FROM THE GROUND UP

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AGRONOMY NEWS

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EPA'S AGRICULTURE COMPLIANCE ASSISTANCE CENTER

The U.S. Environmental Protection Agency (EPA), with the support of the Department of Agriculture (USDA), has developed a National Agriculture Compliance Assistance Center to provide a base for "one-stop shopping" for the agriculture community -- one place for information about approaches to compliance that are both environmentally protective and agriculturally sound. The Ag. Center seeks to increase compliance by helping the agricultural community identify flexible, common sense ways to comply with the many environmental requirements that affect their business.

Major existing EPA laws and programs that producers of agricultural commodities may be required to comply with include:

Safe Drinking Water Act (SDWA)
Clean Water Act (CWA)
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
Resource Conservation and Recovery Act (RCRA)
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund)
Endangered Species Act (ESA)
Toxic Substances Control Act (TSCA)
Clean Air Act (CAA)
Emergency Planning and Community Right to Know (EPCRA)
Coastal Zone Management Act (CZMA)

The Ag. Center is designed so growers, livestock producers, other agribusinesses and agricultural information/education providers can access its resources easily -- through the telephone, fax, or mail address below. Their intent is to provide plain language materials to help producers comply with environmental laws and avoid enforcement actions.

EPA's Agriculture Compliance Assistance Center
726 Minnesota Avenue
Kansas City, KS 66101
Telephone: (913) 551-7207
Fax: (913) 551-7270
☛Waskom

TIME TO TEST YOUR SOIL

Soil testing labs receive more samples in March than in any other month.

Soil testing for evaluating nutrient levels is absolutely necessary to make the best use of fertilizer for crop production and prevent potential pollution from leaching and run-off. Increasing costs involved in raising crops requires that the most economic level of fertilizer be applied at proper stages of crop production. March is the time of year when most people submit samples for lab analysis, so it is important to send in samples as soon as possible to get results back in a timely manner.

Soil Sampling

Proper soil sampling is crucial to obtaining proper analytical results, whether the sample is analyzed by a laboratory or in the field. Usually 20-30 subsamples per field are required to obtain a representative sample. Time and labor constraints may limit the number of subsamples; however, more subsamples reduce the variability that is common in soil sampling. Soil should be sampled to a depth of one foot for most crops. Corn ground should be sampled to two feet deep and sugarbeet ground to three to four feet deep in one foot increments. If subsamples are not submitted with surface samples, the soil test recommendations for nitrate are based on theoretical nutrient levels of what the subsoils might contain. Fertilizer recommendations may then be over or under-estimated. Any sampling tool can be used from soil tubes to shovels; however, they should be free from rust. Deep subsoil sampling requires the use of an auger with sufficient extensions and possibly some type of mechanism to extract the auger from the soil.

Subsamples from a uniform area should be combined in a plastic bucket and thoroughly mixed. If the sample is to be sent to a laboratory, two to three cups of dried, mixed sample should be placed in a plastic or plastic-lined bag and sealed. The bag should be labelled properly with respect to location. Information about the site concerning type of crop to be grown, whether the crop is irrigated or not, yield goal, and previous crop should also be submitted with the sample. Record keeping at the start of a fertility program helps to evaluate how a site changes from year to year. A grower who has collected soil testing information about his fields for several years may actually be able to reduce the number of soil analyses in the future since enough historical information may sufficiently evaluate a site for its nutritional status with fewer samples.

Samples should be dried at room temperature by spreading them out in a thin layer on some paper towels in front of a fan. If wet samples are sent to a laboratory, they should be kept cool by placing them in a cooler with ice or in a refrigerator.

Sample Preparation

When wet samples are submitted to a laboratory the samples are first air-dried at room temperature. Samples are then ground, the clods are broken up, but the texture of the soil is maintained. Grinding in the field may be done with a wooden or plastic mallet or rolling pin. The sample is then sieved through a 2mm (10 mesh) sieve to remove gravel and large pieces of organic matter. If field testing is to be done, sieving the sample makes the analysis easier since the sample becomes more homogeneous.

Sample Analysis

In the laboratory, the sample is usually weighed and extracted with some type of solution to remove the nutrients. Some laboratories may use calibrated scoops to measure out the sample by volume. Common extractants include ammonium bicarbonate-diethylenetriaminepentaacetic acid (AB-DTPA), sodium bicarbonate (Olsen's test), DTPA (Lindsey's test), ammonium acetate or potassium chloride, to name a few. Different extractants will remove different types of nutrients. For example, AB-DTPA can be used to extract phosphorus, potassium, nitrate, zinc, iron, manganese, and copper. It can also be used to evaluate some heavy metals such as lead and cadmium. Sodium bicarbonate

is used exclusively for extracting phosphorus in alkaline soils. DTPA is used primarily for extracting zinc, iron, manganese, and copper. Ammonium acetate is used for removing extractable bases, such as calcium, magnesium, sodium, and potassium. Potassium chloride is used frequently to extract nitrate and ammonium. At the CSU Soil, Water, and Plant Testing Lab, AB-DTPA is used to extract plant available nutrients. A laboratory can use any reagent to extract plant nutrients from soil if the levels of nutrients from the extractant have been calibrated against field tests to determine crop growth response to fertilizer.

Some extractants are very good for evaluating soil nutrient levels. Sodium bicarbonate, AB-DTPA, Bray, Mehlich, or Morgan's reagent are all good for extracting phosphorus under specific soil conditions such as acid or alkaline pH's. Water, however, has been found to be a poor extractant for soil phosphorus, but can be used to extract sodium in the evaluation of sodium adsorption ratios. Field kits usually use an acidic solution similar to Mehlich reagent to extract soil phosphorus. These are well suited to acid soils but may not adequately evaluate phosphorus in alkaline soils. Kits, however, can indicate whether the soil is low or high in a nutrient when the values for the nutrient level are compared to the manufacturer's soil test level tables.

Different states, private companies, and cooperatives may have different fertilization philosophies.

After the soils are extracted with reagent, the soil has to be filtered out. Most kits have filter paper and funnels that can be used to remove most of the soil from the extractant. After the soil is filtered out, the extract can be analyzed for nutrients. In the laboratory, phosphorus and nitrate are measured colorimetrically using a spectrophotometer. Potassium can be measured by inductively coupled plasma (ICP) or a flame photometer. Micronutrients such as zinc, iron, manganese, and copper can be measured by ICP or atomic absorption spectrometry (AA). Kits are usually limited to the analysis of N, P, and K. The reagents in kits should be handled carefully since some of them may be poisonous or carcinogenic. Material safety data sheets (MSDS) should accompany the kit to indicate what chemicals are hazardous and how to dispose of them. When analyzing samples using a kit, it is important to also analyze a check sample each time to determine whether there is any error in the analysis. A check sample is soil that has been analyzed by a lab so that the nutrient values are well established.

Test Results

Results are usually expressed as parts per million (ppm) or milligrams per kilogram (mg/kg) nitrate-N, phosphorus, or potassium. Nutrient levels are usually expressed on a dry weight basis so ppm are the same as mg/kg.

Fertilizer suggestions are based on the levels of extractable nutrients, whether the crop is irrigated or not, the previous crop, and manure application. Previous crops, such as alfalfa, may add up to 50 pounds of N per acre, whereas beans may add 30 pounds of N per acre. Manure adds about 5 pounds of N per ton. It is important to note what type of extractant was used in the analysis of the soil, since different reagents extract different levels of nutrients especially in the case of phosphorus.

Different states, private companies, or cooperatives may have different philosophies about fertilizer recommendations. From the same soil test results, amounts of fertilizer needed can vary widely. In Colorado, nitrate and phosphorus are the most limiting nutrients. In some cases a recommendation for zinc application may be necessary. In very few cases is potassium, iron, boron, manganese or copper needed.

Conclusion

As with any environmental concern, soil testing must be examined relative to other factors that influence management decisions. Slope, soil type, drainage, irrigation water quality, pest control, or cultural practices all influence how well a crop responds to fertilizer. There may be a tendency to apply more fertilizer to overcome other potential problems that influence crop yield. If soil test results are followed closely over a number of years, however, growers may discover that it may not be necessary to apply high fertilizer levels. Enough information could be accumulated to indicate that crops can be just as productive with fewer nutrients and less cost associated with fertilizers.

☛Self

CERTIFIED SEED APPLICATIONS

Certified seed production applications for 1997 will soon be sent to growers who grew seed in previous years. Anyone interested in producing certified seed in 1997 who did not produce in 1996 should contact the Colorado Seed Growers Association office at 970/491-6202. Applications for fall planted small grains are due on May 15, spring planted small grains on June 1, beans on July 10, and millet on August 10. Foundation seed of spring small grains and millet are also still available.
☛Stanelle

HOW MUCH SEED GETS OUT OF THE GROUND?

Only 57% of viable wheat seed planted resulted in established plants.

A recent article in the Journal of Production Agriculture reported findings from a survey conducted in Oklahoma to determine how efficient wheat producers are in converting viable seed into emerged plants and to pinpoint reasons for poor emergence. Wheat is often grazed in Oklahoma so emergence and stand establishment is even more important than when grain production alone is considered. Over 100 participating growers were visited at the time of planting when seed was collected from the drill tubes and again 10-20 days after planting for stand counts, determination of planting depth, and visual appraisal. The study was conducted for two years.

The results of the study indicated that in both years about 57% of the viable seed planted resulted in established plants. Only a few seed lots had germination below 85%, so poor stand establishment was not due to poor germination. Inaccurate setting of planting depth was a major cause of poor emergence, with planting depth varying from ½" to 2½" within 1 yard of row in many surveyed fields. Plants from seed placed deeper than their coleoptile lengths would not emerge. Seed size also played a role. Seed lots smaller than 22,850 seeds per pound had a 25% reduction in stand compared with larger seed.

The authors recommend that producers limit cultivation depth and tillage frequency prior to planting. Seeding depth is more consistent if the seedbed is firm, and better germination occurs with moist soil at the seeding depth. Depth gauges mounted behind the seed opener reduce variation in seeding depth and, when mounted directly on the opener, are even more effective. Seed should weigh at least 22,850 seeds per pound and finally, the authors think that planter operators need to give careful attention to setting depth and overall condition and operation of the planter.

Acknowledgments:
Stockton, R.D., Krenzer E.G. Jr., Solie, J., and Payton, M.E. 1996. Stand Establishment of Winter Wheat in Oklahoma: A Survey. J. Prod. Agric., 9(4):465-466, 571-575.
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Sincerely,

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