FROM THE GROUND UP

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AGRONOMY NEWS

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SPRING WHEAT VARIETY RECOMMENDATIONS

Because of recent, higher wheat prices, we have received many calls concerning recommendations for spring wheat varieties. It is appropriate to provide some general information regarding spring wheat.

Spring wheat variety trials are conducted at the San Luis Valley, Fruita, Yellow Jacket, Hayden, and Meeker research stations. The market classes of spring wheats evaluated at these sites include hard red, soft white, and durum. Therefore, information to aid in selecting varieties of the appropriate class for these production areas should be available at most Extension offices. If not, please call the Agronomy Extension office (303/491-6201).

Information to aid in selecting spring wheat varieties adapted to the Eastern Plains is not as readily available, because trials have not been conducted as extensively for this area. Past dryland productivity levels have been poor due to the adverse impact of early summer heat on dryland spring wheat production. Thus, spring wheat has the highest probability of succeeding when grown under irrigation on the Eastern Plains. For these reasons, spring wheat should also be sown as early as possible (mid-February to mid-March) to escape the early summer heat. Hard red spring wheats are more adapted than soft white wheats for the Eastern Plains.

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Factors to consider when planning spring wheat varieties:

- ***dryland vs irrigated***
- ***early planting/heat avoidance***
- ***potential Russian wheat aphid damage***
- ***seed availability***

Varieties to grow for dryland conditions include Waldron, Butte 86, Centa, Prospect, and Oslo. Irrigated varieties include Bergen, Nomad, Oslo, WB 926, and Yecora Rojo.

The other concern for producing spring wheat is the potential for Russian wheat aphid (RWA) damage. Spring wheat has a much higher probability of being affected by the RWA than winter wheat, because of its delayed maturity. Therefore, one should be prepared to scout for and control the RWA if necessary.

Finally, the seed supply situation appears to be rather limited for certain varieties (most popular), so that one may have to choose the varieties that are most available. ▫Shanahan

CERTIFIED SEED CLASSES

In seed certification, four production generations are recognized:

- ***breeder seed***
- ***foundation seed***
- ***registered seed***
- ***certified seed***

This certification chain is called the "limited generation system" of seed production.

Certification of field crop seeds was initiated in 1940 in Colorado to provide a system guaranteeing high quality seed for farmers. Originally, the maintenance of genetic stability from one generation to the next was the primary goal. Seed certification has progressed from that initial purpose to monitoring mechanical purity and germination as well as standardizing methods of seed conditioning and storage.

Since undetected problems in a seed field can multiply from one generation to the next, a strict set of standards is applied to each generation grown. In seed certification, four production generations are recognized.

Breeder seed is controlled and regulated by the plant breeder. Virtually every plant is examined by the breeder during strict rogueing operations. This is easily accomplished because breeder seed is produced in small plots measured in square feet and production may be limited to a few hundred pounds.

Foundation seed is the progeny of breeder seed and is the first generation produced under seed production practices governed by the foundation seed organization. Breeders' seed is planted on "clean" fields and produced under strict sanitary regulations to prevent contamination. Even so, rogueing crews will search each field and remove problem plants. But, since this class is grown in fields of 5 acres or larger with production of hundreds or thousands of bushels, minor problems can go undetected. Tolerances from breeder seed to foundation seed may change from "zero" to very strict, depending on the nature of the problem.

The next two generations, **registered and certified**, are produced by private seed growers under standards that are slightly less restrictive. This is done for two reasons; field size may range into hundreds of acres, and depending on the crop, only one or two generations remain. Registered and certified seed classes are still produced under specific standards and chances of contamination with any major problems are extremely low.

In some states, or for some specific varieties, registered seed is not a recognized class. In these circumstances, certified seed is produced directly from the foundation class. Certified seed is the last link in the pedigree system and is not used to produce another class of certified seed.

The certification chain--breeder to foundation to registered to certified--is called the "limited generation system" of seed production. With this system, seed is always three generations or less from breeder's seed. The limited generation system coupled with tight standards and grower regulations is an excellent way to produce quality, pure seed for planting. ▫Stanelle

WHAT SIZE SEED CORN TO BUY

There are many studies that show equal yield responses from different seed corn sizes. It is important to:

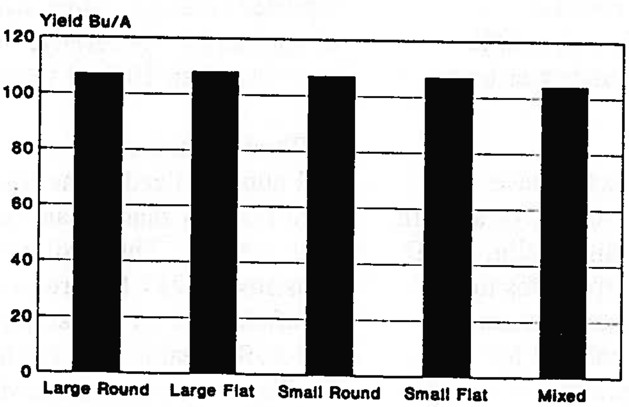
- ***Plant corn early***
- ***Place seed in moisture 1½-2" deep***
- ***Place seed precisely***
- ***Pack thoroughly***

Most of you have already designated the size of seed corn to buy by placing fall orders. There is still time to change sizes but to what?

Just like everything else, commercial seed companies price different sizes and shapes according to supply and demand. Years ago, when double cross hybrids were popular, most of the seed sold was graded flat and bagged 56 lbs/bag. With today's single cross hybrids, the "round seed" grade may constitute over half of the seeds in some hybrids. These seed lots may be graded flat, round, or mixed at specific sizes and sold usually at 80,000 seeds per bag.

To complicate this, some plateless and air planters will accept and do excellent jobs of planting both flats, rounds, and mixed sizes while other plate planters must have a specific seed size and shape. Often the price of seed varies with different sizes and shapes of the same variety. By knowing the price of seed per 1000 kernels, comparisons between seed lots of the same variety are valid. When germinating conditions are optimum, seed size or shape have very little, if any, effect on yield. Studies are shown in Table 1 and 2 comparing different seed grades.

Table 1. Effect of seed size on corn yield.



There are many studies that show equal yield responses from different seed corn sizes. It is most important to plant corn early. The seed should be placed in moisture one and one half to two inches deep. Precise seed placement, in depth, distance apart, and thoroughly packed in the soil will pay dividends. Deep planted seed takes longer to emerge, is subject to reduced germination, and may be crusted under when hard rains occur.

Some will argue that large seed will give better seedling vigor because of a bigger food supply in the seed and others say that small seed will germinate faster in soils with marginal moisture. Probably each line of reasoning is true but differences only occur a small percentage of the time and then only under specialized conditions. □Croissant

Table 2. Effect of seed size and shape on yield.

Seed Size	Yield bu/a*
Large Round	161
Large Flat	154
Med Round	161
Med Flat	152
Small Round	157
Small Flat	156

* Yields not statistically different

WATER QUALITY IMPACTS FROM TURFGRASS

Public concern over drinking water has prompted closer scrutiny of agricultural chemical use in turfgrass. Urbanization and population growth in the U. S. is resulting in increased turf acreage. Due to the increasing amount of land devoted to turf, there is some potential for turfgrass production to negatively impact local drinking water supplies.

Pesticide Fate in Turf

When pesticides are applied to turfgrass, they may undergo microbial decomposition, photo-decomposition, chemical degradation, volatilization, soil adsorption, or plant uptake. Pesticides transported from the application site in significant amounts by runoff or leaching may cause water quality problems.

Due to the increasing amount of land devoted to turf, there is some potential for turfgrass production to negatively impact local drinking water supplies.

To date, over 70 different pesticides have been detected in U.S. groundwater. Some of these chemicals are used on turf; however, it has not been documented that their presence in groundwater is a direct result of application to turfgrass. Few scientific studies have monitored groundwater under turf.

Studies at Penn State University have evaluated pesticide runoff from turfgrass. In one study they applied pendimethalin, 2,4-D, 2,4-DP, dicamba, and chlorphyrifos to turf plots. Plots were irrigated to produce runoff, and leachate was analyzed for pesticide residues. They found that transport of pesticide occurred mainly in the first seven days after application, in amounts that averaged less than 2% of applied. They concluded that dense, high-quality turf stands reduce overland runoff significantly. The greatest pesticide runoff results when irrigation or rain storms occur shortly after application.

Research at Ohio State University has shown that the thatch layer serves as a natural barrier to pesticide movement due to its intense microbial activity and adsorptive capability.

Two leaching studies conducted at Cornell University examined dicamba, 2,4-D amine, carbaryl, and chlorothalonil applied to three soil types. Two irrigation regimes were followed and leachate was collected and analyzed. Most leaching occurred with the dicamba, sandy soil, and higher irrigation treatment.

Fate of Nitrogen Fertilizers in Turf

Nitrate (N) leaching from fertilizers applied to turf has been proposed to be a significant source of groundwater contamination in suburban areas. Nitrogen leaching is influenced by the N rate applied, the N source and application timing, irrigation management, and overall turf health and vigor. Soil type and annual rainfall must be considered in any management system. Petrovic (Cornell University) reviewed research data on nitrogen leaching from turf grasses. He reported leaching values from 0% to 53% of applied N. Generally, leaching losses were less than 10% of total applied.

A Rhode Island study compared fertilized and non-fertilized home lawns and silage corn field on sandy loam soils over a three year period. The fertilizer treatment consisted of 217 lb/acre/yr as urea on the cornfield, and 217 lb/acre/yr as 50% urea and 50% ureaform on the lawn. Both fertilizer treatments on lawns yielded soil water percolate containing small amounts of nitrogen. Over a two year period on non-fertilized lawn, an average of 1.2 lb NO_3/acre was collected while the fertilized lawn lost 5.0 lb/acre. The silage corn field lost 68.1 lb/acre over the same period. Another Rhode Island study compared three fertilizer levels and two irrigation rates on turfgrass. Higher leaching losses occurred in the over-watered, high nitrogen treatment than the unfertilized or moderately irrigated treatments. They concluded that fertilizer and water practices associated with proper home lawn care do not pose a significant threat to drinking water, except in cases of vulnerable aquifers. In areas where groundwater contamination is a problem, late season N applications and frequent watering were discouraged.

Is There a Problem?

From these research results, it might be concluded that there is not a significant water quality problem associated with turfgrass production. Several authors have pointed out that turf contributes positively to water quality due to its ability to minimize runoff and trap pollutants. The dense thatch layer of turf has been shown to filter pesticides and other chemicals out of water moving vertically through the soil profile. In fact, filter strips of turfgrass are an encouraged practice around agricultural fields that are subject to runoff and overland movement of agricultural chemicals.

Next month: Turfgrass BMP's for water quality

Current research findings indicate that leaching hazards may occur with turfgrass; however, leaching is significantly reduced compared to the bare soil conditions found in crop production. Most studies have been done on small scale test plots and may not accurately include the contribution of macropore flow caused by earthworms, soil cracks, or operations such as aeration. In addition, the turfgrass industry has the same problems with mixing, loading, storing, and disposal of pesticides and fertilizers as do rural chemical applicators. Many instances of significant groundwater contamination have been attributed to mixing or storage mishaps. As long as the turf industry is using potentially toxic chemicals which are being detected in groundwater, it cannot be safely assumed that there are no problems. Prevention of groundwater contamination may require an overly conservative approach, but is far better than the costs of the remedy. ▫Waskom

HOW TO IMPROVE NITROGEN FERTILIZER RECOMMENDATIONS

Nitrogen recommendations made by many laboratories are based on the nitrates present in a composite soil sample taken in the fall or spring before planting and the yield goal set by the farmer. Credit is given to legumes preceding the crop and manure applied to the field. This method of fertilizer recommendation is based on a predicted yield goal and predicted nitrogen mineralization of legume, manure, and soil organic matter. If a farmer sends only the surface soil sample, the profile nitrate level is calculated from the level found in the surface sample.

To improve the fertilizer recommendations, soil samples should be taken to a depth of at least 24 inches. Presently, more than 95% of the soil samples from farm fields are taken to the plow depth. Recent studies show that using surface samples to predict nitrate levels in the profile causes an overestimation of fertilizer nitrogen requirement of crops. The overestimation has been found to be as high as 70 pounds of nitrogen per acre and could be higher.

To further improve the nitrogen recommendation accuracy, the farmer should apply part of the recommended nitrogen preplant or during planting and the balance during the season when a better estimate of yields can be made and when additional in-season soil sampling and soil nitrate testing indicate a need for adding more nitrogen. Quick nitrate test kits make in-season testing feasible. The in-season nitrate test will reveal nitrogen accumulation in the soil from inorganic sources, organic materials (legumes, manure, soil organic matter, microbial tissue), and nitrogen losses from leaching, fixation by microbes, gaseous losses (denitrification), and plant nitrogen uptake. Additional research is needed to improve knowledge about in-season soil sampling and interpreting. Current research is being conducted in the South Platte Valley on corn. ▫Soltanpour

SOIL SAMPLING UNDER NO-TILL BANDED PHOSPHORUS

Soil sampling procedures have been developed at Colorado State University by Dr. Dwayne Westfall and others to minimize soil-test variability for soils with banded P.

Soil sampling procedures are well defined for conventionally tilled soils, but uncertainty exists about the best procedures for no-till soils containing residual phosphorous (P) fertilizer bands. In no-till systems, P fertilizer bands remain undisturbed from year to year and the band is likely to remain high in soil-test P for some time after application. Subsequent soil sampling may generate variable soil-test results, depending on whether the band is included or excluded. If soils are sampled randomly, an inadequate number of subsamples can result in inflated P soil-test values, underestimating P-fertilizer needs. Through recent research conducted at Colorado State University, Dr. Dwayne Westfall and others have developed soil sampling procedures that minimize soil-test variability for soils with banded P.

Sampling Procedure When P-Band Location is Known

When residual P bands can be located, the best soil sampling procedure is to collect samples using the ratio from in-the-band to between-the-band samples as follows:

- For 30-inch rows, use a ratio of 1:20 (take one in-the-band for every 20 between-the-band samples).
- For 24-inch rows, use a ratio of 1:16 (take one in-the-band for every 16 between-the-band samples).
- For 12-inch rows, use a ratio of 1:8 (take one in-the-band for every 8 between-the-band samples).

The research was conducted using three different soils and several different P rates. When the soils were taken as described above, the resultant P soil-test values were approximately equal to the "true" P soil-test mean.

Sampling Procedure When Phosphorus-Band Location is Unknown

When the location of the P bands is unknown, completely random sampling or some modification of random sampling is the only alternative. In most cases, 20 to 30 subsamples per composite sample is adequate for a good random sample.

There are some other considerations that should be emphasized prior to initiation of no-till management. The P soil testing should be completed to ensure that the soil's P-supplying capacity is understood. Soil-test P measurements do not change rapidly and thus can be used for fertilizer recommendations for 2 to 4 years. The application of liberal rates of banded P fertilizer increases subsequent P-soil-test variability and therefore, should be avoided. ▫Follett

SOIL BORON

Boron is one of the seven essential micronutrients for plant growth. The visual symptoms of boron deficiency in plants include cessation of terminal growth, shortened internodes and rosetted or bushy appearance. Deficiencies may be present long before visual symptoms occur.

In arid or semi-arid regions, boron toxicity may be more of a problem than deficiency. Toxicity occurs as a result of high levels of boron in salt-affected soils or due to the addition of boron with irrigation water. Known boron deficiencies have not been detected in Colorado.

Water soluble boron usually ranges from less than 1 ppm to about 100 ppm in the soil with an average of less than 2 ppm. At the Soil Testing Laboratory, boron from saturated soil extracts is usually less than 1 ppm. Total boron generally ranges from 7 to 80 ppm but can be as high as 200 ppm. There is little relationship between available boron and total boron; however, when examining disturbed sites, the total boron level may be of interest to evaluate potential boron that may become more available due to weathering.

The predominate species of boron in calcareous soils is as boric acid (H_3BO_3); however, at a pH near 9.0, H_2BO_3 would be the form of boric acid present. Plant roots absorb boron as boric acid.

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

Available boron is usually extracted with hot water or from a saturation soil extract. Hot water extraction involves boiling a soil water mixture, usually in the presence of $CaCl_2$ or $BaCl_2$, to obtain a clear extract. The resultant extract can be analyzed colorimetrically or by inductively coupled plasma (ICP). Hot water soluble boron generally ranges from about 0.3 ppm to 4.76 ppm. Usually boron levels less than 1 ppm indicate deficiencies for boron sensitive crops while values greater than 5 ppm may be considered toxic.

A saturation extract of soils is also an effective way to evaluate available boron. Generally, water is added to soil until a saturated paste is produced. The soil paste is covered and allowed to sit overnight. More water is added the next day to bring the paste back to saturation. The paste is then vacuum filtered, and the resultant extract is analyzed by ICP. Boron from saturation extracts usually ranges from 0.3 to 1.3 mg/l. According to USDA Handbook 60, boron is marginal from 0.7 to 1.5 mg/l in a saturation extract and toxic at more than 1.5 mg/l.

Where boron is not at a toxic level, plant uptake of boron is dramatically reduced when soil pH is greater than 6.3. Irrigation water, however, should be checked for boron so that toxic levels of boron are not applied to the soil. Water containing more than 1 ppm may be toxic. □Self

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