchange

resin cores but measuring N mineralization under in- situ field conditions remains still a challenge.

Therefore, this study evaluated several ion- exchange resin methods for detecting N mineralization rates in soils by using lysimeters and the soil water modelling software tool Hydrus.

The used ion exchange resin Purolite 520A proved to be selective for nitrate and acted as a continuous sink until saturation was reached. To extract nitrate again we developed a procedure involving 1M NaCl.

Since all in-situ mineralization methods tend to alter the water flow and solute transport in soils, the extent of that modification had to be evaluated. Therefore, several ion- exchange resin applications were tested and evaluated using a specially designed microlysimeter set up.

For outdoor investigations, the lysimeter site 'Lobau' was used. There, chemical and in-situ ion exchange resin methods were compared for assessing N fluxes in agricultural soils. Resin samplers altered the flow of water in the soil in a way that losses can only be monitored after calibration with lysimeter data. In summary, the retention of nitrate by the tested resins was primarily limited by the hydraulic conductivity barrier between soil and resin.