Illinois Soil Nitrogen Monitoring – Announcing a New Project

The low corn yields and early death of the crop in dry areas of Illinois have resulted in a great deal of N – both from fertilizer and from mineralization of soil organic matter – in Illinois soils. 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 to decide to cut fall N rates, in case the amount of N carried over into the spring means we will need less total N. Also, knowing how much nitrate remains in the soil next spring can help us to 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 degrees) 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 propose to initiate a project immediately with the purpose of sampling soils for N measurements. Funding for this is being provided by the Council for Best Management Practices, thus there will be no cost to producers and those who take samples.

The simple protocol for this sampling follows:

1. Identify a 20 ft. x 20 ft. site after harvest of corn where samples will be collected. This needs ot be a site you can return to for spring sampling, and it must be a site 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.
2. Take GPS coordinates of the center of the area to be sampled. This and other information will go onto a short form provided and a copy of the form will accompany the soil when it is sent to the lab.
3. Collect soil samples after harvest in fall 2012, preferably in the second half of October after soils have started to cool, but before any fall NH_3 is applied. This will mean that nitrate in the sample should be close to the amount present as soils cool down and freeze.
4. In spring 2013, collect samples at or shortly (within 2 weeks) before planting. Samples can also be collected earlier in the spring once the soil has warmed to near 50º F, but the one close to planting will indicate how much N might be available to the crop.
5. Samples should be a composite of 4 to 6 cores (0.75 to 1 inch diameter) taken randomly from within the area if fertilizer N was broadcast-applied or if tillage has been done. 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.
6. 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 0-6 and 6-12 inch samples and combine them. A

15-inch probe works better. If possible, taking a 1-2-foot sample (below where the 0-1-foot sample was taken) will also be of interest, and should be done if soils are not too hard to get this sample. If tillage occurs prior to sampling and the surface soil is fluffy, step on the soil surface to firm it up, then sample in the footprint.

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

If possible, we would like to have at least 10 samples (samples from 5 sites, 2 depths each) and up to 40 samples (samples from 20 sites) shipped to the lab together to make this more efficient. 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 it can be 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 Lab of Ft. Wayne, Indiana. To request these, the coordinator need only **send an email to Emerson Nafziger <ednaf@illinois.edu>, including the name and mailing address of the coordinator, the number of samples to be taken (number of sites times 2), and the county or counties where the samples will be taken**. We will in return email a form to fill out and send 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, they should be refrigerated. Shipping should be done on Monday through Thursday; do not ship on a Friday.

This is a late-breaking effort for this year, and we'll need to move quickly to get started. To do this we ask that **all requests to sampling bags and shipping boxes be sent to Emerson Nafziger no later than October 15, 2012**. We only need to know the number of samples to request the bags and boxes – exact sampling locations can be decided after the bags and boxes reach the coordinator.

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

Emerson Nafziger

Fabián Fernández