AGRI FACTS™

New Ideas And Reminders On Soil Sampling

As we fast forward into 2000 and beyond it is critical that we not move too quickly through the sampling phase of soil testing. Insufficient effort in this phase degrades this critical best management practice (BMP) to numbers that mean nothing. However, a properly collected and handled soil sample can be a diamond in the rough as it guides farmers to greater profits, efficiency, and environmental quality.

General Guidelines

The fundamental guidelines of soil sampling and handling are well developed and will not be repeated here. General guidelines should be obtained from the soil testing lab that will be used for analysis since soil test interpretation can be influenced dramatically by how and when the sample is taken. Also, the tests to be performed can influence the depth of sampling required. For example, nitrate analysis almost always requires deeper sampling than for phosphorus (P) or potassium (K).

Guidelines For Sampling Where Residual Bands Are Present In Conservation Tillage

The growth in conservation tillage and banding of fertilizer nutrients has added new challenges to soil sample collection. Less mixing of fertilizer bands with bulk soil in these systems increases soil test variability and has been a frustrating problem for the soil sampler. Hitting too many bands in a sample can cause an inflated soil test level and lost profit due to nutrient deficiency while avoiding the bands completely could overestimate fertilizer needs.

Recent research in Colorado and Kansas has resulted in useful guidelines for sampling no-till where K has been banded that allows one to obtain the true average K test for the area sampled.

Where the band locations are known, the number of core samples to be taken between the bands for every core sample taken in-the-bands is equal to 8 times the band spacing in feet. If row spacing is 30 inches, 20 cores should be taken between the bands for every core taken in the band.

When the band locations are not known, paired-sampling where the first sample is taken at random and the second sample of the pair is taken at 50% of the band spacing from the first sample and perpendicular to the band direction will reduce variability over random sampling. These guidelines were developed from P data but are likely appropriate where other immobile nutrients like K have been banded.

Dealing With Soil Variability

We all know that soils within fields are variable. The crop tells us that every year — and screams it to us during droughts when differences in soil texture and organic matter are most apparent. The soil properties that vary within fields result in variation in yield potential and frequently in soil test levels. A recent survey of Missouri crop production fields where the fields were sampled in 2 to 4 acre grids revealed that greater than 100% variability in soil test P and 60% variability in soil test K were common within any of the fields. Bray 1 P levels in one field varied from 16 to 150 lb/A!

What Can Be Done With Variable Fields?

Historically, the extreme areas of the fields have been avoided and a sample taken to represent the dominant area in the field. Another approach is to sample those areas with different soil tests and yield potentials separately or by a grid system and fertilize them separately. This approach was used on the Missouri field mentioned earlier. Dividing this field into 3 areas and applying P as called for with conventional application equipment increased P use by 1600 lb for the 80 acre field, for an added cost in fertilizer, sampling, and spreading of $12.50 /acre. However, corn yields increased by 36 to 46 bu/A which represented a $7000 increase in gross income from the 80 acre field!

Soil sampling by soil type using NRCS soils maps provides another opportunity for variable rate fertility management using conventional equipment. This technique is particularly well adapted where only a few soil types exist in fields and where those differences are closely associated with physiographic differences in the landscape.

To expand further on this idea, a University of Minnesota study using variable rate application equipment produced a striking reduction in corn yield variability across the field and an increase in average yield and net return. The extra investment in intensive soil sampling can result in substantial increases in yields, profitability, and efficiency and at the same time decrease the potential of negative environmental effects caused by reduced crop residue production in under-fertilized areas and excessive residuals in over fertilized areas.

Consistency In Sampling Technique
Depth of sampling, time of sampling, sampling pattern, and sample handling can all influence test results, especially in today's conservation tillage systems. Once an approach is selected, it should be followed each year. This is particularly important if the same individual does not do the sampling each year. How and when the sample was collected should be recorded for each field or area within a field.

Fall Sampling
Successful crop production today demands substantial planning. Complete and accurate crop management plans cannot be made without soil test results in hand. After harvest is an excellent time to soil sample in most systems. Soil conditions are usually favorable for collection of samples and a better job of sampling frequently results. Field time often is in short supply in the spring and soil sampling is the practice frequently omitted when something has to go. Also, research has shown that it is agronomically sound to apply needed P and K on most soils in the fall and fall sampling provides the scientific input necessary to guide that application.