FROM THE GROUND UP

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AGRONOMY NEWS

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THANK YOU!

The Department of Soil and Crop Sciences extends a special thank you to Dr. John Mortvedt for his many contributions during the past 18 months. John joined the Department as a replacement for Hunter Follett in the area of soils extension. He has accomplished much in a relatively short period of time: a series of Service-in-Action sheets describing fertilizer suggestions have been reviewed, updated, and published as a replacement for the single volume guide used in the past. Many of these SIA's required major revision requiring input from numerous faculty and staff. In addition, John has provided leadership in establishing the Certified Crop Adviser program in Colorado by working with public agencies and crop production related organizations in Colorado. He has also been a regular contributor to departmental newsletters, field day programs, and weekly updates on satellite delivery of information. On behalf of the department, I sincerely appreciate all of his efforts and wish him well in all future endeavors.
▫Sommers

USING A CHLOROPHYLL METER TO MONITOR NITROGEN STATUS OF CORN

Parviz Soltanpour, Dwayne Westfall, and I recently finished a 3-year project to evaluate the usefulness of portable chlorophyll meters for evaluating the nitrogen (N) fertility status of irrigated corn during the growing season. The current emphasis on environmental and economic sustainability has resulted in lower N fertilizer recommendations from many universities and soil testing labs. Producers are essentially being asked to manage fertilizer inputs more precisely, with less reliance on "insurance" N. There is currently a need for additional management techniques such as the chlorophyll meter, to help reduce or eliminate the perceived need for insurance fertilizer.

"We believe the most appropriate application of the chlorophyll meter is to compare the average greenness of corn leaves in a field to that of a well fertilized reference strip in the same field."

Our study was conducted in cooperation with Extension Agents in Boulder, Larimer, Morgan, and Weld counties on growers' fields to determine if the portable chlorophyll meter could help producers make in-season N application decisions. The portable chlorophyll meter also has been evaluated on apple, cotton, peppers, potatoes, rice, and wheat, but shows particular promise for use with corn. The concept of plant tissue testing is not new. However, the recent development of the portable chlorophyll meter provides a method to obtain an instantaneous, non-destructive evaluation of plant tissue, providing producers who fertigate with a new tool to manage N more efficiently.

Systematic sampling technique and a sample size of at least 30 leaves per field is needed to accurately determine N response.

The Minolta SPAD-502 chlorophyll meter does not actually measure chlorophyll, but rather leaf greenness. One of the difficulties of using greenness to evaluate N status is that other plant and environmental factors as well as N availability may affect the leaf greenness. Among the factors that must be considered are plant age, moisture status, plant population, genotype, other nutrients that affect leaf greenness, and stress from environmental or biotic factors. For this reason, we believe the most appropriate application of the chlorophyll meter is to compare the average greenness of corn leaves in a field to that of a well fertilized reference strip in the same field. The producer can manage most of the field conservatively, while double fertilizing a single strip to be used as a reference. When the average chlorophyll reading for the field drops below 95% of the reference strip, additional fertilizer is suggested. This sufficiency index (SI) can be calculated as:

$$SI = \frac{\text{Avg of field readings}}{\text{Avg of readings from the well fertilized reference strip}} \times 100\%$$

Optimal reading times for in-season N management are sometime between the 6-leaf and tassel stages. Plants smaller than about 1 foot tall are quite variable and probably not reliable indicators of potential crop response to additional N fertilizer. Corn hybrids will differ in greenness, so do not compare readings of one hybrid to those of another to make N fertilizer decisions. One of the other problems we have noted is that a good deal of variability in leaf greenness can occur within a typical production field. Systematic sampling technique and a sample size of at least 30 leaves per field is needed to accurately determine N response. It is important to consistently sample the same leaf from each plant. For plants that have not tasseled, we recommend the uppermost fully expanded leaf with an exposed collar. After tassel, use the ear leaf. It is also very important to consistently measure greenness at the same location on the leaf.

Our research indicated that a sampling position halfway between the stalk and leaf tip will give the most consistent reading.

The Minolta SPAD-502 is currently the only chlorophyll meter on the market and it costs about $1,200. The cost will probably limit its use to serious crop advisors. Extension Agents in counties with significant irrigated corn acreage may want to consider purchasing a meter, but should be advised that it can only diagnose N sufficiency, not N requirement. If you are interested in acquiring a chlorophyll meter, give one of us a call. ▫Waskom

1995 CORN MATURITY STATUS

Because the number of days from silking to physiological maturity or black layer formation is fairly constant, one can generally estimate maturity date by adding 60 days to silk date, assuming average temperature conditions after silking.

Because of delayed planting and early season cool and wet conditions, corn producers have many concerns about the maturity status of the 1995 Colorado corn crop. Many are asking, "How far behind normal is the crop?".

One can make rough estimates of delayed maturity by comparing accumulated 1995 growing degree days (GGDs) from planting to date versus average GDDs accumulations. Accumulated GDDs to date (August 11) are 15-30% below normal across the state. However, a more useful indicator of crop progress in 1995 is silking date. Because the number of days from silking to physiological maturity or black layer formation is fairly constant, one can generally estimate maturity date by adding 60 days to silk date, assuming average temperature conditions after silking. The obvious value of silk-date-plus-60 days is to compare projected maturity with average frost dates for your area. For example, if your corn field silked on July 30, then it would reach maturity on approximately the 30th of September. Compare this date with average killing frost dates to assess potential crop risk to frost injury. Regarding current crop status, the Colorado Department of Agriculture Statistical Service reported that 65% of the state's crop had reached silking by August 13. This compares with 50 percent of the corn crop silked by August 1 in an average year, indicating that crop maturity in 1995 appears to be about two weeks behind normal.

Crop maturity in 1995 appears to be about two weeks behind normal.

What kind of yield reductions can one expect with delayed silking dates? Unfortunately, the answer varies greatly from year to year. Little evidence has been gathered in Colorado to address this question. However, long-term research conducted at Iowa State University in northern Iowa (where length of growing season is similar to northeastern Colorado) has shown that delaying planting from the optimum date (late April-early May) to June 1 delays silking dates by about two weeks. This resulted in a 14% average reduction in grain yield and 6% increase in grain moisture. In another long-term study in southern Iowa it was found that delaying silking from July 20 to August 7 resulted in a 22% reduction in grain yield. The 1993 Colorado corn growing season, which was cool with delayed silking dates, may also provide some insight into possible expectations for 1995. The average state corn yield in 1993 was 130 bu/A, which was 20% below the five-year average. While this does not imply that 1995 yields will be reduced by this amount, as the remainder of the 1995 season may differ significantly from 1993, it does give cause to be concerned.

The point of this whole discussion is to provide an update on crop maturity status and encourage producers to prepare for all possibilities as we

approach the fall harvest period. It is not too early to begin scouting for fields that are most delayed in maturity. These fields have the lowest probability of maturing before frost. It may be prudent to consider these fields as potential for forage harvest. Thus, one would want to begin identifying end users for the forage product and make plans for forage harvesting operations. One would also want to begin making plans to accommodate high moisture grain in your grain handling system, as delayed silking dates normally spell high moisture grain at harvest. ▫Shanahan

CYANAZINE (BLADEX®) HERBICIDE VOLUNTARILY CANCELED

EPA and Dupont have signed letter of agreement to phase out production of cyanazine for use in the U.S. over the next four years.

Environmental Protection Agency (EPA) announced on August 2 that it has signed a letter of agreement with Dupont to phase out production of cyanazine for use in the United States over the next four years. Cyanazine is sold by the tradename BLADEX® and is also a component of the package mix, EXTRAZINE®. Cyanazine is a major corn herbicide in Colorado. According to the 1992 Colorado Pesticide Use Survey by Dr. Bert Bohmont, cyanazine is used on 88% of the sweet corn acres, 11% of the grain corn acres, and 9% of the forage corn acres. This results in approximately 105,000 acres of corn in Colorado being treated annually with cyanazine.

Significant use rate changes will not come into affect for Colorado users until the 1998 season.

During the phase out period, use rates will be reduced in the following manner. All products released for shipment after July 25, 1996, will state a reduction in maximum seasonal application rates from the current 6.5 pounds per acre to 5 pounds by January 1, 1997, to 3 pounds by January 1, 1998, and 1 pound by January 1, 1999. All sales and distribution by DuPont are prohibited after December 31, 1999. Growers will be able to use up remaining supplies of cyanazine through 2002. Current Colorado use rates for cyanazine are in the range of 1-2 pounds per acre. Therefore, significant use rate changes will not come into affect for Colorado users until the 1998 season. In addition, the agreement states that all applications will require a closed cab system after January 1, 1998.

This action is a result of EPA conducting a special review of the triazine herbicides (atrazine, cyanazine and simazine) and the cost to DuPont to reregister the product. The special review was based on EPA's concern that long term exposure to these pesticides in food and drinking water may pose a risk of cancer.

Growers should take advantage of the four year phase out by getting ready for the change through experimenting with new products and application timings on limited acres. ▫Apley

CCA EXAM DATES SET

Information concerning the 1996 Certified Crop Adviser (CCA) exams has been distributed by the American Society of Agronomy (ASA). CCA exams will be given twice in 1996, on February 2 and August 2. The February location will be at the Adams County Fairgrounds near Brighton, the same location as in 1995. The August location has not been selected yet.

<u>The deadline for receiving exam registration papers and fees at the ASA Headquarters office is December 15,1995</u>. All applicants for the February testing date should plan to mail their registration papers and fees by December 1, because late

REMINDER: Obtain your application forms early this fall if you intend to participate in the February 2, 1996 testing. Send the completed form and the appropriate fee(s) to the ASA Headquarters by December 1, 1995 to insure registration for the February 1996 testing date.

registrations will be moved to the August testing date.

The examination fees are $100 for the National exam and $75 for the State exam. Fees for retakes of each exam are half price. As in 1995, the registration fee for all state and federal government employees has been waived for both 1996 testing dates. However, all applicants will have to pay the full registration fee for the National exam starting in 1997.

Those interested in applying for either or both the National and State exams should request an application form from the American Society of Agronomy, 677 South Segoe Road, Madison, WI 53711 (phone 608-273-8080). Their fax number is 608-273-2021. Applicants should also request a copy of the Performance Objectives for the National and/or State exams. Performance Objectives are an outline of the material which will be covered by these exams.
▫Mortvedt, Apley and Waskom

INTERAGENCY TRAINING FOR CERTIFIED CROP ADVISERS

Colorado State University Cooperative Extension and the Natural Resources Conservation Service will be providing Certified Crop Adviser training during the last week in September or the first week in October at Greeley, CO. The two day session will combine classroom with practical field training in the competency area of soil and water management. The training is targeted to individuals who are preparing to take the Certified Crop Adviser exam on February 2, 1996. The training will also provide continuing education units (CEU's) for individuals who are already certified. For more information, please contact Jerry Alldredge, Weld County Cooperative Extension, (970)356-400, Ext. 4465 or Michael Petersen, USDA-Natural Resources Conservation Service, (970) 330-0380. Please publicize this educational opportunity in your area.
▫Apley

FERTILIZER APPLICATION FOR WINTER WHEAT

This is the season when wheat growers are planning their fertility program for next year's winter wheat. Adequate soil fertility is one of the main requirements for profitable wheat production. Nitrogen (N) often is the most limiting plant nutrient for wheat. Phosphorus (P) also is frequently deficient for optimum wheat production. Soils likely to be P-deficient include severely eroded areas, soils low in organic matter, and soils which contain large amounts of free calcium carbonate (high pH soils).

For an accurate assessment of the fertility status of a given field, soils should be tested for NO_3-N, available P, potassium, and zinc, organic matter content, and soil pH. Take soil samples from the tillage layer (4 to 8 inches) or the 1-foot soil depth. Take subsoil samples to a depth of 2 feet for NO_3-N determination.

Fertilizer rates for wheat should be based on crop needs for realistic expected yields on a field-by-field basis.

Nitrogen Recommendations

Nitrogen fertilizer rates should take into account various credits for available N in the soil. These credits are: (1) NO_3-N in the root zone prior to planting, (2) N which will mineralize during the growing season from the soil organic matter and previously

grown legumes, and (3) N in manure and irrigation water applied to the field.

Most efficient use of N can be obtained by applying some of the N fertilizer prior to or at planting. The remainder can be topdressed in the early spring, especially if soil moisture conditions are favorable.

For an accurate assessment of the fertility status of a given field, soils should be tested for NO_3-N, available P, potassium, and zinc, organic matter content, and soil pH.

Suggested N rates for dryland wheat at an expected yield of 50 bushels per acre are given in Table 1 (see last page).

Suggested N rates for irrigated wheat at an expected yield of 100 bushels per acre are given in Table 2 (see last page).

Phosphate Recommendations

Crop responses to phosphate fertilizers generally occur only on soils with low to medium soil test levels. Band or seed row) applications of phosphate fertilizers are more effective than broadcast applications. Some of the N may be applied with the seed in combination with phosphate fertilizers for band application, but not more than 20 lb N/acre. Mixing phosphate fertilizer with wheat seed for drill planting is an effective method of applying low rates of N and P. Dual application of N and P in a band prior to planting also is an efficient method of applying both of these nutrients.

Suggested phosphate fertilizer rates for dryland and irrigated winter wheat with band (or seed row) application are given in Table 3 (see last page).

Where trade names are used, no discrimination is intended, and no endorsement by the Cooperative Extension Service is implied.

Other Nutrients

Most Colorado soils are relatively high in available potassium, and few wheat responses to potassium fertilizers have been reported. There have been no confirmed micronutrient deficiencies in wheat in Colorado. ▫Mortvedt

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Sincerely,

John F Shanahan

John F. Shanahan
Editor and Extension Agronomist

Table 1. Suggested nitrogen rates for dryland winter wheat, as related to NO_3-N in the soil and soil organic matter (expected yield, 50 bu/A).

ppm NO_3-N in soil*		Soil organic matter, %		
0-1 ft	0-2 ft	0 - 1.0	1.1 - 2.0	>2.0
		-----Fertilizer rate, lb N/A-----		
0 - 3	0 - 5	75	75	75
4 - 6	6 - 9	75	70	50
7 - 9	10 - 12	75	45	25
10 - 12	13 - 15	50	20	0
13 - 15	16 - 18	25	0	0
> 15	> 18	0	0	0

* Concentration of NO_3-N in the top foot of soil or the sum of NO_3-N concentrations in 1-foot sample depths to 2 feet.
-To adjust N rate for expected yields different from 50 bu/A, add or subtract 20 lb N/A for each 10 bu/A difference (maximum N rate is 75 lb/A for dryland winter wheat).

Table 2. Suggested nitrogen rates for irrigated winter wheat, as related to NO_3-N in the soil and soil organic matter (expected yield, 100 bu/A).

ppm NO_3-N in soil*	Soil organic matter, %		
	0 - 1.0	1.1 - 2.0	>2.0
0 - 6	125	95	75
7 - 12	105	75	55
13 - 18	85	55	35
19 - 24	65	35	15
25 - 30	45	15	0
31 - 36	25	0	0
> 36	0	0	0

* Sum of ppm NO_3-N in 1-foot sample depths to 2 feet (for sample depths of 1 foot only, multiply the ppm value by 1.67 before using the table).
-To adjust N rate for expected yields different from 100 bu/A, add or subtract 20 lb N/A for each 10 bu/A difference.
NOTE: Increase the above rates by 40 lb N/A in the following counties: Alamosa, Conejos,Costilla, Rio Grande, and Saguache.

Table 3. Suggested phosphorus rates for dryland and irrigated winter wheat.

ppm P in soil		Relative	Fertilizer rate, lb P_2O_5/A	
AB-DTPA	$NaHCO_3$	level	Dryland	Irrigated
0 - 3	0 - 6	low	40	40
4 - 7	7 - 12	medium	20	20
> 7	> 12	high	0	0