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INTERPRETATION OF SOIL TEST VALUES

Interpretation is difficult because soil testing laboratories use different extractants for determination of certain elements. There is justification for the various extractants used since not all extracting solutions are applicable to all soils. No single extracting solution universally capable of measuring nutrients in all kinds of soils. A strong acid extracting solution on western soils, for instance, could give an erroneous estimate of the phosphorus (P) level in your field showing that the

soil has high available P when, in fact, it is low in P. Therefore, extracting solutions must be geographically adapted to reflect soil variability.

If you know which extractant was used, you can evaluate the nutrient level, such as low, medium, high, or very high. Table 1 shows the P soil test values for four different extractants (soil test methods) for corn.

Table 1. Phosphorus soil test comparisons for corn.

	Soil Test Methods			
	Bray#1	Mehlick	NaHCO ₃	AB-DTPA *
	----- ppm P -----			
Low	0-5	0-12	0-7	0-3
Med.	5-15	13-25	8-14	4-7
High	16-25	28-50	15-22	8-11
V. H.	>25	>50	>22	>11

*AB-DTPA = ammonium bicarbonate diethylenetriaminepentacetic acid. Colorado State University Soil Testing Laboratory uses the AB-DTPA method.

Soil test values should be considered an index to the expected yield responses obtained from given nutrient applications. These values (low, medium, high, or very high) will vary by individual crop. A laboratory's low reading for alfalfa would be considered medium phosphorus level for corn. The soil test value is a measure of relative phosphorus availability for plant growth. The test does not measure total P in the soil.

A soil testing low in P indicates that crops would likely respond to the addition of P fertilizer. Soil testing medium in P means that crops are likely to respond to P, if growing conditions are favorable for high yields. Soils testing high are not likely to produce economic yield increases with an application of additional phosphorus. Applying only small quantities of phosphorus on high P test soils is suggested to maintain high fertility status. No economic advantage occurs when applying phosphate to soils testing very high.

Another confusing factor when interpreting field test values is that test results can be expressed in a variety of ways. For example, the soil test value

can be expressed as pounds/acre, ppm, mg/kg, kg/ha, etc.
 □Follett

OPERATION OF THE AIR /SCREEN CLEANER

Once wheat harvest is over, the next step growers must take is to prepare for fall planting. Seed bed preparation and seed conditioning before planting is a must. Most wheat seed cleaned before planting is run through an air/screen cleaner to remove impurities. This machine, known as a screener or clipper, is the most common, versatile piece of seed cleaning equipment.

The air/screen cleaner, as its name implies, uses two methods to clean, air and screens. The air section removes materials that are lighter in weight and have a high surface area to weight ratio. Air separations may be taken at several points within the machine, with one, two, or three separations being most common. An air separation should be set so that a few good kernels are removed with the lighter trash. This results in the best air separation.

The second part of the air/screen cleaner separates on width and thickness of the seed. Round hole screens are usually used as scalpings, where larger material remains on top of the screen while seed and smaller particles fall through. Slotted or oblong screens are more commonly used as sifter or bottom screens. These screens allow smaller particles to drop through while the good seed remains on top. Large machines have a combination of round and slotted screens to size and separate seed.

Difficulties in interpretation of soil test values:

- ***Soil testing laboratories use different extractants for determination of certain elements (geographic adaptability)***
- ***Test results are expressed in a variety of ways***
- ***Values vary by individual crop***

To find the correct screen size to use, test it by placing seed on a screen and shake. If the desired separation is made, that size is the one to use. Of course, factory recommendations and owners manuals give general guidance.

The capacity of the air/screen cleaner is based on the sifting screen size. Depth of seed on this screen should be no more than two to three kernels deep. Depths greater than this will not allow all kernel surface to be exposed to screen perforations. This results in reduced separations and poor results. Owner's manuals will give capacity ranges for your machine.

Even though an air/screen cleaner is a versatile machine, it cannot make all separations. Jointed goatgrass has the same width and thickness as wheat but is longer and therefore cannot be removed. Secondary cleaning equipment must be used in cases such as this.

The air/screen cleaner is the most common and efficient piece of seed cleaning equipment. Correct setting and use of this machine will yield quality seed for planting. □Stanelle

NEW FEEDLOT REGULATIONS FOR WATER QUALITY

The Colorado Department of Health - Water Quality Control Division has recently proposed new regulations which will impact confined animal feeding operations. These regulations are anticipated to be adopted by the Colorado Water Quality Commission and be in effect by mid August 1992. They will apply to confined operations where livestock are fed for 45 days or longer in a 12 month period.

The purposes of these regulations are to control the discharge of contaminants from manure or wastewater into surface water, and to encourage using these materials in a beneficial manner on agricultural land. Concentrated animal feeding operations with 1,000 or more animal units will have specified manure and wastewater retention and disposal requirements. Animal feeding operations that do not qualify as "concentrated" will have prescribed best management practices to reduce adverse water quality impacts.

The application of manures on agricultural land is a beneficial practice if loading rates do not exceed crop nutrient uptake, particularly for nitrogen. However, recent groundwater monitoring data from Weld County indicate groundwater nitrate levels in excess of 40 mg/l NO₃-N around several of the large feedlots. This information has prompted the Colorado Department of Health to prepare these more stringent controls.

The most significant change in the feedlot regulations is the recognition of the potential and liability for groundwater contamination. The old regulations did not have clear discharge controls. The new rules specify control measures, and call for control of discharge so that no water pollution occurs. Retention structures and other run-off control measures must contain the 10 year 24-hour storm event, and manures must be removed to control overflow or discharge under normal conditions. Permeability rates of retention ponds are regulated to minimize groundwater contamination.

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Disposal of manure on agricultural lands must be managed so there is no adverse impact to surface or groundwater. Application on frozen or saturated soils is restricted. Producers that do not want to develop a site-specific agronomic analysis (i.e. soil testing, manure nutrient testing yield goal estimation, etc.) can apply manure at a rate not to exceed crop N uptake as specified in tables in the regulation. However, due to the high variability of manures and crop management practices, the use of table values for determining loading rates is usually an undesirable option. If applicators wish to apply more manure than can be assimilated by plant nutrient uptake, a site specific agronomic analysis is required and must be kept on file for a minimum of three years. Agronomic analysis will include calculation of plant available nutrients from all sources (to include soil and irrigation water testing), analysis of manure composition, and compensation for yield goal and management factors. Innovative methods of disposal are encouraged, but require the Health Department's approval. Treatment and discharge of manure and wastewater into state waters requires a permit.

These new rules could be used by the Health Department to enforce the reduction of nitrate or phosphate loading from feedlots to surface or groundwater. The Health Department will not have any additional resources for enforcement of the rules, but will investigate on a complaint basis, as in the past. Increased information from various state and local groundwater monitoring programs may also trigger enforcement.

These new regulations are much more extensive than can be detailed in a short newsletter article. For further information, contact me, Dr. Dwayne

Westfall at Colorado State University ,
or Darrel Lang at the Colorado
Department of Health. □Waskom

FROST DAMAGE AND WHEAT GERMINATION

Did the May freeze destroy winter wheat seed germination? Can I plant it and expect quality germination? I will clarify the situation. Little research data is available on germination of seed that was frozen in the field before maturation. However, general seed quality principles apply.

In eastern Colorado, most wheat berries damaged by the frost failed to develop and are now light and shrivelled. These will probably be removed by the combine, but I would recommend additional cleaning for all wheat used for seed. After frost and other stresses, the wheat plant was reduced to half or less of the normal kernel numbers to mature. Occasionally the remaining seed appears to be larger and plumper than normal.

To determine if this is high germinating seed, you must have the seed tested. Seed testing can be performed right after harvest and the results will indicate seed value. Once a favorable test is achieved, the seed should be cleaned.

In cases such as this when wheat is severely stressed by freezing temperature and drought, it is most important to obtain a germination test by a seed testing lab. A "rag doll test" done at home will show that seed has sprouted, but to the inexperienced eye, it is difficult to distinguish good seeds from weak

germinating seeds that may not emerge above the soil surface. An experienced seed analyst is trained to identify these "abnormals" resulting in an accurate germination test.

In other words, following normal seed production practices will be your best bet in determining if your wheat seed will germinate. □Stanelle

ALTERNATIVE/SPECIALTY CROPS

There is an increased interest in specialty crops by industry and governments around the world. The Colorado State University Cooperative Extension Service has initiated specialty crop research in Adams, Rio Grande, Huerfano and Otero counties on crops having potential market growth. Field days are scheduled at Center (Rio Grande County) on July 28 and at Rocky Ford (Otero County) on September 10.

At Center, quinoa, canola, crambe, and kamut wheat are being tested. Quinoa has attracted a worldwide interest because it has high quality protein. Studies in the U.S. and Europe have shown that quinoa can be used for control of giardia (a parasitic microbe found world wide. malaria, and control of some cancers. Starch from quinoa is used to make synthetic cream in Europe. Canola growing in the San Luis Valley will be used for oil production. Initial trials of feeding whole canola and canola meal to sheep, hogs, and chickens is successful. The oil crushing plant at Goodland, Kansas has shown interest in purchasing sunflower, safflower, canola and crambe. Kamut wheat is a spring wheat closely related to durum. Kamut wheat has been grown in north central Montana, but because of extreme rust problems,

production may be favored in Colorado by the industry. A very high quality pasta is made from this wheat.

At Rocky Ford, guar, edamame soybeans, bambara groundnuts, colored flour corn, and sesbania are being tested. Guar is a legume used for the gum its seed contains. About 10% of the guar used in the U.S. is produced here. It is used in many products ranging from whipped dessert toppings and ice cream to oil drilling mud. Edamame soybeans are used as a fresh green bean. They are boiled and eaten as a snack in Asia. Edamame soybeans taste somewhat like lima beans and peanuts. The current market value is approximately \$1/pound. While we don't know a great deal about the yield of edamame in the Arkansas Valley, soybean yield trials have produced between 40 and 80 bushels per acre. Using a green bean bushel of 40 pounds, this should give growers 1600 to 3200 pounds of salable beans per acre. Markets exist for both shelled and unshelled beans. Bambara groundnut trials are very preliminary. There are two advantages to this "crop". First, as a new crop, we can establish our own market structure and price while identifying with peanuts. Second, groundnuts "pop" and could be marketed as a novel popping peanut. Groundnuts are very drought hardy. How drought affects yield is not known. Colored flour corn trials include red, white, and blue corn which currently have stable, limited markets. Sesbania appears to be a potential forage, fiber, and green manure crop. Other minor crops such as chia and amaranth are being studied.

A planting of teff is located in Huerfano county. Teff is a small seeded annual grass from Ethiopia.

There is an opportunity to see what quinoa, canola, crambe, kamut wheat, guar, edamame soybeans, bambara groundnuts, colored flour corn, sesbania and teff are all about.

Come to a field day to see what may be a future crop for you.

Field days:

*July 28
Center, CO
(Rio Grande
County)*

*September 10
Rocky Ford, CO
(Otero County)*

The market for teff is very limited as a cereal. Teff flour is used to make sourdough pancakes called "enjira". We are looking at teff as a dryland forage crop as well as for seed production. The Adams county specialty crop project has winter and spring canola forage trials. Forage quality of this crop has been very high in prior trials (96% TDN and 16.5% protein). Yields in prior trials have varied from 2.5 to 12.5 tons of dry matter per acre.

More than a third of the farm income in the United States is derived from specialty and minor crops. The value of diversity cannot be ignored.

Come to a field day location of your choice and see what may be a future crop for you.

□Johnson

Sincerely,



Robert L. Croissant
Editor
Extension Agronomist - Crops

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

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