FROM THE GROUND UP

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AGRONOMY NEWS

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WINTER WHEAT FREEZE DAMAGE

Significant winter wheat freeze damage losses have occurred in parts of northeastern Colorado. The extreme cold temperatures experienced during the last week of October 1991 have taken their toll, and the damage is now obvious.

Wheat growers can learn from their own and their neighbors' practices to reduce losses in the future. Results from the CSU wheat research plots at Willard and Ovid show considerable cultivar differences in freeze resistance. The entries in the tests can be placed into 3 groups: most hardy are **Quantum hybrids QT549 and QT562**; medium hardy are **Arapahoe, Bronco, Hawk, Lamar, Rawhide, Sandy, TAM 107, and Tomahawk**; least hardy are **Sierra, Siouxland, TAM 109, TAM 200, Vona, and Yuma.**

Considerable differences in freeze damage can result from soil management practices, and even the least hardy varieties have survived well in many situations. Factors associated with enhanced survival are: increased soil compaction over the seed at planting time, north-south planting direction, increased crop residues, increased snow cover, and higher soil moisture. The most severe losses occurred on hilltops, sandy soil, and stubble-back situations. It is estimated that in Sedgwick County 15% of wheat plants were killed and that 10% of the wheat fields will be destroyed. ▫Quick

STARTER FERTILIZERS

The use of starter fertilizers offers an opportunity for growers to increase profits with many of today's row crop production systems. Higher crop yields, regardless of tillage system, are not only a matter of fertilizer rates and methods of application but fertilizer placement as well. Proper fertilizer placement improves nutrient availability to plants, which means higher yields, particularly in conservation tillage systems.

Starter fertilizers can safely be used with row crops if the recommended fertilizer sources and rates are used and if equipment is kept adjusted during the planting season to maintain the correct band placement below and beside the seed row.

The benefits of starter or banded fertilizer can be summarized as follows:

- Starter fertilizers are generally more effective for early growth than an equal amount of broadcast fertilizer.
- Phosphorus (P) fertilizer is generally more effective in band than broadcast applications in soils low-to-medium in available phosphorus.
- Effectiveness of some micronutrients is increased if band applied with most starter fertilizers.
- Starter fertilizers are most effective in cool weather. Nutrient absorption and diffusion to roots are slower at lower soil temperatures.
- Soil compaction also reduces nutrient availability. Because of soil compaction, plants are subject to added nutritional stress, and they respond more to starter fertilizer.

Fertilizer Placement

Most starter fertilizers are now banded two inches to the side and two inches below the weed row. This placement is far enough from the seed so that germinating seeds and seedlings are not adversely affected, yet close enough to allow early root penetration into the soil surrounding the fertilizer band. Results of numerous experiments, as well as field observations, have shown that there are no adverse problems associated with band application at the usual rates if this distance from the seed row is maintained.

If fertilizer is applied with the seed, the rate must be low to avoid germination damage. The fertilizer can cause salt damage during germination and emergence. Fertilizer such as urea or diammonium phosphate (DAP), which release free ammonia, should not be used in seed-placed fertilizers because small amounts of ammonia are quite toxic to seedlings.

Research conducted in Colorado has shown that dribbling P fertilizer on the soil surface after row closure is an effective method of applying fertilizer to dryland winter wheat planted with hoe drills. The surface banded fertilizer becomes a subsurface band with time as soil sloughs into the drill row.

Conclusion

Starter fertilizers can be safely used with row crops if the recommended fertilizer sources and rates are used and if equipment is kept adjusted during the planting season to maintain the correct band placement below and beside the seed row. ▫Follett

PREPARING SEED FIELDS FOR HARVEST

Whenever we talk about seed production, one word keeps coming up - **purity**. Seed producers are continually striving to remove

impurities from the seedlot. The best way to remove these problems is not allow them to contaminate the seed field in the first place. This is where field roguing becomes a necessity.

A rogue is an undesirable plant. There are several different types of rogue plants: crop mixtures, weeds, varietal mixtures, or off-types. Some may be easily seen and others, such as off-types, are more difficult to find and remove.

It is important for the seed grower to walk his fields several times during the season. A barley plant in a wheat field may be more easily seen at heading time than just before harvest. Weed problems can be sprayed if found when they are small. Conversely, off-type plants and mixed varieties are best seen near harvest time because of height, maturity, or color differences.

The best way to remove seedlot impurities is not allow them to contaminate the seed field in the first place.

Experienced roguers employ techniques that help find specific problems. Weeds or other plants introduced into the field from non-seed sources are often found in the first drill pass on the outside edge of the field, driveways, or equipment turn-around areas. Contamination from drills inadequately cleaned will be found in the first hundred feet or so of the first rows planted. Tall off-type plants and rye in wheat are most easily found by scanning the field with the eyes at the level of the crop canopy. Experienced roguers stop and look behind themselves from time to time because maturity differences and color variations tend to show up differently with the various angles of the sun. Draws, low spots, and wet or green areas should always be inspected for weed problems.

Rogues that are shorter than the canopy can be most difficult to find. The roguer must stop periodically and push the heads back to reveal any odd plants present. Individual plants must be scrutinized during this operation to distinguish smaller problem plants from shorter tillers. The roguer should also note any problem plants found growing in the row. Rogues found in the row indicate a seed contamination and should be expected throughout the entire field.

The roguer should know or have access to weed and crop identification materials. Knowing if a weed is noxious or if it could cause a major problem in the seedlot can help determine if the plants should be removed. A description of the variety may be helpful in identifying the off-types in a seed field. However, these descriptions can sometimes be difficult to follow. A good rule of thumb may be to look at the field and identify what the vast majority of plants look like and remove the ones that don't conform. The crew that rogues our Foundation seed fields uses the phrase, **"when in doubt, pull it out"**.

Also, be careful with the plants you pull. Plants with seeds, even green seeds, can still contaminate. Plants pulled, but left in the field, can produce volunteer plants the next cropping season. Some of these plants could even be picked up by the harvester and the seeds could still contaminate the seedlot. Pulled plants should either be removed from the field or laid between the rows and flattened.

An area infested with problem weeds can be isolated in a manner that combine operators will readily see. Flagged stakes, red ribbon tied to plants, or spray paint are methods commonly used. Make sure that the harvester knows what these areas

mean and that they should be avoided. It is recommended to cut the outside round of the field for grain to prevent problems that may be in that area.

It may sound like field roguing is a difficult job, and in some cases it may be, but good farming and seed production practices will keep most problems to a minimum. Field roguing can easily help eliminate problems that will be harder to control after the seed has been harvested. ▫Stanelle

CROP RESIDUE MANAGEMENT

Want to improve your corn production skills?

See page 8.

Many producers have expressed concern regarding new federal requirements for maintenance of crop residue on the soil. These regulations require specific levels of residue present to protect the soil from wind and water erosion. Therefore, it is appropriate to discuss some management factors important in residue maintenance. This does not address the federal regulations in detail.

The amount of residue needed to protect a field will depend on many factors, including surface slopes and soil texture. For example, a gently rolling field (3-4% slope) with a sandy loam soil should have approximately 600 lbs/A of wheat residue remaining on the soil surface after planting. The type of residue present will also determine the amount required for erosion protection. Higher corn residue levels will be required than wheat residue to produce the same amount of erosion protection. Therefore, the three planning steps in a residue management program should involve:

- determining how much residue will be required at planting
- determining how much residue your crops provide
- planning tillage operations accordingly

The amount of residue required will depend on many factors described by the Soil Conservation Service. The amount of approximate residue that various crops produce is given in Table 1. As an example, a 30 bu/A wheat crop would produce 2400 lbs/A of residue at harvest. It should be reiterated that these figures are approximations, and actual values will vary with variety, soil fertility, and soil water status during crop growth. In general, optimum levels of soil nutrients, soil water, and pest control will encourage plant growth and produce higher levels of crop residue. A precise method of measuring residue levels would be to clip a given area (1/1,000 acre), weigh the clippings and convert to lbs/A.

Table 1. Residue production for various crops.

Crop	Unit	Lbs. per Unit
Rye	bu.	100
Wheat	bu.	80
Barley	bu.	50
Corn	bu.	50
Sorgh.	bu.	50
Sunfl.	lb.	1.1

The amount of residue left after harvest will then determine how many tillage operations one can perform. Tillage operations and implements

can vary greatly in how much residue they bury. Table 2 gives a comparison of our commonly used machines, and how much residue you can expect to have left after each operation. As can be seen from these data, tillage implements which turn more soil, such as a moldboard plow or tandem disc, tend to bury much more residue than implements which stir the soil, like cultivators or sweep blades.

Obviously, the ultimate operation for maintaining residue is the use of herbicides to control weeds rather than tillage. Finally, it should be noted that the weathering process itself causes deterioration of residue, and this should be remembered when developing a residue management plan.

Factors in crop residue management:

- ***surface slope***
- ***soil texture***
- ***type of residue***
- ***use of herbicides***
- ***tillage operations***
- ***weathering process***

Table 2. Residue remaining after various operations.

Operation	Remaining Residue
No-Till	100%
Sweep Blades	90%
Drill	80-90%
Cultivator	80-85%
Chisel Plow	50-75%
Tandem Disc	10-30%
Plow	0-10%
Overwintering	75-85%

Obviously, the new federal regulations for residue management will present new challenges for producers. Hopefully some suggestions mentioned in this discussion can help producers address these challenges. (Adapted from a Soil Conservation Service publication) ▫Shanahan

BEST MANAGEMENT PRACTICES FOR TURFGRASS PRODUCTION

Although turfgrass is generally thought to deter runoff and leaching, improved fertilizer and pest management practices are important to maintaining good quality drinking water. Best Management Practices (BMPs) are methods or alternatives designed to reduce or prevent water pollution from routine operations. The BMP approach is a means of addressing non-point source pollution problems in a manner compatible with traditional, voluntary implementation of improved practices. A site specific plan, including structural and managerial controls of pollution sources (pesticides) and transport medium (water), is at the heart of the BMP concept. The goal is to produce a high quality product in an environmentally and economically sound way.

Best management practices should be compatible with current operating procedures, but may entail a slightly higher level of management. Turfgrass BMPs include site specific management of pests, fertility, and water. The following list of BMPs should not be considered exhaustive, but rather an example of practices which will help improve or maintain water quality.

Site Characteristics

- Knowledge of soil type, aquifer depth and recharge rate, and runoff potential.
- Promote optimum turf vigor and health (dense turf allows less runoff and leaching and is more competitive against many pests).

Best Management Practices (BMPs) are methods or alternatives designed to reduce or prevent water pollution from routine operations.

Pesticide Selection and Use

- IPM approach incorporating careful scouting and monitoring, rather than preventive sprays.
- Pesticides should be used only when other cultural, mechanical, and biological methods fail to manage pests below economic thresholds.
- Pesticide selection should be tied to characteristics of the target site. Selection of least toxic and less persistent sprays should be employed if possible. Knowledge of pesticide half-life, solubility, and adsorption should be included in selection.
- Time application of pesticide to avoid rainfall or irrigation shortly after application.
- Employ application techniques which increase efficiency and allow lowest effective application rate. Carefully calibrate spray equipment and follow label instructions.
- Construct approved mixing, storage, and spill containment facilities. Keep concentrated products downhill and away from wells. Dispose of containers, rinsate, and waste properly.
- Keep precise pest and pesticide records.

Nitrogen Fertilizer Practices

- Goal is to optimize N uptake by plants and minimize residual nitrate left in soil.
- Fertilizer need should be based upon soil analysis and should be weighted towards a conservative recommendation on sandy soils or over vulnerable aquifers.
- Utilize split applications of slow release forms such as ureaformaldehyde, methylene urea, IBDU, and sulfur-coated urea.
- Late season applications should be minimized on sandy soils or near vulnerable aquifers.

Water Management

- Avoid application of any pesticide or fertilizer immediately prior to rainfall or irrigation.
- Apply only enough irrigation to replace loss by evapotranspiration.
- Control surface water to avoid runoff.

Turfgrass managers can minimize negative water quality impacts by implementing Best Management Practices. Public education on the use of Ag chemicals in turfgrass is also needed. Much of the pesticide and fertilizer used by industry is in response to consumer desire for a very high quality product. Education is needed to change consumer preference for perfect, pest free lawns and golf courses. Responsible use of agricultural chemicals by the turf industry is an important step in the public education process. ▫Waskom

SLUDGE ANALYSIS FOR AGRICULTURAL USE

Testing soils and sludges for sludge application to agricultural land requires close adherence to "Domestic Sewage Sludge Regulations" as determined by the Colorado Department of Health.

There are four types of tests that may have to be performed including: sludge screening analysis, sludge application analysis, soil monitoring, and plant tissue monitoring. The sludge screening analysis is the most comprehensive series of tests that must be performed. Sludge screening tests include: total solids, volatile solids, volatile solids reduction (usually done on site), pH, volatile acids (anaerobic liquid sludge only), organic N, ammonia-N, nitrate-N, total P, total K, electrical conductivity, aluminum, arsenic, cadmium, iron, lead, chromium, copper, mercury, nickel, molybdenum, selenium, silver, zinc, and polychlorinated biphenyl (PCB). Levels of elements are usually expressed as totals. Sludge screening tests need to be done every one to five year, depending on the concentration of heavy metals in the sludge and the size of the facility. Information regarding sludge screening should be supplied by the producer in connection with submission of its first Letter of Intent describing how the sludge is to be used.

Additional information about sludges can be found in the "Domestic Sewage Sludge Regulations" booklet. The regulations booklet can be obtained from:

Colorado Department of Health, Water Quality Control Div, Permit and Enforcement Div, 4210 E 11th Ave Denver CO 80220

Sludge application analysis is less rigorous than sludge screening analysis and includes: total solids, volatile solids, volatile solids reduction, pH, volatile acids, organic N, ammonia-N, Nitrate-N, total P, total K, PCB, and total levels of cadmium, copper, lead, nickel, and zinc. Sludge application analysis needs to be done every two weeks to six months following sludge screening, again depending on heavy metal concentration and the size of the facility.

Soil monitoring analysis needs to be done on the soil to which the sludge is applied. Soil monitoring analysis includes: pH, ammonia-N, nitrate-N, total P, electrical conductivity, lead, cadmium, copper, nickel, zinc, soil texture by hydrometer, cation exchange capacity, organic matter, and available P.

The levels of metals and other available forms of elements are usually extracted with ammonium bicarbonate-DTPA or with 4 N HNO_3. Fertilizer recommendations are also provided relative to some intended crop to be grown to give the applicator an indication of how much NO_3-N can be applied with the sludge. Nitrate-N is of most concern since it can readily leach. Heavy metals are of concern as well, and maximum trace element application rates are listed in the "Domestic Sewage Sludge Regulations".

Plant tissue monitoring must also be performed at the sludge application site every one to three years from the time the sludge was applied. Plant tissue monitoring analysis includes: total N, NO_3-N, total P, and total levels of cadmium, copper, lead, nickel, and zinc. Plant tissue samples should consist of five pounds of material from the area that the sludge was applied. Each portion of the plant that is intended for human consumption should be composited separately and analyzed.

Sludges are a useful and inexpensive source of nutrients for agricultural use. The application of sludge, however, requires close monitoring of the chemical content so that soils do not become overloaded with heavy metals or nitrate. ▫Self

NATIONAL CORN GROWERS ASSOCIATION YIELD CONTEST

The National Corn Growers Association is announcing the 1992 Yield Contest and entry deadlines. This is an excellent chance to participate in national competition and improve your corn production skills.

Requirements for entry:

- entry must be postmarked before July 1 1992
- grower must be a current member of the NCGA
- contest entry fees must be included
- entries must be at least 10 continuous acres of one corn hybrid
- hybrid must be commercially available for sale
- harvest data must be postmarked prior to December 1 1992

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

There are seven contest classes available for entry. Most Colorado producers enter the irrigated class; however, some have entered ridge-till and no-till classes.

Contestants will receive a summary of contest winners and their production practices at the completion of the contest year.

For entry information, call the NCGA office phone 314/275-9915, your seed corn salesman, or your county Extension agent. ▫Croissant

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