AGRONOMY

Sampling Guide: Soil

Soil sampling lays the foundation for good nutrient management planning. As fertilizer is applied and crops are harvested, the soil test indicates whether the soil fertility is increasing or decreasing. In order to properly monitor these changes, field histories need to be accumulated. History data should include: pervious soil test data, crop rotation and yields, fertilizer and amendment application times and rates, climatic data, soil temperatures, seasonal rainfall and soil moisture conditions. Over a period of years, these histories are a valuable resource in developing a clear understanding which factors have the greatest influence on yields.

Sampling Procedures

In order for a soil test to be an effective monitoring tool, sampling procedures need to be consistent from one year to the next. This is where field histories come in. Factors such as sample depth, area represented, time of year, number of sub-cores and sampling equipment should be the same each time the field is sampled.

Sampling Depth

Most surface samples are taken from a depth of 0 to 6 inches to 0 to 8 inches. This is where management of fertilizers and soil amendments occur, meaning this is the volume of soil that will be affected by a grower's management. The exception to this is the mobile nutrients which have the ability to move with the soil water: nitrate, sulfate and chloride. In addition to the surface, it is recommended that these mobile nutrients also include a profile depth of 6 to 24 or 6 to 36 inches. These profiles need to be collected into a separate bag with the depth labeled.

Of all the factors affecting consistency of a soil test system, sample depth has the greatest influence. Below is a table demonstrating the affects of a tillage system and sample depth on phosphorus soil test values.

Soil Sampling Depth and its effect on Soil Test Phosphorus (Bray I-P)

	------- Tillage System -------		
Sample Depth (Inches)	Plow P ppm	Chisel P ppm	No-Till P ppm
0-1	55	104	172
1-2	50	104	74
2-3	44	94	42
3-6	40	38	22

Stratification in Reduced Tillage

When sampling in no-tillage systems maintaining sample depth is even more important. Immobile nutrients (such as phosphorus) build on the soil surface with broadcast fertilizer applications. At some point in time, it becomes important to determine the degree of stratification. It is suggested that a sample unit/area be used as a test. Instead of a 0 to 6 inch sample depth, perform a split sampling of 0 to 3 inches and also from 3 to 6 inches. This split sampling allows the determination of stratification. If the second depth (3 to 6) is 50% of the surface depth (0 to 3), significant stratification has occurred. Further, broadcast applications without tillage will continue the process. It would be advisable to recommend a deep tillage and begin the no-till process over.

Representative Area Sampling

Conventional Sampling System

Several options are available for determining how to divide a field(s) into individual soil samples. If the field is less than 20 acres, the whole field can be made as one sample. If greater than 20 acres, then multiple samples are required. Topography, soil type or even quadrants can do this division. It is important to remember that unusual areas (farmsteads, fence rows, ponded areas, blowouts, etc.) need to be avoided or sampled separately. Old farmsteads are still apparent decades after they are abandoned.

When sampling, 15 to 20 sub-cores are needed for providing a representative sample. More would be even better. In addition, the laboratory needs at least 8 to 16 ounces of material in order to perform all analyses.

GRID Soil Sampling

Grid soil sampling involves dividing the whole field into small, equal-sized grids. Most grid sizes are comprised of 2.5 up to 5 acres. The soil cores from each grid are collected either from the center point or from random points throughout the grid cell. A minimum of 10 cores is needed in order to provide the laboratory with enough soil to perform analyses.

Time of Year to Sample

The time of year (early fall vs. spring) can affect analytical results. For monitoring, it is recommended samples be collected during the same season: late fall, winter, spring and summer. Do not rotate your sampling schedule.

Research Conducted at the Univeristy of Wisconsin				
Month	pH (ppm)	Organic Matter %	P (ppm)	K (ppm)
September	6.7	2.2	18	140
October	6.9	3.3	18	110
November	7.1	3.7	18	110
December	7.2	4.2	25	170
January	6.9	2.7	28	130
February	7.2	2.8	19	150
March	7.5	3.4	19	120
April	7.2	3.2	19	105
May	6.8	2.8	19	113
June	7.0	2.8	19	92
July	7.0	2.3	10	80

The variation in the test data is due to the natural variability of wetting and drying, freezing and thawing, plant nutrient uptake and nutrients released from residue decay. Since these changes occur at differing rates each year, it is difficult to predict what changes might occur. For this reason, pick the season most convenient for your operation and stick with it.

Sample Handling

Proper handling of the sample is important to maintain the integrity of the soil. Soil is a biologically active material. This activity continues even after the sample has been collected. It is necessary to collect and ship no later than the next day. If storage is required, three options are available: dry the soil with low heat (not greater than 120° F), store in a freezer or at least refrigerate. These processes will slow down or stop the biological activity, preserving sample integrity.

Sample Submittal Forms

To streamline the laboratory's handling and assure fast turnaround of the received samples, include laboratory submittal forms. Laboratory submittal forms or information sheets are available at the AgSource website, by contacting your nearest laboratory location or from your Sales Representative. Essential information includes:

- Your company name and address (this could be pre-printed by the laboratory)
- Grower Name
- Sample Identification
- Crop and yield goals
- Previous crop
- Desired test options