FROM THE GROUND UP

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AGRONOMY NEWS

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FREEZING TEMPERATURES IN NORTHEAST COLORADO ON MAY 26, 1992

The spring freeze which occurred on May 26 in eastern Colorado did cause extensive damage; however, severe damage was limited to areas from 10 to 20 miles wide east of the state line and about 100 miles long. This area is near the towns of Holyoke, Wray, Idalia, and Burlington. Damage was limited to injury on winter wheat and corn. Other crops escaped the freeze because of later planting and emergence dates. The most severe freeze injury of that May 26th storm occurred in Nebraska and northwest Kansas.

Temperatures during the first week after the freeze were cold and very little plant growth occurred. Damage was evident and easy to detect 12 days following the freeze this year. Wheat kernels stopped developing and began to shrivel. These seeds, partly formed, froze and will shrivel. A quick glance reveals a noticeably blank narrow head with awns that stick straight up.

During the survey on June 4, many fields of wheat showed indications of maturity; however, this may be misleading. There are complete fields of wheat that may not be harvested

within this severe freeze zone along the eastern Colorado state line. Other fields are partially damaged by frost but, in either case, prolonged drought and temperatures below freezing destroyed a significant number of wheat acres. Damage on droughty fields could have been intensified by poor root systems of wheat.

Corn injury was most severe within the same area as wheat. Many fields have been replanted either partially or entirely. Soil temperatures seemed to have an effect on the extent of damage. Fields clean tilled, fields having dark soils, or fields recently irrigated had less damage than no-till or fields having light colored soil.

Hunter Follett was hospitalized for several days last week. He is now back in the office and working on several projects.

All cards, calls, and visits were much appreciated.

Plants having marginal frost damage had partially frozen leaves but, in many instances, complete leaves were frozen causing severe damage. When the stalk was frozen to within 2-3 inches from the soil surface, it is anticipated these plants will recover and yield well. Even though the growing point was not frozen, on plants having 1-2 inches of green tissue next to the soil line, these plants may not recover sufficiently. The rolled up central leaf on plants occasionally shows decay. When this occurs, and plants fail to quickly respond with new green leaves, the plants are weak and will not yield. Fields having 15,000-18,000 sound plants at this time are worth saving. Replant costs are high and shorter maturing varieties have less yield potential.

Cold temperatures during the last several weeks caused most corn fields to turn a yellow color. Cultivation should help warm the soil and improve color. Small amounts of nitrogen added to the center pivot will improve growing conditions when plants are small.

Temperatures in the low 20's° F were observed lasting up to 5 hours in the eastern Colorado locations. These temperatures were cold enough to promote damage in all areas of fields. ▫Croissant, Shanahan, Brown

EXTENSION PERSONNEL CHANGES

Extension Specialists in the Department of Agronomy will be changed effective July 1, 1992. Duane Johnson will have a partial Extension appointment (1/3 time) in the area of new and alternative crops. Duane will continue and hopefully expand his activities in both applied research and Extension on new crops for both irrigated and dryland crop production systems.

In turn, Parvis Soltanpour will no longer have a formal Extension appointment. He will assume additional teaching and research responsibilities in the area of environmental soil science and water quality.

We hope that this staffing change will strengthen our overall program in Extension Agronomy. ▫Sommers

SEED SIZE AND FIELD PERFORMANCE

Seed within the same variety may come in many sizes and weights. For years, there have long been speculations as to the effect of seed size on field performance. Eighteenth century agronomist Jethro Tull, in his book, Horse Hoeing Husbandry, recommended the use of "mid'l siz'd seed" because small seed wouldn't grow well and large seed could better be utilized for human consumption.

Small seed functions as well as larger seed under optimum cropping conditions, but under stress (moisture, heat), the larger seed has more reserves to produce a high yielding plant.

Since Cooperative Extension does not employ a psychic using a crystal ball to forecast the weather, the next best would be to plan for plant stress and plant larger, heavier seed.

Years ago, research showed that seed size in corn was not a factor. We were encouraged to sell customers small rounds or small flats for their plate planters, because there were more small seeds in a 50 pound bag.

Recently, there has been extensive research on seed size performance in small grains. There is some variability because most work shows a positive yield effect for large, plump seed, and some shows no effect. What do we believe? My evaluation indicates small seed functions as well as larger seed under optimum cropping conditions, but under stress (moisture, heat), the larger seed has more reserves to produce a high yielding plant. Since Cooperative Extension does not employ a psychic using a crystal ball to forecast the weather, the next best would be to plan for plant stress and plant the larger, heavier seed.

Seed lots have seed varying from very small to very large. Seed conditioning removes those unwanted small kernels. Most seed is cleaned through an air/screen cleaner. This machine is the first step in improving seed size. Increase the airflow to remove the maximum amount of lighter seeds with the chaff. Use of a slotted bottom or sifting screen will remove shrivelled seeds and retain the more desirable plump kernels. Use a 5½ x ¾ or 6 x ¾ for best results. Screen sizes will vary by variety.

The gravity table is the second method of increasing seed size. This machine actually floats the small seed above the larger, plumper kernels, yielding a denser, heavier seed lot. Don't be afraid to remove larger amounts of tailings during the conditioning process. Shrink rates of 10 - 20% are not uncommon and I have heard of 50% removal in poorer seed lots.

There is a quick method of determining seed size in purchased seed lots. Many certified and commercial seed producers list bushel test weight and seeds per pound on the label. Bushel test weights in wheat above 61-62 pounds per bushel are very good. Between 13,000 to 14,000 seeds per pound are average for wheat. Both these figures may change for smaller seeded varieties or during years where stress affects grain fill.

Larger and plumper seeds may produce a more vigorous crop in the field, especially under stressful conditions. Seed conditioning methods will remove those less vigorous seeds and produce a seed lot with better potential for top yields. Seeds per pound and bushel test weights are two ways to judge quality in purchased seed. ▫Stanelle

WATER QUALITY/BEST MANAGEMENT PRACTICES FIELD DAY

Several articles have appeared in *Agronomy News* this year regarding the use of quick tests to measure soil nitrate availability. This is a relevant topic because fertilizer and irrigation practices currently used by many Colorado farmers are suspected of causing groundwater quality problems due to leaching of NO_3 into the groundwater.

Farmers occasionally apply more N fertilizer than is required to "insure" adequate N. Because of excessive "insurance" N levels that may leach into the ground water and increase fertilizer costs, there is a need to develop environmentally sound and economically viable fertilizer management tools for farmers and crop advisors.

Field days will be held June 30 - July 1, 1992 to introduce the Pre-Sidedress Nitrate Test to interested Extension agents who are addressing nutrient management issues.

Current N fertilizer recommendations in Colorado are based on soil samples taken in the fall or in the early spring before planting. However, the majority of N uptake by corn occurs in mid-summer. Mineralization of N from manure or other organic matter, and NO_3 leaching, can significantly change soil N status during this time. The pre-sidedress nitrate test (PSNT), developed in Vermont by Magdoff (1984), may improve N recommendation accuracy and help to minimize the use of "insurance" N fertilizer in Colorado. By complementing preplant soil testing with PSNT, it may be possible to improve N fertilizer requirement prediction accuracy, resulting in reduced leaching of NO_3 to groundwater.

The current PSNT is based on NO_3 concentration in the top foot of soil when corn is about 6-12 inches tall. Sampling at this stage of growth is a compromise between being early enough to allow sidedress applications of N fertilizer before the corn gets too tall to allow equipment entry, and late enough to evaluate the influence of spring weather conditions and early irrigation on N availability for the remainder of the season. Quick soil test kits for NO_3 have been developed that allow "field testing," thereby alleviating the problem of slow turn-around time in commercial soil testing laboratories.

A five county study was initiated by the Agronomy department and Extension agents in Adams, Boulder, Larimer, Morgan, and Weld counties to investigate and demonstrate the use of PSNT for irrigated corn. Eight nitrogen fertilizer rates will be used to obtain a range of soil nitrate levels and yield responses. Extension irrigation specialists and the Northern Colorado Water Conservancy District agronomists are cooperating in this project to measure how irrigation efficiency influences the use of PSNT.

Field days will be held June 30 - July 1, 1992 to introduce this methodology to interested Extension agents and staff of other agencies which are addressing nutrient management issues.

The schedule with specifics for time, place, and contacts is on the following page.

The Water Quality/BMP field days are scheduled as follows:

June 30, 1992

10:00 am Boulder County
Cooperator - Mike Laber

7042 N 107th Ave, Longmont (Hwy 287 south of Longmont)

For further information, contact Larry Benner 776-4865

2:00 pm Weld County
Cooperator - Dennis Hoshiko

West side of Hwy 85, SE of Old Monfort Feedlot, Greeley

For further information, contact Jerry Alldredge 356-4000

July 1, 1992

2:00 pm Morgan County
Cooperator - Bob Zadel and Stan Linker

1/4 mile west of Hillrose to Morgan Co Rd 33, North 1.6 miles

For further information, contact Bruce Bosley 867-2493

▫Waskom

CHOOSING A FERTILIZER

Most of us have been faced with the dilemma of choosing a fertilizer for our lawn and garden plants. This can be a very difficult and intimidating process if you're not prepared to deal with the garden supply salesmen. Fertilizer manufacturers complicate the process even further by marketing fertilizer in a multitude of ways. There are complete fertilizers, incomplete fertilizers, special purpose fertilizers, foliar fertilizers, fertilizer and pesticide combinations, organic fertilizers, inorganic fertilizers, slow-release fertilizers, etc.

First we need to understand the numbers that are marked on the fertilizer bag. Fertilizer grade is expressed as a set of three numbers such as 10-10-10 or 16-8-8. Fertilizer grade is the minimum guaranteed percentage of plant nutrients in a fertilizer. The numbers "16-8-8" on a fertilizer bag mean that the manufacturer guarantees that it contains (always in this order) 16 percent total nitrogen (N), 8 percent available phosphate (P_2O_5), and 8 percent water-soluble potash (K_2O). The remaining 68 percent of the product consists of other elements necessary to stabilize the chemical compounds such as calcium, chlorine, and oxygen. If a nutrient is missing, it is represented by a zero; thus, 45-0-0 for urea, 0-46-0, for triple superphosphate, 0-0-60 for potassium chloride (muriate of potash), and 18-46-0 for diammonium phosphate. The order of arrangement for secondary and micronutrient varies with the need of the additional plant nutrients and by state regulations.

When a fertilizer contains the three major plant nutrients nitrogen, phosphorus, and potassium, it is called a "complete fertilizer". However, it is not complete since it may not contain any of the minor plant nutrients such as iron or manganese. When only one or two of the major plant nutrients are present in a fertilizer, it is referred to as an "incomplete fertilizer".

Special purpose fertilizers are formulated to induce a desired

response from a plant. An example of a special purpose fertilizer is a low nitrogen-high potassium fertilizer. This fertilizer is formulated to increase drought tolerance of turfgrasses.

Foliar fertilizers are water-soluble materials applied to the foliage of a plant instead of the soil. This method of fertilization is usually practiced in supplying minor elements, such as iron and manganese. Foliar feeding is fast acting, but it is not long lasting like soil applications.

When purchasing fertilizers, look for terms like:

slow release
controlled release
sulfur coated urea
ureaformaldahyde
water-insoluble-nitrogen

These are all forms of fertilizers which release nitrogen slowly to plants.

You will pay more for these types of fertilizers, but the benefits may outweigh the cost.

Fertilizers are often combined with pesticides. These fertilizer- pesticide combinations make it easy for the home gardener to treat pests such as weeds while they are fertilizing their lawn. However, weed and feed fertilizers are usually more expensive than a regular turfgrass fertilizer and care must be taken not to apply these fertilizer near other plants since they can injure shrubs and trees.

Probably the most confusing fertilizer terms are organic and inorganic. Today, anything that is organic is looked upon as better than inorganic. Organic products are natural and therefore must be better for us and the environment. However, plants obtain the same nutrients from inorganic fertilizers as they do from organic fertilizers and could care less how they obtain them.

The major advantage of organic fertilizers over inorganic fertilizers is the slow release of the major plant nutrients. Most organic fertilizers must be decomposed by soil microorganisms before nutrients are made available to plants. This reduces the possibility of fertilizer burn. Unfortunately, not all organic fertilizers release their nutrients slowly. There are some organic forms of nitrogen (urea) in fertilizers that release nitrogen just as fast as inorganic fertilizers. So don't be fooled by a fertilizer label which states that the enclosed fertilizer is fifty percent organic. It may be in an organic form, but chances are that it is not in a slow release form.

When purchasing fertilizers, look for terms like "slow release", "controlled release", "sulfur coated urea", "ureaformaldahyde", and "water insoluble nitrogen". These are all forms of fertilizers which release nitrogen slowly to plants. You will pay more for these types of fertilizers, but the benefits may outweigh the cost. ▫Follett

HANDY KIT NOW AVAILABLE FOR MEASURING CROP RESIDUE

Measuring crop residue is a simple task with the aid of the new Crop Residue Management Kit. Two different versions are available, one for corn and soybean residue and one for small grain. The kits were developed for farmers and others interested in crop residue management. Intended to serve as a guide to farming with more residues, each kit contains:

- **50-foot measuring tool**
  This instrument can be used to measure crop residue cover, as well as to estimate plant populations.

- **Measuring and managing crop residues**
  A five-minute videotape that illustrates how to measure residue.

To order Crop Residue Management Kits, contact:

NACD Service Center
PO Box 855
League City, TX
77574-0855
800/825-5547

•Field by Field Record Book
This pocket-sized record book offers a place to record all field operations and track actual residue amounts left after each tillage operation. It can also be used to record fertilizer, herbicide, and insecticide use as well as recording yields.

•Crop Residue Management Guide
This 20-page color brochure includes six 5" x 7" color photos of corn residue from 10 to 60 percent ground cover and four photos showing from 10 to 40 percent ground cover with soybean residue. The color brochure for wheat includes eight color photos of wheat residue from 10 to 70 percent ground cover. The brochure also lists a dozen ways to leave more residues, and shows and explains five different tillage implement points. Use its residue chart to estimate how much residue will be left after planting with a current or proposed tillage system.

The Crop Residue Management Kits were produced by the National Association of Conservation Districts and the Conservation Technology Information Center in cooperation with the USDA Soil Conservation Service. The corn and soybeans kit is $10 plus shipping and handling and the small grains version is $11 plus shipping and handling. ▫Follett

Errors in the previous edition of this article (May, 1992) warranted reprinting with corrections. Please use this article for correct information.

NITRIFICATION INHIBITORS

Nitrification inhibitors (NI), such as N-serve, are chemicals that reduce the rate of nitrification, a process defined as the conversion of ammonium ions (NH_4^+) to nitrites (NO_2^-) and then to nitrates (NO_3^-) (see Figure 1). Why is it desirable to delay formation of nitrates? Nitrates are soluble, can be leached out of the root zone, then eventually enter the groundwater. Presence of excessive nitrate in ground water is undesirable.

Denitrification is a process when nitrates change to gaseous forms of nitrogen and escape into the atmosphere. This may result in reduced yields and in economic losses for farmers.

Denitrification is significant when high levels of nitrates are present and oxygen is limited in the soil profile, e.g., in flooded soils or in soils that have received heavy rates of manure or sewage sludge or other organic material. The organic material increases the microbial activity in the soil which may result in depletion of oxygen thus promoting denitrification. Organic materials also provide a source of energy for denitrifiers. Denitrification is promoted by high soil moisture, soil crusting, and compaction that slows down the rate of oxygen diffusion into the soil. Warm temperatures increase the denitrification rate. There are more than 14 bacterial genera with members that are capable of denitrification. Some bacteria are active at very high temperatures found in desert soils.

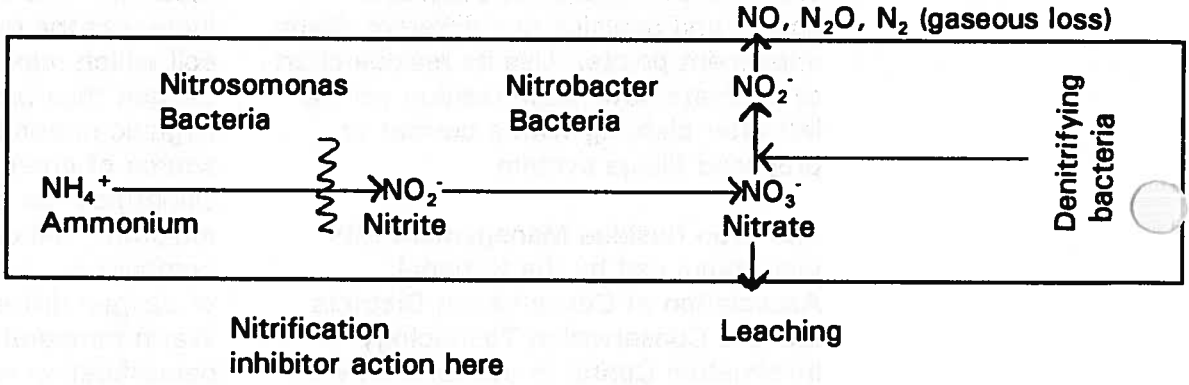
Nitrification inhibitors reduce microbial activity and delay the change of ammonium to nitrates. This provides a moderate nitrate level in the soil allowing crops to use it as plants develop, reducing the amount of nitrate available for subsequent leaching. The non leachable nitrogen as ammonium is attracted to clay and organic matter. Plant roots can absorb both ammonium and nitrate.

Nitrification inhibitors reduce leaching and denitrification if soils are subject to denitrification. Is the use of nitrification inhibitors economical? Only when the savings in nitrogen fertilizers or return due to higher yield is greater than the cost of the inhibitor. In some areas of Nebraska, the use of nitrification inhibitors is required when nitrate leaching potential is high. In Colorado, research has shown very little response to the use of nitrification inhibitors. However, these experiments were conducted under conditions where leaching and denitrification were not a problem. It is expected that under condition mentioned before, use of NI will pay off. Nitrification inhibitor are used with anhydrous ammonia, urea, uran, and other ammonium containing fertilizers. How is the nitrification inhibitor applied? Fertilizer dealers either mix it with dry fertilizers before application or custom apply it with anhydrous ammonia.

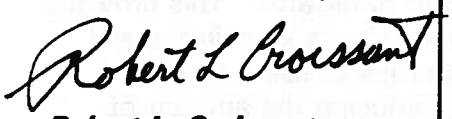
Where trade names are used, no discrimination is intended, and no endorsement by the Cooperative Extension Service is implied.

In summary, nitrification inhibitors are tools that may be used to manage fertilizer nitrogen in an economic and environmentally sound manner. It should be used only when nitrate leaching potential or denitrification potential is high. For more information, contact your local Extension agent and your fertilizer dealer. ▫Soltanpour

Figure 1. Action of Nitrification Inhibitors (the box shows the soil boundary)



Sincerely,



Robert L. Croissant
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Extension Agronomist - Crops

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