FROM THE GROUND UP

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AGRONOMY NEWS

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A TEST FOR SOIL TESTING LABS

As you prepare to soil sample your wheat fields for fall fertilizer recommendations, think about how much trust and confidence you put in your soil testing lab. How do you know whether the lab you use is giving you sound recommendations? Are they helping you to avoid nutrient deficiencies? Are they preventing you from buying fertilizer when you don't need it? Most likely, your experience with a lab either builds your confidence or causes you to question its accuracy.

What should you look for in an agricultural testing lab? We all expect timeliness without sacrificing accuracy, but how do we know if the analysis and recommendations are accurate? There are three types of accuracy in soil testing. If any of these steps are compromised, the recommendations are questionable.

1) Does the sample accurately represent the field? This is up to whomever takes the soil sample. Were 15-20 sub-samples taken randomly from each 40-acre area to assure adequate field representation? Were areas with special problems, unique soil types, or different management practices sampled separately?

2) Is the analysis of the sample accurate? Did the lab measure the amounts of NO_3-N, P, and K in your soil accurately? One way to detect the degree of analytical accuracy is to ask the lab to explain their quality control procedures. Quality control means running standard samples (soil samples whose nutrient concentrations are known) to be sure that they are measuring the same concentrations as the sample is known to have. Another test you can do yourself is to send the same sample in twice (be sure the sample was well mixed before you split it in half!). The lab should be able to give you the same answers within about 10%.

3) Are the fertilizer recommendations accurate? Were the soil test results calibrated to fertilizer response in field situations similar to your own?

Colorado State University Cooperative Extension has a test in the field this summer to help you to compare fertilizer recommendations from several commonly used labs. The test is being done on irrigated corn for grain in Morgan County (Bruce Bosley), Kit Carson County (Ron Meyer), and

Montrose County (Wayne Cooley). The labs being tested include Servi-Tech, Olsen's Agricultural Laboratory, Ward Laboratories, Colorado State University Soil, Water, and Plant Testing Laboratory, Midwest Laboratories, Harris Laboratories, Weld Laboratories, Triple S Lab, Grand Junction Laboratories, A&L Laboratories, Root and Norton Laboratories, Agricultural Testing and Consultants, and Stukenholtz Laboratory. The recommendations from each of the labs are given below (in no particular order). The recommendations are given as lbs/A of N-P_2O_5-K_2O + any recommended micronutrients.

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Lab Number	Montrose County	Morgan County	Kit Carson County
1	132-0-0	70-20-0	68-0-0
2	115-30-0	220-60-0 + S	140-25-0
3	210-0-60		
4	140-0-0	170-60-0	70-30-0
5	155-0-0	170-40-0	115-15-0
6	150-0-0	185-25-0	130-0-0
7	190-110-0		
8	172-33-0		
9	275-50-210 + Zn,Mn,B		
10	195-180-70 + Zn,B		210-115-0
11		220-40-0 + S,Zn	
12		170-60-30	
13		170-100-30 + S,Zn	

As you can see, the same soil sent to several labs resulted in a range of fertilizer recommendations.

As you can see, the same soil sent to several labs resulted in a range of fertilizer recommendations. We will be taking leaf samples at tasseling and measuring yields to see whose recommendations result in the best yields without spending more money than necessary on fertilizer. If you'd like to see the plots for yourself and make your own judgment, feel free to call Bruce Bosley at (970)867-2493 (Morgan County), Ron Meyer at (719)346-5579 (Kit Carson County), or Wayne Cooley at (970)249-3935 (Montrose County). They will be happy to show you the plots. If you'd like to talk about how the study is designed call me at (970)491-1913.

This work won't benefit you if you don't get your soil tested. So get out there and sample your wheat fields before it's too late!☛Davis

PRECISION AGRICULTURE

This is what the term "precision farming" is all about -greater accuracy and efficiency in the placement and use of crop inputs.

I recently attended a conference on precision agriculture where numerous presentations were made on topics ranging from A to Z in this newly emerging field. Another term that has been used in the press to represent this discipline is variable rate application of crop inputs. The basic premise of this discipline is that agricultural production fields are no longer managed as contiguous units with uniform applications of crop inputs (i.e., fertilizers, seeds or pesticides). Instead, inputs are applied variably over the landscape depending upon the variable requirements of the landscape position. Technologies such as combine yield monitors, variable rate crop production input controllers, and global positioning system (GPS) sensors (utilizing department of defense satellite network) are utilized to accomplish this task. **While one may get the impression that this field requires the use of sophisticated technologies, it should also be emphasized that one does not have to be a rocket scientist to get started in this emerging area of agricultural crop production management.**

Many farmers are getting a start by equipping their combines with yield monitors. In conjunction with GPS sensors, producers can detect spatial variation in yield in their fields. The detailed yield information can take field management to a new level. Instead of managing the entire field with uniform application of fertilizer, for example, you may be able to modify fertilizer applications for different areas of the field, resulting in overall improved efficiency. **This is what the term "precision farming" is all about - greater accuracy and efficiency in the placement and use of crop inputs.** The long-term prospects could be good for farmer pocketbooks and for the environment as well. You'll pay for only the amount of fertilizer you need while loosing less to runoff and leaching.

Most of the experts agree that grain yield monitors are the place to begin. With a yield monitor, GPS sensors, and appropriate software, you will begin the process of identifying problem areas in your fields. For example, a field may average 160 bu./ac., but the digital color map generated with a yield monitor and GPS sensor may reveal areas in the field ranging from 220 to 100 bu./ac. **One might want to adjust nitrogen applications rates for corn based on these field variations in yield potential.**

Keep in mind that while the yield maps generated may look pretty and colorful, they do not tell you the source of this yield variation. If you don't know why, then the question will be what caused these variations. Some problems may be readily apparent, such as variable weed infestations, while others may be more difficult to diagnose. **There are so many variables involved in crop production that analyzing yield maps will present a real challenge.** Was the

yield difference due to soil type, soil depth, soil fertility, drainage, organic matter, pH, compaction, pest infestation, weather, or some other unknown factor? There is a considerable amount of research underway across the U.S. to address some of these questions.

Here are some good rules of thumb to help decipher yield maps:

- Keep analysis simple and quantify obvious factors such as hybrid or variety, nitrogen rate, and seeding rate.
- Seek advice in generating and interpreting yield maps (consultants, extension personnel, etc.)
- Don't make hasty decisions - 3-5 years of yield data and maps may be needed before making major management changes.

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Todd Peterson, Pioneer Hi-Bred's precision farming specialist, says his company has been testing corn plant population response for nearly as long as there's been hybrid seed corn. "Yield response to changes in plant population is fairly consistent across different yield levels and soil factors." He adds, "The range of optimum plant population is relatively narrow in most production systems." Peterson suggests that growers, "be careful before making drastic changes in plant population, because it may just confuse the issue." He cautioned that there is more risk associated with lost yield from stands that are too low than from stands that exceed the optimum plant population. Pioneer is conducting an ongoing variable-rate seeding study with farmers using yield monitors. "It appears the correct way to use the variable- rate controllers is to turn them up and leave them there," joked Peterson. "Just like many factors we can control using precision farming technology, it will take several years of data collection and analysis before we understand how to use these tools. However, we don't expect our recommenda- tions for variable-rate seeding to change a great deal as we continue to learn more about this technology."

The one obvious factor after attending this conference was that there were more questions than answers. But as with any new emerging technology, one has to get into the race at some point in time. Getting started by employing yield monitors seems to be a prudent place to start.☛Shanahan

SALINITY PROBLEMS IN DRY BEANS

Dry beans are extremely sensitive to saline soil conditions compared to most field crops (Table 1). Soil salinity is determined by measuring the electrical conductivity from a moist paste of the soil of interest (units of conductance are mmhos/cm). Electrical conductivity of the soil solution increases with increasing levels of salts present. Salinity affects beans when the electrical conductivity of the soil is more than 0.8 mmhos/cm, and soils that test over 2 mmhos/cm will normally cause some injury to bean plants and reduce yields. Conductance readings of 3.5 mmhos/cm and greater can result in severe yield losses. Varieties vary considerably in growth and survival in saline soils. Susceptible genotypes suffer severe growth reduction, leaf burn and damage at germination and the seedling stages. The literature has indicated that black beans tend to be more salt tolerant than pinto or great northern, but that concept has not been tested in Colorado.

Saline irrigation water often contributes to salt problems in soils. Fields that are irrigated with saline water will have high salt accumulations near the soil surface due to water evaporation at the surface, leaving the salt deposited on the soil surface. Salt accumulation will cause the plant to show water stress due to the inability of the plant to take up water. Marginal leaf necrosis can also develop due to salt toxicity in the leaf tissue.

Table 1. Soil electrical conductivity (mmhos/cm and crop performance

Crop	Relative yield decrease - %			
	0	10	25	50
	mmhos/cm			
Barley	8.0	10.0	13.0	18.0
Sugar beet	7.7	8.7	11.0	15.0
Wheat	6.0	7.4	9.5	13.0
Sorghum	4.0	5.1	7.2	11.0
Soybean	5.0	5.5	6.2	7.5
Corn	1.7	2.5	3.8	5.9
Dry Beans	1.0	1.5	2.3	3.6

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The accumulation of salts can be reduced by special irrigation management techniques. Techniques involve determining the electrical conductivity of both soil and irrigation water. The ratio of these two values will determine what is know as the leaching fraction. This fraction determines the amount of over application of irrigation water (water application beyond consumptive crop use) that should be applied to flush the salts out of the upper soil profile beyond the crop root zone. The irrigation water must be applied in large quantities to dissolve the accumulated salts then transport them through the soil profile beyond the root zone. Fields that have salinity problems should be watered more frequently than nonsalt affected fields to provide adequate soil moisture to the plant. Soils with unfavorable physical properties, such as compaction or high clay content will present a challenge to leaching salts. Since most crops are more tolerant than beans, one should consider alternative crops such as barley, sugar beet or sorghum on fields that have a history of salt problems.

☛Brick

FAX MACHINE

We are pleased to advise that we now have our own FAX machine, which is located in our main office. This will neable our staff to get your messages without delay. The new numbèr is 970/491-2758.

Sincerely,

John F. Shanahan
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