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## Soil Profile Nitrate—Spring 2013 Sampling Summary

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### **Abstract**

I wrote an ICM News article this spring ([Soil Profile Nitrate in Corn Fields Following the 2012 Drought](#)) summarizing the fall soil profile residual nitrate-N from 2012 drought affect corn fields. The same field areas were sampled again this spring before planting. As mentioned in an earlier ICM News article ([Wet Conditions and Change in Soil Profile Nitrate](#)), the amount of nitrate-N in the soil profile has changed with the wet conditions this spring.

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### **Disciplines**

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## Soil Profile Nitrate – Spring 2013 Sampling Summary

By John Sawyer, Department of Agronomy

I wrote an ICM News article this spring ([Soil Profile Nitrate in Corn Fields Following the 2012 Drought](#)) summarizing the fall soil profile residual nitrate-N from 2012 drought affect corn fields. The same field areas were sampled again this spring before planting. As mentioned in an earlier ICM News article ([Wet Conditions and Change in Soil Profile Nitrate](#)), the amount of nitrate-N in the soil profile has changed with the wet conditions this spring.

Following was the procedure used to collect samples and summarize the results. After harvest last fall, Iowa State University Extension Field Agronomists, ISU FARM specialists, and staff in our research group collected profile soil samples from 38 field sites, and resampled 35 of those sites again this spring. Most of the fields were on-farm, with some samples collected from a research study conducted at several ISU Research Farms. Samples were collected by one-foot increments to either a two foot or three foot depth. Samples were analyzed for nitrate-N concentration by depth, with concentration converted to pounds nitrate-N/acre amount (lab analysis ppm x 4 = lb nitrate-N/acre). The amount in the profile sample was then summed across the depths sampled.

### Soil Profile Nitrate Summary

The amount of profile nitrate-N has decreased from the fall amounts due to the spring rainfall (Table 1). Unfortunately the wet weather and decrease in profile nitrate is what we were worried about. Based on common sites sampled last fall and again this spring, and with the same sample depths, the reduction in profile nitrate-N was 54 lb/acre for the 0-2 foot depth and 27 lb/acre for the 0-3 foot depth. Since these amounts are from a different total number of sites, one cannot compare the change between the two depths. Also, individual sites had quite different amounts of profile nitrate-N, and changes from fall to spring sampling (examples in the [5/6/2013 ICM News article](#)). Fig. 1 shows that about forty percent of the field sites sampled this spring had more than normal background profile nitrate-N levels. Therefore, sampling fields is important to best know the potential value of carryover nitrate.

As mentioned earlier, nitrate has moved down in the soil profile. For all sites sampled, the change from fall to spring preplant sampling in the 0-1 foot depth was -41 lb nitrate-N/acre, for the 1-2 foot depth was -13 lb nitrate-N/acre, and for the 2-3 foot depth was +21 lb nitrate-N/acre. This shows the movement with water percolation, but also the accumulation in the third foot and that not all nitrate-N has moved below the three-foot depth or out of the rooting zone. As discussed in the previous ICM articles, do not subtract the full profile amount from the 2013 corn N fertilization rate, rather, first subtract a 50-60 pound N amount to account for the typical profile nitrate-N level. Based on the spring sampling, there is still carryover nitrate-N that can be accounted for in 2013 corn crop N applications; just not as much as was there last fall. If above normal rainfall continues, then the amount of carryover

nitrate will continue to decrease.

	0-2 foot		0-3 foot	
	Fall	Spring	Fall	Spring
Number of sites sampled	35	35	22	22
Average profile nitrate (lb nitrate-N/acre)	109	55	119	92
Minimum profile nitrate (lb nitrate-N/acre)	24	16	28	32
Maximum profile nitrate (lb nitrate-N/acre)	248	116	244	196
Standard deviation in profile nitrate-N	68	31	71	52

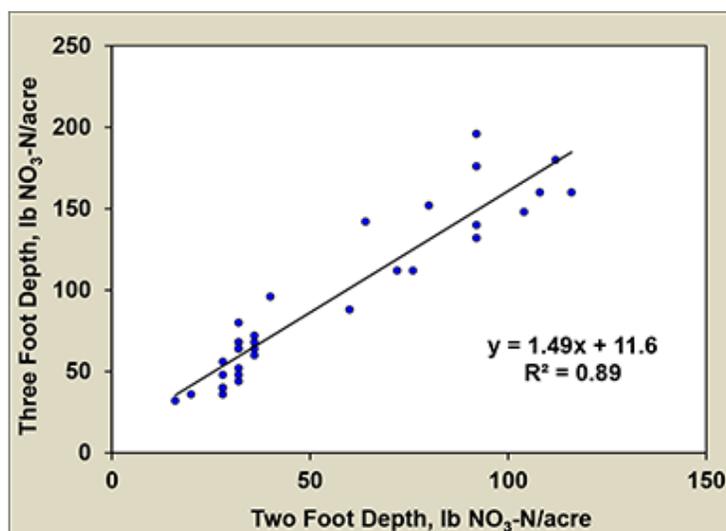
#### Website to View Individual Soil Profile Nitrate Information

In an effort to assess residual soil nitrate-N following 2012 corn crops, a soil nitrate monitoring network map was developed in conjunction with the University of Wisconsin. The amount of residual nitrate-N at each site and sample timing, along with field information, can be found at the University of Wisconsin website <http://uwlab.soils.wisc.edu/soilnitratemonitoring>. Appreciation goes to Carrie Laboski and the nutrient management team in Wisconsin for developing the website.

#### Predicting the Three Foot Nitrate-N Amount

The data from the Iowa spring preplant profile sampling shows a reasonable relationship between the two foot and three foot depth nitrate-N amount (Fig. 1). Although it is preferred to collect samples to a three foot depth, if that sample depth is not possible due to soil conditions, then results from the two-foot depth can be used to estimate the three foot amount. The equation shown in the Fig. 1 gives that conversion (y is the predicted three foot amount in lb nitrate-N/acre and x is the two foot amount in lb nitrate-N/acre).

**Fig. 1. Relationship between the two foot and three foot profile nitrate-N amount, spring 2013 preplant samples.**



The relationship between a one foot sample and the three foot profile amount was also determined. That relationship was weak, and highlights the need that when sampling for residual or carryover profile nitrate-N, a

deeper sampling than one foot is needed. The spring sampling results also highlight a potential problem where presidedress nitrate tests (LSNT) this spring could miss nitrate deeper in the profile, since that test is only collected to a one foot depth.

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