FROM THE GROUND UP

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AGRONOMY NEWS

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FARMSTEAD ASSESSMENT SYSTEM (FARM*A*SYST)

Despite recent efforts by farmers to protect groundwater from agricultural contaminants, significant improvements are still needed. Recent research suggests that farmstead activities and structures can be a major source of rural water contamination and deserve special consideration to preserve our water supply. Farmsteads include farm buildings and the adjacent land. Agricultural activities are usually headquartered at these sites and fertilizer, pesticides, and livestock wastes are handled and stored at farmsteads. Petroleum products, solvents, and other non-crop chemicals are also handled, stored, and often disposed of at these sites. Agricultural lenders are becoming wary of the potential for environmental liability and most of their concern focuses on the farmstead and waste disposal site.

One solution to this problem could be the use of a voluntary site analysis to identify pollution risks associated with farmstead activities and the corrective and preventive actions needed to reduce these risks. To meet this need, a Farmstead Assessment System, called **Farm*A*Syst**, has been developed by the Universities of Wisconsin and Minnesota to provide

accurate, site-specific information and recommendations for practices that may be affecting groundwater.

Farm*A*Syst works by using a series of worksheets to evaluate the risk of farmstead activities and structures for causing contamination of well water. The assessment system includes educational materials that aid in conducting farmstead inventories and evaluating contamination sources. The assessment can be done individually or in group education sessions. Group sessions normally involve local professional and agency technical staff who can help farm operators identify any corrective actions.

Become involved in designing, planning, and implementing the Colorado Farm*A*Syst by participating in the following meeting:

National Farm*A*Syst regional workshop in Denver, November 9-10.

Participants select the appropriate worksheets for their farmsteads, all of which evaluate structures or activities - such as well condition or pesticide handling, storage, and disposal. A separate evaluation worksheet helps assess specific soil and geologic features of the land and how they affect groundwater pollution potential. Then an overall evaluation sheet combines the findings from the site evaluation and the assessments to develop a relative risk rating for that farmstead. Educational materials also provide information on local sources of technical assistance and emphasize the cost-effectiveness of taking corrective or preventive measures.

Farm*A*Syst is a unique program because it examines a wide range of potential contaminants and provides a mechanism to accurately assess farmsteads. This information enables farmers to take decisive action to preserve the quality of their drinking water, their property values, and their health.

Currently, Colorado State University Cooperative Extension and the Soil Conservation Service are exploring ways to develop and implement Farm*A*Syst for Colorado. With some modification, this voluntary program could be used by Colorado farmers, ranchers, their rural neighbors, and ag lenders. Implementation of the program will require the following steps:

1. Adapt Farm*A*Syst material to Colorado conditions, laws, and management constraints.

2. Distribute copies to all offices of organizations participating in the Colorado Farm*A*Syst program.

3. Provide in-service training to organizational staff.

4. Publicize the program through various media.

5. Offer the program in a variety of formats, including: self-conducted assessment, one-on-one site assessments, group workshops, and demonstrations.

Colorado State University Cooperative Extension is taking the lead role in developing this program for Colorado. Other agencies, including the SCS, Health Department, EPA, and the Department of Agriculture, have indicated support and interest in working on this project.

Two opportunities for interested Extension personnel are upcoming. The national Farm*A*Syst staff is planning a regional workshop in Denver on November 9 and 10, 1992. Following that workshop, a Colorado Farm*A*Syst planning meeting will be held at 1:30 p.m. on November 13, 1992, at the Colorado Department of

Agriculture, 700 Kipling, Suite 4000, Lakewood, Colorado. At these meetings, interested parties will have an opportunity to become involved in designing, planning, and implementing Colorado Farm*A*Syst. Your participation is welcomed and encouraged, as we would like to have some county input. For more information or to provide us with your feedback on this program, contact myself 303/491-6103 or Lloyd Walker 303/491-6172. ▫Waskom

ALTERNATIVE/SPECIALTY CROPS

I have been hesitant to promote **amaranth** as a crop in Colorado. It does produce well; however, the market is especially small relative to other crops. A marketing contract is necessary before you plant in the spring.

On August 21 and 22, I attended the 6th annual meeting of the Amaranth Institute in Fargo, North Dakota and detected an improved outlook on the crop. Amaranth processing has been difficult, thereby limiting its use. An attempt to incorporate amaranth in granola was unsuccessful because the amaranth always settled in the bottom of the bag. By itself, amaranth has a sand-like texture and is generally not "nutty" like the adds say. After four years of declining sales, granola production with amaranth has ended. Subsequently, Arrowhead Mills, a company doing research and marketing, has begun to blend amaranth grain with two new cereal products. New amaranth products including "popped amaranth" which looks, smells, and tastes like miniature popcorn, "flaked amaranth" which will enrich cereals and breads, and "milled amaranth" which is being used in a pancake/waffle mix are being made by other companies.

For information on amaranth, write or call:

Amaranth Institute Bricelyn, MN 56014 507/653-4379.

Recent chemical analysis has revealed new information about amaranth's composition. Amaranth is about 8% oil. This oil is the highest of any known vegetable as a source of "squalene" (pronounced sku-AA-lean). Chemically it is a $C_{30}H_{50}$ isoprenoid. For the health-conscience and the ecologically-concerned, squalene is normally obtained from the livers of sharks and whales. Squalene belongs to an important group of fat-soluble products called tocopherols and tocotrienols which are "isomers" of vitamin E. These vitamin E products are suspected of having benefits of reducing cholesterol. Amaranth has high levels of lectin, called amaranthin (also called phytohemagglutinin) which is being tested for the detection of colon cancer. It is high in biologically useful iron. Dr. Jim Lehmann of the Amaranth Institute calls this a "nutraceutical"- a word composed from NUTRients and pharmACEUTICALs.

The starch granules from amaranth are uniquely small and may have potential ranging from a fat substitute in cream products such as nonfat ice cream to making fine paper. Most starches, for example from wheat, corn, and potatoes, have large-sized granules which give a coarse texture to the product.

The future of amaranth is looking brighter. Contracts for this crop are still very limited but I'm not as hesitant as I was several weeks ago to recommend you consider planting some in a corner of the farm.

You might write to the Amaranth Institute for more information:

Amaranth Institute
Bricelyn, MN 56014
507/653-4379. ▫Johnson

POST-HARVEST PROCEDURES FOR DRY BEANS

Dry edible beans have a thin fragile seed coat which can be easily damaged during handling. Seeds can be damaged in many ways, although cracks, splits, and seed coat checks are most common. All of these factors lower product quality and detract from the visual appearance of the cooked product. Since the price paid by canners is adjusted according to seed quality, it is imperative to maintain high quality from the field to the package. A quick method to assess seed coat damage involves soaking the seeds in water for 3 - 5 minutes, then evaluating the seed for breaks and slipped skins. The seed moisture content is the most important factor related to susceptibility to seed damage; however, seed size is also important. In general, larger seeds are more prone to damage, and damage increases as the moisture content decreases. Proper seed moisture content is also important for safe storage of beans.

Being aware of bean seed moisture content is important as it relates to susceptibility to damage as well as safe storage.

Handling

The use of bucket elevators and belt conveyors rather than augers or paddle elevators to move beans will reduce seed damage, especially if seed moisture content is low. If augers are used, they should always be run at the lowest speed to operate efficiently and at full capacity. When paddle elevators are used, it is important to run at reduced speed and keep the flight chains tight to prevent them from riding and grinding on the beans. While beans are being moved, they should never be allowed to drop long distances. Padded bean ladders or a sleeve can be used to slow the fall. Careful adjustment to reduce discharge drop distances from the combine onto the truck, and from the truck to the elevator pit should be maintained.

Storage

Storage facilities for dry edible beans can be constructed of wood, steel, or concrete. The most important consideration for a storage bin is protection from water and contamination from other crops, rodents, chemicals, insects, and temperature extremes. A good aeration or drying system is necessary for storage of beans which have high moisture or where moisture can accumulate due to moisture migration caused by humidity and temperature fluctuations. Bean seeds should be approximately 14-16% moisture for short-term storage and 11-14% for long term storage.

Excessive moisture contained in stored beans will cause the same problems as in other grains. Beans stored for extended periods, that is longer than a few months, will be subject to moisture migration problems. Moisture migration occurs when outside average temperatures are greater than 10° F difference than the grain temperature. In the fall when outside temperatures decline, a circular movement of air down the sides and up the middle occurs within the bin. The outside air cools, then warms, as it moves up the middle of the bin. This warmed air then picks up moisture from the grain and deposits it in the top center of the bin. Excessively high moisture levels then occur causing problems.

Aeration, that is, moving air through the grain which controls grain temperature and moisture, is recommended. This is accomplished by moving low rates (1/5 to 1/3 cfm/bu) of air through the grain. Air movement, greater than 1 cfm/bu, is common and will condition grain faster and provide limited drying over extended periods of time. Usually in

the dry air of Colorado, heat in not necessary. Air movement can be in either direction. A suction system recommended for very low (1/3-1/5 cfm/bu) air rates draws air through the grain and exhausts it out the bottom. High capacity suction systems may collapse the bin roof. The pressure system forces air in the bottom through the grain and then out the top, and is adaptable for both low and medium airflow rates. In both cases, condensation may occur when the temperature differences of grain and outside air increase; however, you can see the moisture by using the pressure system. Pressure systems result in more uniform air distribution. Most blowers are designed to operate more efficiently against pressure than suction. ▫Brick

FALL FERTILIZER APPLICATION

Fall fertilization is an important management tool in many production programs. Fall fertilization should be based on sound agronomic, economic, and environmental principles.

Apply fertilizer in the fall:

- ***Beat the weather***
- ***Reduce soil compaction***
- ***Store nutrients***
- ***Obtain fertilizer supplies readily***

Advantages of Fall Fertilizer Application

- Beat the weather - Take advantage of warm, clear fall days. Fall weather is more predictable than spring weather. There is less wind in the fall.

- Reduce soil compaction - In fall, soils are usually dry enough to withstand field equipment weight without compacting. When soil is compacted, moisture infiltration, aeration, and nutrient uptake is reduced resulting in less plant growth.

- Nutrient storage - Fall or plowdown applications of fertilizer place nutrients in a moist, active root zone. Surface applications broadcast and incorporated in spring tend to concentrate nutrients in the top few inches of soil. Nutrients concentrated there encourage shallow rooting of plants, increasing the chances for drought stress.

- Availability of fertilizer supplies - Fertilizer supplies are more readily available because of off-season schedules. This allows for extra time for soil sampling and consulting with company personnel.

There is justifiable concern that fall nitrogen fertilization may increase nitrate nitrogen leaching. Nitrogen fertilizer applications on light textured soils or in hydrologically sensitive areas must be delayed until late spring for maximum efficiency. Excessive rainfall or irrigation on fine textured soils can also lead to denitrification. When this occurs, nitrate is converted to a gaseous form of N which can be lost to the air.

Banded preplant nitrogen plus through-the-sprinkler application probably is the most efficient method of applying nitrogen to row crops such as potatoes. Planting time applications, plus through-the-sprinkler application shortly after planting, is possibly the most efficient for spring grains. Anhydrous ammonia is the best source for preplant fall N application since N in the ammonia form is resistant to leaching. Nitrification inhibitors such as N-Serve can further prevent leaching by slowing the conversion of ammonia to nitrate.

Nutrients such as P, K, and Zn are relatively immobile in soils and uptake efficiency and response are highest

when these nutrients are placed into the root zone. By applying fertilizer P and K before fall tillage, thorough incorporation into the root zone is assured. If only shallow tillage is performed after P and K application, the fertilizer stays in the dry surface soil during the entire growing season. Much less of the applied nutrient will be taken up by the plants.

Use a soil test to determine recommended levels of nutrients required for optimum yields.

Phosphorous and K is sometimes applied on fields without incorporation. Phosphorous and potassium bind tightly to soil particles and will move only by wind or water erosion. Avoid surface applications on fields with little or no crop residue.

Zinc is best applied either with deep incorporation or banded beneath the plants. One application of 5-10 pounds/acre of actual zinc will raise the zinc level in the soils so that annual applications are not necessary. Zinc chelate or other soluble zinc sources can be added to the band solution applications each year.

Fall Forage Fertilization

Fall P and K applications are well suited to alfalfa and cool season grass production. Fall applications ensure better winter survival and longer-lasting stands. Alfalfa sometimes does not respond to spring P applications until the second cutting. Fall P and K applications ensure that the nutrients are in place during the critical early season growth period. Alfalfa has a high requirement for both P and K. About 10 lb of P_2O_5 and 50 lb of K_2O are removed in each ton of alfalfa produced. Colorado soils are rarely deficient in potash; however, 40-50 lbs/A of P_2O_5 are needed to maintain fertility.

Use a soil test to determine recommended levels of nutrients required for optimum yields. ▫Follett

IMPORTANT EVENTS

Water Quality - The New Rules of the Game.
Date: 23 Oct 1992
Ramkota Inn, Greeley CO
Sponsor: Colorado Cooperative Extension Service and the Colorado Bar Assn.
Contact Reagan Waskom (303)491-6103.

Agriculture-Water Quality Issues
Date: 8--9 Feb 1993
Colorado State University Campus
Sponsor: Agronomy Department and Agricultural and Chemical Engineering Department, Colorado State University
Contact Bob Croissant (303)491-6201 or Lloyd Walker (303)491-6172.

Corn Management Short Course
Date: 12-15 Jan 1993
Colorado State University Campus
Sponsor: Colorado State University Cooperative Extension
Contact: Bruce Bosley (303)867-2493.

✓MARK YOUR CALENDARS

WILL CORN MATURE BEFORE FROST?

General conditions this year are contributing to maturity problems, especially in corn, in eastern Colorado. Daily high temperatures are 3-5 degrees below long-term averages, depending on specific locations. Many locations are as much as 200 heat units below average when compared to the calculations through the 28 August ratings. However, western Colorado temperatures and growing degree day accumulations are close to normal.

Late planted corn, due to unusual conditions this year, may have trouble reaching physiological maturity.

Because of the cool growing season this year and planting dates between mid-April and mid-June, development is very erratic. Corn replanted after the freeze (26th of May) in eastern Colorado will have trouble maturing. The freeze on 26 May was severe enough that most farmers replanted at least part of their corn acres along the eastern Colorado border.

It is advisable to make alternate plans for harvest in case of an early frost.

Under normal conditions, physiological maturity (black layer formation) occurs about 50 to 60 days after pollination. Late replants did not have the advantage of long daylight hours. The longest day of the year is 21 June and shorter days and longer nights have been the rule since that time. Temperature does influence kernel development and heat accumulation (growing degree days) is a good indicator for predicting maturity dates.

Growing degree days are computed by the following formula:

Growing Degree Days (GDD) = {[(maximum temperature + minimum temperature)/2] - 50} summed for each day from planting to physiological maturity.

Daily maximum temperatures greater than 86°F, result in use of 86°F in the formula. Minimum temperatures less than 50°F result in the use of 50°F.

Almost all hybrids require 1100 to 1200 GDD to develop from silking to physiological maturity. Late planted corn that didn't silk until the first or second week in August will not be safe from yield reductions due to frost until late September or early October. Corn in the late milk to dough stage will require 30-35 calendar days and 650-750 GDD to mature. Fields in the early dent stage will require 20-25 days and 425-525 GDD to reach physiological maturity. Nighttime temperatures are getting cooler, snow has occurred in Colorado mountains for several weeks already, and freezing temperatures have occurred in Montana and Wyoming. These are reasons to be concerned.

It is advisable to make alternate plans for harvest in case of an early frost. For example, corn scheduled for grain would make acceptable silage following an early fall frost. Growers should attempt to harvest silage at about 70% moisture for a quality product. Higher moisture levels cause leaking storage structures and poorer quality silage. Excessively dry material will be difficult to pack tightly enough to prevent spoilage.

Corn that does not reach black layer maturity in the field before frost will dry very slowly in the field. Attempts to combine this product will result in the cob breaking up. ▫Croissant

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

Sincerely,

Robert L. Croissant
Editor
Extension Agronomist - Crops

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