Cooperative Extension
Colorado State University, Fort Collins, Colorado 80523

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AGRON-O-GRAM

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DOREEN JORDAN RESIGNS

For the last 17 years, those contacting the extension agronomy office at Fort Collins have been accustomed to Doreen's pleasant personality and abundance of knowledge. As of August 31, Doreen resigned the secretary position to be with her husband Dawson, travel more together, enjoy their beautiful new home west of Livermore and do all the things she wanted to do before but didn't have time. Dawson, former Dairy Extension Specialist at Colorado State University, retired June 30, 1990 and since has been consulting, judging dairy shows, and has been on international assignments. Here is wishing both of them the best in the years to come.

Jeri Dreher will start her new duties as extension secretary on Monday, September 3rd. Jeri comes with a wealth of experience and expertise with computers. She received her BA in math and computer science at the University of Colorado and has most recently been employed in the office of Vice President for Research at Colorado State University. We welcome Jeri to the agronomy department as extension secretary.

FALL WHEAT SEED

The Colorado Seed Growers office has been receiving complaints about improper advertising and sale of seed. Seed protected under Title V of the Plant Variety Protection Act can only be sold as a class of Certified seed. The act is specific in defining illegal activities; protected varieties cannot be offered for sale, advertised, or sold using variety names unless sold as Certified seed. Using terms such as "cleaned, TAM 107", or "grain from Certified Hawk" imply that uncertified, protected varieties are being sold for seeding purposes and is illegal.

The Plant Variety Protection Act protects companies and individuals who invest time and money developing new crop varieties. The illegal sale of protected varieties is probably the main reason that companies have discontinued their Hard

Red Winter Wheat breeding programs. The ultimate loser is the farmer who will have fewer new and improved varieties in the future.

Common varieties of wheat covered under PVP include: Tam 107, Hawk, Sierra, Thunderbird, Bronco, Vona, Mesa, Sandy and Victory.

Certified seed growers are also concerned about farmers who sell "seed" as certified without going through the certification system. We see ads describing seed as "grown from certified", "certified quality", or "certifiable" and in most cases, this seed has not passed through the safeguards of the certification system. Other cases where farmers buy Foundation or Registered seed and unknowingly think that the offspring is automatically Certified seed are also common.

There are two losers when a farmer plants "bogus certified seed": the farmer who plants the seed and does not get the quality he expects, and the certified seed grower, whose reputation is hurt when problems occur. Many circumstances occur where a farmer has become skeptical about certified seed quality because of previous problems with "bogus" seed.

To be sure that the seed is truly Certified Seed, the farmer should insist that each bag be tagged with an official purple or blue tag, and that each bulk load be accompanied with a CSGA Bulk Sales Certificate. (Stanelle)

HOW MUCH (OR HOW LITTLE) IS ONE PART PER BILLION?

When it comes to residues of chemicals in food and water, how much is too much? The only logical answer is, "It depends." It depends on what the substance happens to be, how toxic it is and over how long a period of time it is present in food or water.

For example, only a few Clostridium botulinum microbes in a pound of meat can trigger acute food poisoning. On the other hand, relatively large concentrations of "good" bacteria are needed to turn milk into cheese.

As recently as 20 years ago, science could measure residues only in parts per million (ppm). Levels of any substance up to 999 parts per billion were undetectable and showed up as "zero" residue.

But as the ability to measure trace levels of substances increases, zero keeps getting smaller and smaller. This is referred to as the vanishing zero. Today, residues can be detected in quantities as small as one part per trillion (ppt). For some substances, scientists now can find one part in a quadrillion. A quadrillion, incidentally, is one followed by 15 zeros.

One part per quadrillion is a million times smaller than one part per billion. A coffee drinker who sweetens his coffee would use about one part of sugar to 48 parts of coffee if he stirs a teaspoonful of sugar into a cup. To equal one part per billion, the teaspoonful of sugar would need to be dissolved in 1.3 million gallons of coffee -nearly as much as would be required to fill two Olympic-sized swimming pools.

In terms of time, one part per billion is equivalent to one second in 32 years. A part per quadrillion is equivalent to one second in 32 million years.

There's a "bad news - good news" aspect to the precision with which minute concentrations of chemicals can be detected.

The bad news is how the public at times reacts to reports that any trace of a certain chemical compound has been detected in food or groundwater.

Whether a part or two per billion of a chemical poses a health risk depends on what the chemical is, under what conditions it is detected and whether the concentration approaches acceptable levels established by the Environmental Protection Agency.

Today, we can take a closer look at our food supply and groundwater resources. With careful monitoring, the ability to detect parts per billion or parts per trillion offers the opportunity to spot potential contamination long before the point of danger. Being able to detect potentially harmful substances (whether naturally occurring or manmade) at concentrations well below the threshold of danger assures ample time to correct situations that might eventually lead to problems.

That's the "good news" about our more precise methods of detecting and measuring minute levels of agricultural chemicals ranging from crop protection products to fertilizer. (Follett)

MEASURING ELEMENTS IN EXTRACTS OR DIGESTS

Elemental analysis is an important service that most soil laboratories provide. There are basically two methods for analyzing elements in soils, plants, or water. One is atomic absorption spectrometry (AA) and the other is inductively coupled plasma (ICP). the ICP method is used at the CSU Soil Testing Laboratory on a regular basis, while AA is used for unusual elements that do not have detectors on the ICP. The ICP utilizes argon plasma, which is basically an energized form of argon gas whose energy is maintained by a radio frequency (RF) generator. Plasmas burn at about 8,000 K. The advantage of ICP is that when a sample is introduced into a plasma, there is complete sample vaporization and atomization. Therefore, refractory compounds (very stable compounds), such as calcium and magnesium sulfates and phosphates, are completely released, allowing for the discreet reading of calcium and magnesium without prior sample treatment. The argon plasma also produces a chemically inert environment within which atoms and ions can exist while being analyzed. The ICP allows the operator to select only high and low standards (for example, 2100 pm and a blank, respectively), since the calibration curve can be extended quite far beyond the high standard. Thus, the user of a simultaneous ICP can measure as many as 50 to 60 elements in only 20-30 seconds, while consuming approximately 2 ml of sample. The Soil Testing Lab can measure 23 elements on its ICP. The disadvantages of inductively coupled plasma are the initial investment (usually more than $100,000), and occasional interference between elements. For instance, elevated quantities of Fe in soils may interfere with other elements being analyzed.

Atomic absorption, on the other hand, is inexpensive to operate, but no more than 1-2 elements can be analyzed at a time. AA utilizes a flame that burns at 3000 K. although inter-element interferences are minimal, solutions may require special treatment to release refractory compounds. Elements such as potassium and sodium may be difficult to analyze since they ionize easily, and as a result, decrease the number of atoms available for analysis. All of these disadvantages can be overcome by pretreatment of the sample prior to analysis; however, this necessitates more time to complete analyses.

Both AA and ICP are excellent instruments for the elemental analysis of soils, water, and plant samples. The ICP may have a slight advantage over AA when measuring very low concentrations of elements. (Self)

WINTER WHEAT PLANTING DATES

Improper wheat planting dates may affect many conditions and seriously reduce yields. For example, an improper planting date may result in increased Footrot, Western Streak Mosaic Virus, Hessian fly damage (Phytophaga destructor), Russian Aphid (Diuraphis noxia) infestation, or even reduce available soil moisture to seedling wheat plants.

Winter wheat sown in the fall, especially in areas of high daytime temperatures, produces weak plants having a poorly developed root system. Very often plants under stress in early planted fields are attacked by root rotting organisms relating to increased winter injury. Late seeding results in poor tillering, more chance of winter injury and lower yield. Seedlings developed to the 3-4 leaf stage survive the winter better than seedlings reaching the 1-2 leaf stage.

When soil temperatures are below 68°F four inches deep at 6:00 AM, then soils have cooled sufficiently to reduce the susceptibility of wheat to footrot. As of 4 September, soil temperatures are 73°F at 6:00 AM in Akron and may go as high as 85°F in the afternoon. Prior to stubble mulch farming, early planting was necessary to provide cover preventing wind erosion. Today, there is little reason that erosion cannot be controlled by reduced tillage resulting in proper straw mulch.

Early planted fields are subject to Russian Wheat Aphid (RWA) flights subjecting the field to early infestation. This infestation will continue to build throughout the fall and spring unless spray control measures are taken. Wheat infested with RWA has been shown to have less cold tolerance. Destroying adjacent fields of volunteer wheat and later plantings reduce fall infection.

Wheat Streak Mosaic Virus (WSMV) is a disease of wheat transmitted by the wheat curl mite, Aceria tulipae. The wheat curl mite is active during the fall months and can transfer WSMV for a distance depending on prevailing winds and length of growing weather after fall emergence. Volunteer wheat, an alternate host, should be destroyed. Generally, later planted wheat is less exposed to virus-carrying mites in the fall. However, the effectiveness of delayed planting depends upon the extent of warm weather in the fall.

The Hessian Fly is present in Colorado but seldom causes economic yield losses. The adult fly lays eggs in the fall on newly emerging plants. Subsequently, hatched larvae crawl downward to the base of the leaf where they feed and overwinter. A second generation lays eggs in the spring, then causes economic losses when tillers lodge, breaking at ground level. Planting after fly free dates is usually effective but will vary depending upon rainfall and temperature. The "fly free date" is near the 24th of September in Northeastern Colorado.

Soil water storage during the fallow period is a major contributor to high yields. Early planting may produce lush fall growth, depleting surface moisture and when winter snow and rain is limited, then plants under stress may winter kill.

Suggested dates vary depending on the location but 10-20 September is a good guideline in Northeastern Colorado. In higher elevations, earlier plantings enabling growth of 3-4 leaves is in line, while in warmer regions, wheat should be planted later. Special problems mentioned above warrant adjusted planting dates. However, in most areas, a good soaking rain usually brings out wheat planters, sometimes too early. (Croissant)

FALL IS THE BEST TIME to SAMPLE SOILS for FERTILIZER PLANS

Soil sampling can be done at any time, but there are advantages for fall sampling.

Dry soil conditions are favorable for collecting samples and allow superior uniform sampling. It is time to review the 1990 production season after harvest and plan ahead for 1991. Fall sampling in the fall will allow you to have 1991 fertilizer recommendations available for crop production planning.

Fall soil sampling allows you to avoid the spring rush. Spring activities, including fertilizer and herbicide application and planting, mean that many essential jobs must be carried out in a short time. When time runs out and something has to go unfinished, soil sampling is most often the victim. Sample in the fall when there is more time and the information will be ready for use when you need it.

Spring sampling can mean delays in receiving lab reports. Spring research in several states has indicated that fall samples are just as accurate as samples taken in any other season. Agronomically, fall is a good time to sample. It is agronomically sound to apply needed phosphate and potash for spring planted crops during the fall.

CROP SALT TOLERANCE

Excessive salts in the root zone can reduce crop yields. To reduce the salt effect on plants, the grower has different options. One option is to leach the soluble salts, other than sodium, out of the root zone. If sodium level is excessive, an amendment such as gypsum, sulfuric acid, elemental sulfur, etc. can be used depending on soil and climatic conditions and the excess sodium salts can be leached out. Open or tile drains must sometimes be installed to make leaching of the salts feasible.
Another option is to use salt tolerant crops. In extreme cases, farmers have to produce more salt tolerant crops and also establish drains, a costly proposition.

In many cases, choosing a salt tolerant crop is an economical option. In the following tables, you will find the salinity threshold (A) and percent yield decrease per unit salinity increase above the threshold level (B or slope of the line). From these figures, you can calculate the percent yield for a crop at a given salt level (EC) using the following equation:

$$Y,\% = 100 - B(EC - A)$$

The salinity levels are from soil saturated extracts and units are in mmhos/cm. As an example, the threshold level (A) for alfalfa is 2.0 and the slope (B) is 7.3, assuming an EC value of 5.0 mmhos/cm, the following calculations show percent yield:

$$Y,\% = 100 - 7.3(5 - 2) = 78\%$$

In this example, alfalfa yield is reduced approximately 22%. The farmer can apply 8 inches of good quality water per acre to reduce the salt level to 2.0, the threshold level for alfalfa, before planting or during seed germination. Alternatively, he can grow barley with a threshold level of 8.0 mmhos/cm which is not affected by the salinity level of 5.0.

SALT TOLERANCE IN CROPS

Common name	Threshold (A)	Slope (B)
	mmhos/cm	% per mmhos/cm
Barley	8.0	5.0
Bean	1.0	19.0
Corn	1.7	12.0
Sorghum	6.8	16.0
Sugarbeet	7.0	5.9
Wheat (sd)	8.6	3.0
Wheat (d)	5.9	3.8
Alfalfa	2.0	7.3
Clovers	1.5	12.0
Corn (silage)	1.8	7.4
Fescue, tall	3.9	5.3
Foxtail, meadow	1.5	9.6
Orchardgrass	1.5	6.2
Ryegrass (per)	5.6	7.6
Sudangrass	2.8	4.3
Wheatgrass, std crstd	3.5	4.0
Wheatgrass, frwy crstd	7.5	6.9
Wheatgrass, tall	7.5	4.2
Wildrye, beardless	2.7	6.0
Onion	1.2	16.0
Potato	1.7	12.0

If you are interest in knowing the salt tolerance of other crops, please let me know. For a salinity evaluation, send your soil samples to CSU Soil Testing Lab or other reliable laboratories. (Soltanpour)

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Sincerely,

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