

Illinois Soil Nitrogen Monitoring: Announcing A New Project

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The low corn yields and early death of the crop in dry areas of the state have resulted in a great deal of N in Illinois soils, both from fertilizer and from mineralization of soil organic matter. Because soil microbes convert ammonium to nitrate over time, we can expect that nearly all of this N is in the form of nitrate.

Nitrate is a form of N that plant roots can take up, of course. But it's also a form that, unlike ammonium, moves readily in the soil. With no roots present in most fields to take up nitrate, the nitrate in the soil now is subject to downward movement with water. If it stays relatively dry between now and next spring, some of this nitrate may remain in the soil to be available for next year's crop. Having a lot of soil N present now might help some producers decide to cut fall N rates, in case the amount of N carried over into the spring means less total N will be needed. Also, knowing how much nitrate remains in the soil next spring can help us fine-tune N rates if corn in 2013 follows corn in 2012.

If there is enough rainfall to get tile lines to run, we can expect some of the nitrate to leave the field in drainage water or to migrate below the root zone. In fields without tile drainage, wet soil conditions (while soil temperatures are above 50°F) can also result in conversion of nitrate to nitrous oxide or nitrogen gas, both of which will leave the soil. Knowing how much nitrate is present this fall can help us know how much loss there might be before corn or soybean roots next spring start taking up what N is left.

Knowing how much soil N remains in fields now will thus provide valuable information from both economic and environmental standpoints. To start to gather such information, we are initiating a project immediately to sample soils for N measurements. Funding is provided by the Council for Best Management Practices; there is no cost to producers or to those who take samples.

The protocol for the sampling follows:

- After harvest of corn, identify a 20 ft by 20 ft site where samples will be collected. This needs to be a site you can return to for spring sampling, and it must be one where you know that N application for the 2012 crop was uniform (not on a headland, for example). This should also be a field where no manure was applied for the 2012 crop, and it might be best to avoid fields where manure has been applied in recent years.

- Take GPS coordinates of the center of the area to be sampled. This and other information will go onto a short form we provide, and a copy of the form will accompany the soil when it is sent to the lab.

- Collect soil samples after harvest this fall, preferably in the second half of October, after soils have started to cool but before any fall NH₃ is applied. This timing means that nitrate in the sample should be close to the amount present as soils cool down and freeze.

- In spring 2013, collect samples at or shortly

before planting (within 2 weeks). Samples can also be collected earlier in the spring once the soil has warmed to near 50°F, but the one close to planting will indicate how much N might be available to the crop.

- Samples should be a composite of 4 to 6 cores (0.75 to 1 inch diameter). If fertilizer N was broadcast-applied or if tillage has been done, take samples randomly from within the area. If N was banded (anhydrous or UAN) in 2012 and soil hasn't been tilled, take one probe core in the band (or center of the row), one core 7 or 8 inch from the band, and one core near the row. Do this in two places and composite for one sample.

- The most important information comes from samples taken to a 1-foot depth. This can be done using a regular probe as long as you can take 0-to-6-inch and 6-to-12-inch samples and combine them. A 15-inch probe works better. If possible, a 1-to-2-foot sample (below where the 0-to-1-foot sample was taken) will also be of interest; take this sample if soils are not too hard to get it. If tillage is done prior to sampling and the surface soil is fluffy, step on the soil surface to firm it up, then sample in the footprint.

- Take the 4 probe samples (6 if sampling after banded N) from each depth and combine them in one bag. Label each bag, package soil samples in the box provided, and send the box to A&L Laboratory along with the information form for each sample location.

If possible, we would like to have at least 10 samples (from 5 sites at 2 depths each) and up to 40 (from 20 sites) shipped to the lab together for efficiency. This will require a coordinator to pull together samples from the sites. The coordinator can be a producer sampling numerous fields – his or her own or from other producers as well – or a public or private employee who assembles samples from producer fields.

Bags and boxes for sampling will be sent to each coordinator by A&L Laboratory of Ft. Wayne, Indiana. To request these, the coordinator need only send an email to Emerson Nafziger (ednaf@illinois.edu), including the coordinator's name and mailing address, the number of samples to be taken (number of sites times 2), and the county or counties where samples will be taken. We will in return email a form to be sent with each set of samples, and we will request that sample bags and shipping boxes be sent directly to the coordinator.

All of the samples put in the same box for shipping should be taken over a 24-hour period and shipped immediately to the lab. If any samples need to be kept for more than 24 hours before shipping, refrigerate them. Shipping should be done on Monday through Thursday; do not ship on a Friday.

Results as they come in will be placed on a map with no identification of producers or GPS coordinates; they will also be made available to the coordinators of the sampling. Δ

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