Crops Leave Large Amounts of Soil Nitrogen

Nitrogen cycling and distribution in soils are of great economic importance because each hectare of crops needs hundreds of kilograms of nitrogen to grow. Environmentally, nitrogen lost from soils can degrade water quality. Cash crops cease taking up nitrogen a month or more before harvest maturity, and residual nitrogen (as nitrate) commonly leaches downward >1 m between fall and spring in the humid mid-Atlantic region. Few studies have investigated residual soil nitrogen deeper than 30 cm, so we don’t know how much nitrogen remains and at what soil depth.

In an article recently published in Agricultural & Environmental Letters, researchers found that, on average, 253 kg ha\(^{-1}\) of plant-available nitrogen remained in the 0- to 210-cm profile following summer crops, 115 kg ha\(^{-1}\) in the nitrate form. Over half of the remaining nitrogen was 90 to 210 cm deep, which is likely to be out of reach to next year’s summer crop. Nitrate 0 to 210 cm deep was as high, or higher, following soybean than corn.

Knowledge of the amounts and depth of nitrogen is critical to developing conservation practices that scavenge residual nitrogen, which can save farmers money in fertilizer costs and reduce exports to bodies of water.


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Estimating Wheat and Rye Forage Availability

Forage producers must choose a stocking rate amid uncertainty about how much forage is available. The rising plate meter was developed to estimate forage availability. It needs a calibration equation to convert its measurement to a prediction of forage mass, and predictions can vary across crops, seasons, and locations.

An article recently published in Agricultural & Environmental Letters reports rising plate meter calibration equations for wheat and rye forage mass in Oklahoma.

Most previous literature uses a linear model, but a recent paper argues for a quadratic model with no intercept. The results favored a quadratic model with an intercept, but wheat models did not require an intercept. Pooling tests showed different models were needed for season (winter and non-winter), and tillage type (tilled or no-till). The no-till models differ because of debris on the surface and the winter models differ due to less water content in winter.

These calibration equations can be used along with the rising plate meter to provide estimates of forage availability. Field clipping will still be considerably more accurate than the rising plate meter, but these calibration equations can help when clipping data are economically infeasible.


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