2005

Crop Watch No. 2005-22, September 30, 2005

Lisa Brown Jasa
University of Nebraska-Lincoln, ljasa@unlnotes.unl.edu

CROP WATCH
University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources
University of Nebraska Lincoln

No. 2005-22, September 30, 2005

In corn

Check fields for stalk rot to determine harvest order

Stalk rots of corn have been observed in many Nebraska fields. Advanced stages of stalk rot can be recognized by premature plant death and plant lodging, which can be a particular problem during harvest if lodging occurred below the ear. You can assess the risk of stalk rots in your fields by conducting "push or pinch" tests of at least 25 plants. If plants do not spring back when pushed on, or if the stalks are soft when pinched, there is a high likelihood of lodging.

In the past, most researchers agreed that if more than 15-25% of plants in a given field had stalk rot, that field should be harvested as early as possible after physiological maturity. The extra cost to dry the grain would be offset by the added yield obtained by harvesting before widespread lodging occurred. (Whether this holds true given the recent increase in gas prices remains to be seen).

Fusarium stalk rot

Stalk rot at this time of year can be caused by several organisms. Stalk rot caused by Fusarium or Gibberella can be indicated by a pink or red color inside the stalk . In the case of Gibberella stalk rot, the red pigmentation is accompanied by raised black fungal structures on the stalk. On the other hand, Anthracnose stalk rot can be identified by the presence of larger shiny black lesions visible on the outside of the stalk underneath the rind. Diplodia stalk rot is characterized by raised small black dots produced by the fungus, called pycnidia, on the outside of the lower stalks and roots. These growths give the plant a rough, sandpaper-like

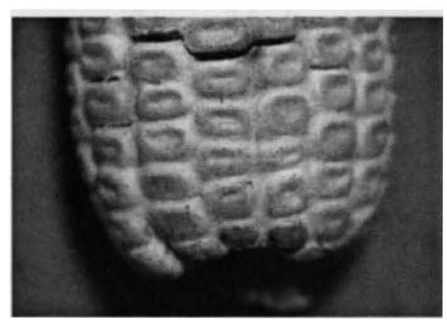
(Continued on page 203)

Inside

Grain mold and mycotoxin risk elevated this year

Growing conditions across the state varied widely this year and in many areas weather conditions were favorable for the development of one or more corn ear rots. Ear and grain molds are important because they can reduce the quality of grain and, under the right conditions, may lead to the accumulation of mycotoxins.

Development of ear rots and grain molds can be minimized by reducing plant stress, reducing damage caused by insects and during handling, planting tolerant hybrids in high-risk areas, and especially by maintaining proper storage conditions after harvest. Drying grain to less than 15% moisture within 48 hours of harvest, removing old grain



Diplodia ear rot pycnidia

Pycnidia produced by the fungus that causes Diplodia ear rot. (Photo courtesy of Tamra Jackson, UNL IANR Plant Pathology)

from empty bins, and stirring grain bins to prevent the development of hot spots will help inhibit growth of

(Continued on page 204)

Ag briefs

Del Hemsath, Extension Educator in Dakota, Dixon and Thurston counties: Soybean harvest was going strong and about 25% complete before rains of 1-5 inches on Saturday put harvest on hold. Yields in rainfed fields were reported at 45-60 bu/ac. Grain moisture levels range from 9% to 16%. No irrigated beans were harvested. Wet corn is being harvested for feedlots. Most alfalfa cutting is complete except for those fields with a fourth or maybe a fifth cutting. Cornstalks are being grazed.

Gary Lesoing, Extension Educator in Nemaha and parts of Richardson County: It has been extremely dry here the past six weeks. We have had very little rain since we received 3-5 inches in mid-August.

Soybean and corn harvest is beginning in earnest now and there are long lines at some of the elevators. Yields are quite variable. In Nemaha County soybean yield reports are from the upper 20s to 30 bu/ac in some of the drier areas and over 50 bu/ac in the southeastern area near the Missouri River. Reports in eastern Nemaha County indicate soybean yields of 35 bu/ac to more than 40 bu/ac. These overall yields are much better than some of the drier areas in the region where 20 bu/ac is more the norm.

Corn that has been harvested has generally yielded fairly well. It has dried down and some is being combined at about 15% moisture. Corn harvested in eastern Nemaha County yielded 120-130 bu/ac, while a good bottom field made over 170 bu/ac. The highest yield I have heard to date was in Richardson County, where a field made over 200 bu/ac. I am sure there will be some high yields in the area, some more average, 100-120 bu/ac and, where rainfall was scarce this summer, some lower yields.

Some wheat has been planted, but it needs rain to germinate and emerge. Pastures that have been grazed all summer are gone and alfalfa is also done for the year. Most growers had four cuttings of alfalfa.

Paul Hay, Extension Educator in Gage County: Crops in southeast Nebraska are drying fast and harvest is in full swing. Yields are a bit better than expected for the most part, which will make for an average year.

Doug Anderson, Extension Educator in Thayer and Nuckolls counties: Soybean harvest here is going full bore. Yields are okay -- 25-35 bu/ac dryland and 60-70 bu/ac irrigated. Some dryland corn fields which weren't taken for silage are being picked. Yields are a mixed bag, ranging from 20 to 90 bu/ac with the majority in the 40-50 bu/ac range. This is better than expected.

Jennifer Rees, Extension Educator in Clay and Webster counties: Soybean yields have been excellent this year with irrigated yields ranging from 65 to over 75 bu/ac. Dryland yields have ranged from 35 to 50 bu/ac. Several farmers have mentioned the stems are still green even though moisture is below 11%. Soybean harvest is around 60% complete. Wheat planting should begin fairly soon.

USDA's National Agricultural Statistics Service Nebraska Field Office: Temperatures ranged from 2 to 12 degrees above normal with a few highs reaching 100° for the week ending September 25.

Corn conditions rated 5% very poor, 8% poor, 22% fair, 45% good, and 20% excellent. Irrigated fields rated 81% good or excellent while dryland fields rated 39%. Seventy-two percent of the crop had reached maturity, ahead of 48% last year and 71% for the average. Corn harvested increased to 10%.

Ninety-two percent of the **soybean** crop had dropped leaves, ahead of 79% last year and 77% for the average. Harvest progressed to 19%. Conditions rated 4% very poor, 10% poor, 29% fair, 42% good, and 15% excellent.

Sorghum conditions rated 4% very poor, 10% poor, 26% fair, 46% good, and 14% excellent, better than last year and average. Sixty-five percent of the crop had reached maturity, ahead of 36% last year and 60% for the average.

Sorghum harvest progressed to 5%, ahead of last year at 3%.

CROP WATCH

cropwatch.unl.edu

Crop Watch is published from March to November by Cooperative Extension and Communications and Information Technology in the University of Nebraska Institute of Agriculture and Natural Resources, PO Box 830918, 108 Agricultural Communications Bldg., UNL, Lincoln, NE 68583-0918. To order a print subcription or to change your address, write to *Crop Watch* at the above address or call (402) 472-7981. The newsletter also is available on the Web at **cropwatch.unl.edu**

Lisa Jasa, Editor; Email: ljasa1@unl.edu

Stalk rots *(Continued from page 201)*

feeling. During hot, dry conditions, charcoal rot can occur in corn, sorghum, and soybean and is recognized by the appearance of black, charcoal-like dust, which are fungal structures called microsclerotia, inside stems and roots.

Management of specific stalk rot diseases depends on a correct diagnosis. Some hybrids are less susceptible than others, so hybrid selection can be an important part of management. Stalk rots are more common in stressed plants, such as following other diseases (especially Gray Leaf Spot), or those found in fields with high plant population densities, high nitrogen levels, no-till environments, or insect feeding damage. Management is improved by reducing plant stress and avoiding wounds that can allow easier access for pathogens to enter the plant. For more information on stalk rots, see the NebGuide, "Common Stalk Rot Diseases of Corn" at *ianrpubs.unl.edu/plantdisease/g1385.htm.*

(Above) **Diplodia stalk rot**

(Right) **Anthracnose stalk rot.** The plant is killed from top down as the fungus progressively colonizes the stalk; damage can be confused with early dry-down. (Photos from the NebGuide, *Common Stalk Rot Diseases of Corn*, G99-1385, by James Stack)

It's also important to note that conditions that favor stalk rots also may favor ear rots and grain molds, too, and that some of the same fungi cause important ear rots, such as Fusarium, Diplodia, and Penicillium. The best management of ear rots and grain molds is by reducing injury to the ears in the field and during harvest and by drying grain to less than 15% moisture immediately after harvest before it is stored.

Tamra Jackson
Extension Plant Pathologist

Fall grazing alfalfa offers benefits

Some of the best pasture of the year still may be available this fall -- from your alfalfa fields. Alfalfa can provide considerable, high quality grazing this fall without the delays from slow curing hay and the costs of baling.

Many growers find that grazing alfalfa in the fall provides some special flexibility that often is useful this time of year. Alfalfa makes an outstanding weaning pasture for spring calves and yearlings will continue to gain weight rapidly even after summer grass starts to die off. Cows gain excellent condition before winter by grazing alfalfa during the fall and ewes and lambs perform very well on fall alfalfa.

Fall grazing of alfalfa is not without problems, though, and bloat is always a concern. After alfalfa has been frosted and started to dry down it has less tendency to cause bloat than summer alfalfa. To protect your livestock from bloat, fill them with hay before turning them onto alfalfa, and provide access to dry hay or corn stalks.

Another option would be to feed bloat protectants like poloxalene as blocks or mix it with grain. This can be an expensive supplement, but it works well when animals eat a uniform amount each day.

Also be careful not to damage your alfalfa stand. Only graze when fields are dry and firm. Reserve a small sacrifice area to graze and for feeding when soils are wet to avoid damaging the entire field.

Bruce Anderson
Extension Forage Specialist

Grain molds and mycotoxins *(Continued from page 201)*

grain mold and subsequent mycotoxin production.

The best-known mycotoxin in Nebraska is aflatoxin, which is produced by the fungus that causes Aspergillus ear rot. Hot, dry weather during the latter half of the growing season after pollination especially favors aflatoxin production. Drought-stressed corn, such as that in non-irrigated fields (particularly in southeast Nebraska this year) and field corners out of range of center pivots are especially vulnerable to the accumulation of aflatoxin. Aflatoxin is toxic and carcinogenic to humans and livestock and therefore, its levels in grain are strictly regulated by the FDA. Aflatoxin is regulated at very low levels ranging from 0.5–300 parts per billion (ppb), depending on its end use.

For tips on drying grain and maintaining bin moisture at optimum levels to limit potential diseases . . .

see the Sept. 16 CropWatch & pages 206 & 208 this week

Another mycotoxin, fumonisin, is produced by the fungus that causes Fusarium ear rot. This mycotoxin is also carcinogenic, but is not regulated at concentrations as low as that of aflatoxin (up to 50 ppm). It is particularly toxic to horses and can cause the blind staggers. Fusarium ear rot is favored by a wide range of environmental conditions and can be recognized by its scattered tufts of mold on the ears that may be white to pink in color and may be accompanied by starburst patterns on the kernels.

Another grain mold, Penicillium grain mold (Penicillium ear rot), can cause embryo discoloration known as "blue eye" and lead to the production of penicillic acid, which is not usually a toxigenic concern. This disease, which is favored by high moisture levels, particularly in stored grain, has recently been reported again in Nebraska. Management options include reducing ear damage caused by insects in the field and maintaining low moisture while the grain is in storage.

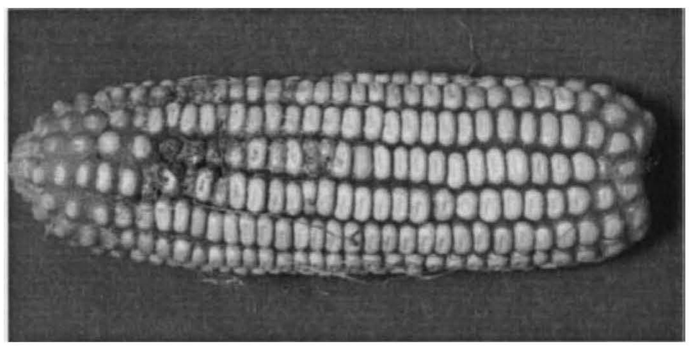
Finally, Diplodia ear rot is another common disease in the Corn Belt. The fungus that causes this disease does not produce a mycotoxin but can significantly reduce grain quality. Extensive fungal growth usually begins at the butt of the ear and can overtake the entire ear, creating a lightweight mummified ear. This disease also can be recognized by the production of small raised, black fungal reproductive structures on infected kernels (Diplodia ear rot pycnidia) and stalks giving it a rough feeling.

Suspected ear rot and grain mold samples can be submitted to the UNL Plant and Pest Diagnostic Clinic for identification. Most grain elevators also will routinely measure mycotoxin levels.

Tamra Jackson
Extension Plant Pathologist

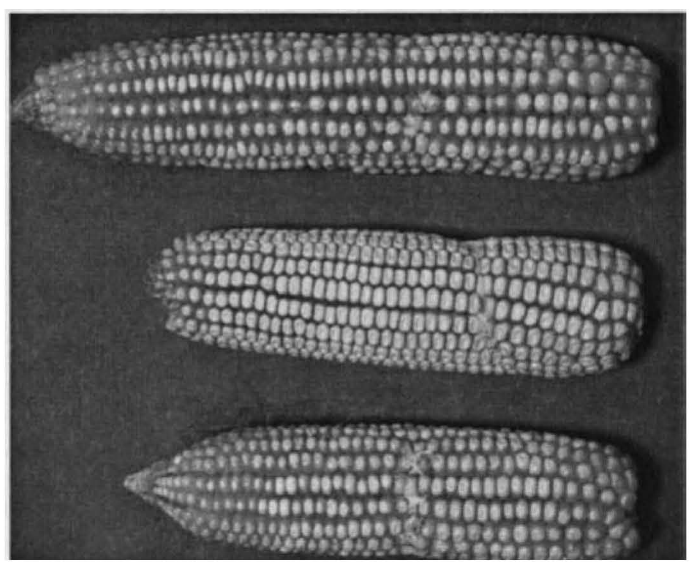
Diplodia ear rot

Fusarium ear rot scattered tufts of white/pink mold.



Penicillium ear rot

The mold causing Penicillium ear rot typically is green.



Fusarium ear rot

Diplodia ear rot on proximal end of the ear and progression to a mummy ear.

Soybean cyst nematode --

Don't let it rob your soybean yields

If you found something that would improve your soybean yields by five bushels or more per acre without adding any costs, wouldn't you jump at the opportunity? If you have soybean cyst nematodes (SCN) in your field, the step to higher yields can be as easy as planting SCN-resistant varieties next year.

Soybean cyst nematode, known as the silent yield robber, may cause substantial yield losses in fields where there are no signs or symptoms — the plants look healthy. SCN-resistant varieties cost no more than susceptible varieties (no technology fee) and their yields are comparable to susceptible varieties on non-infested sites. Most seed companies have a good selection of SCN-resistant varieties with the other agronomic traits you normally select.

The soybean cyst nematode is a microscopic worm that attacks the roots of soybeans, competing with the plant for moisture and nutrients. Often there are no above-ground symptoms . . . until the combine goes through the field. Then farmers often find portions of fields, or even whole fields, that don't meet yield expectations and can't be explained by other yield-limiting factors such as soil type, weather, weed competition, and pest infestations. Unfortunately, many farmers and crop consultants don't consider SCN until all other possibilities have been eliminated.

Table 1. In 1999-2004, the University of Nebraska conducted 12 research trials comparing SCN resistant and susceptible varieties on infested sites and the same varieties on six non-infested sites.

Average yield from 12 infested sites
Resistant varieties: 47.4 bu/ac
Susceptible varieties: 42.4 bu/ac

Average yield from 6 non-infested sites
Resistant varieties: 58.9 bu/ac
Susceptible varieties: 59.5 bu/ac

Average egg count post-harvest, infested sites
Resistant varieties: 491 eggs/100 cc soil
Susceptible varieties: 1,823 eggs/100 cc soil

Get a free SCN test

Bags for a free SCN analysis (a $20 value) were distributed to Extension offices and at area soybean meetings last summer. The tests are provided through a joint project of the Nebraska Soybean Board and University of Nebraska-Lincoln.

Test for SCN this fall

Testing for SCN is easy and, unlike other pests, can be done any time during the year even in winter when the ground is frozen. Fall testing after harvest, however, offers several advantages:

- This year's early harvest leaves more time for soil sampling for SCN this fall.
- Farming activities are slower after harvest, allowing more time to collect soil samples.
- Poor yielding fields or areas in fields are fresh in your mind, making it easier to identify and sample those areas.
- If in a rotation, you can sample fields that will be planted to soybeans next year to see if SCN is present and order SCN-resistant seed or make other planting decisions accordingly.
- If sampling a field that was in soybeans this year and fall tillage has not occurred, you can sample a couple of inches over from the existing row so you are pulling a sample that will include part of the root mass, increasing the chance of positively detecting SCN if it is present.
- Testing labs are generally not as busy at this time of year and you can get results quicker and have more time to make any management decisions based on the results.

Sampling for SCN can be done the same way you would take a topsoil sample for fertility recommendations. In fact by taking a few extra soil cores when sampling a field, you can have enough soil to send in half for your fertilizer recommendations and the other half for SCN analysis.

Another benefit to testing this fall is that the Nebraska Soybean Board funded a project with the University of Nebraska-Lincoln Extension to test soybean fields across the state to learn more about the distribution and levels of SCN infestations. (SCN has been identified from the eastern most counties on the Missouri River to as far west as Buffalo and Boyd counties.) Through this program, we hope to

(Continued on page 206)

Control stored grain moisture even in the short-term

Monitoring and controlling grain moisture content throughout the storage period is key to maintaining stored grain quality and its original value. If grain moisture content is too high, grain will inevitably spoil.

For grain stored up to one year, moisture content should be no greater than 14% for corn and sorghum, 12% for soybeans, and 13% for other small grains. For grain stored longer than one year, moisture content should not exceed 13% for corn and sorghum, 11% for soybeans, and 13% for small grain. Values should be reduced by 1-2% when storing lower quality grain such as immature or drought-stressed grain, severely cracked or damaged grain, and grain previously subjected to insects or molds.

If high temperature drying is used, operate the dryer at the lowest temperature possible. High temperatures reduce grain quality and make grain more susceptible to breakage and stress crack development. High temperature drying should be discontinued when the grain moisture is about 2% above the desired final moisture content. The remaining moisture will be removed in the cooling process.

Cool grain to ambient temperatures for about four to six hours. During this time, grain will go through a steeping process where moisture in the kernels redistributes and equalizes. Cooling the grain too rapidly can cause stress cracks, while cooling too slowly encourages spoilage. If grain is cooled in a storage bin, do not turn off the fan until all grain has been cooled, regardless of weather conditions. Holding warm grain in a bin for even a few days is a needless risk.

Natural air drying is an excellent way to minimize grain damage. This involves providing airflow rates of at least 1 cubic foot of air per minute per bushel of grain for extended periods, depending on the weather and initial grain condition. One critical aspect of natural air drying is that the initial drying front must be moved through the full depth of the grain bin as quickly as possible. To accomplish this, the fans must be operated continually.

For more information, see University of Nebraska–Lincoln Extension NebGuide G94-1199, *Management to Maintain Stored Grain Quality,* available on the Web at *ianrpubs.unl.edu/farmbuildings/g1199.htm*

David Shelton
Extension Agricultural Engineer

SCN *(Continued from page 205)*

receive more than 1,000 SCN soil samples by late 2005.

Bags for a free SCN analysis (a $20 value) were distributed to Extension offices across the state to be distributed by the local Extension Educator. Free sample bags were also given to participants at the Solution Days and Soybean Management Field Days held in August. If you would like a free sample kit, contact your local Extension office to see if they have any available or contact the UNL Plant and Pest Diagnostic Center at (402) 472-2559. Free sample bags are available on a first come, first served basis. When they're gone, they're gone!

UNL SCN trials

In 1999-2004, the University of Nebraska conducted 12 research trials comparing SCN resistant and susceptible varieties on infested sites and the same varieties on six non-infested sites (*Table 1*). Important observations from these studies include:

- On 12 infested sites, the average yield advantage from using resistant varieties was five bushels per acre. The advantage ranged from no difference in yields between resistant and susceptible varieties to over 13 bushels per acre.

Although the average yields were lower on the infested sites, when compared to the non-infested sites, this was because of the yield potential of these fields *andnot because of the presence or absence of SCN.*

- Each year, the same varieties were planted on non-infested sites near the infested sites. There was no statistical difference in yields any year and less than a bushel difference in the average yield at the six non-infested sites. In three trials, the resistant varieties had a slight yield advantage and the other three years the susceptible varieties had a slight yield advantage.

This shows that you will not sacrifice yield if you plant a resistant variety on a non-infested field or in a field with a very low level of SCN infestation. For this reason, we recommend planting resistant soybean varieties in *any* field where SCN has been detected, regardless of how low the level of infestation.

- What was consistent in all infested fields was the resistant variety's ability to reduce the level of reproduction. Spring egg counts in these studies averaged about 600 eggs per 100 cc soil for both resistant and susceptible varieties. Resistant varieties decreased levels of SCN in the fields while susceptible varieties allowed about a three-fold increase during the growing season.

For more information on SCN, see NebGuide G99-1383, *Soybean Cyst Nematode Biology and Management*, available online at *ianrpubs.unl.edu/plantdisease/g1383.htm.*

John Wilson
Extension Educator, Burt County

Results from field trials with common mullein

Spring treatments may provide best control

Fall is here and it is time to spray many pasture weeds, however, recent research indicates it may not be the best time to control common mullein. This plant has become a troublesome weed in pastures throughout Nebraska, Kansas, and Colorado. (Please refer to the June 24 *CropWatch* for more introductory information on this weed.)

Common mullein

To examine weed control options for common mullein, two pasture sites with significant common mullein pressure were selected to compare eight spring- and eight fall-applied chemical treatments. Each treatment was replicated three times at each site. Treatments, rates, and percent control can be viewed in *Table 1*.

Mullein rosettes were counted prior to treatments and again on June 23, 2005 to determine percent control. For the fall treatments, Surmount and Tordon 22K controlled 98-100% of the plants, while the other treatments were less than 90% effective. However, all treatments resulted in greater than 97% control in the spring, indicating that spring applications offer better mullein control.

At a mullein field day held on June 30, producers, industry representatives, and commercial pesticide applicators discussed their successes and failures regarding mullein control. All agreed on three criteria:

- Chemical application must occur in the rosette stage.
- Surfactants are necessary.
- More water provides better coverage, thus ground applications are more effective than aerial ones.

Mullein, like musk thistle can be effectively controlled in the rosette stage, but it is difficult to control once it has bolted and produced a stem. The leaves of common mullein are covered with dense hairs, making control difficult; however, use of a surfactant and more water greatly improves efficacy. Aerial applicators applying 2 gallons of water/acre have had a difficult time controlling this weed in pastures that are not easily accessible by ground rigs. Ground rigs have had greater success when using at least 15 gallons of water per acre of water with the addition of a surfactant.

This project was a cooperative effort of local producers, UNL extension educators and specialists, the South Central Agricultural Laboratory near Clay Center, BASF, and Dow AgroSciences. The goal was to determine effective and economical control of common mullein. We feel producers can achieve similar control by following the treatment criteria listed in *Table 1*; however, the underlying factor will be whether the pasture has been managed properly. Many pastures have been stressed due to overgrazing in drought conditions.

Jenny Rees
Extension Educator Clay/ Webster counties

Table 1: Chemical treatments for common mullein at Blue Hill, Nebr., (adapted from a handout produced by Nebraska Extension Weed Scientist Fred Roeth for a 2005 Mullein Field Day.)

Treatment	Rate	Percent control fall	Percent control spring
Tordon 22K	1.0 pt/A	98	100
Grazon P + D	3.0 pt/A	77	100
Surmount	2.0 pt/A	100	100
Overdrive	6.0 pt/A	56	100
Overdrive +	4.0 oz/A		
Cimarron	0.25 oz/A	87	99
Cimarron	0.30 oz/A	28	97
Cimarron +	0.20 oz/A		
2,4-D ester	2.0 pt/A	56	100
Clarity +	0.50 pt/A		
2,4-D ester	2.0 pt/A	90	100

Notes

All treatments include the addition of surfactants of 0.25% NIS v/v and 2.0% AMS v/v.

Fall treatments were applied on October 18, 2004, at 3-4:00pm. Air temperature was 73°F with 37% RH and wind less than 5 MPH.

Spring treatments were applied on April 20, 2005 at 4-5:00pm. Air temperature was 77°F with 42% RH and wind less than 5 MPH.

All treatments were applied in water at 20 GPA with 30 PSI and 11002 nozzles.

Controlling stored grain temperature with aeration

Whether holding wet grain for a short or long time, it is important to control grain temperature. Both wet grain and molds respire and give off heat. Aeration is needed to keep the grain cool and to slow mold growth. Properly aerated grain can be held safely about four times longer than non-aerated grain.

Aeration is the movement of low volumes of air through stored grain. The primary objectives of aeration are to keep the grain at a seasonally cool temperature, which is within 10 to 15 degrees of the average monthly ambient air temperature, and to maintain a relatively uniform temperature within the grain mass. Temperatures should not differ by more than 10 degrees from one part of the bin to another.

Temperature differences within the grain mass create convection currents that can move and concentrate moisture in the top center of the bin. The first indication of trouble is usually damp or tacky feeling kernels at the grain surface, followed by the formation of a crust.

Grain mass temperature needs to be controlled throughout the year. It is especially critical to cool grain from warmer harvest or summer storage temperatures. Grain should be cooled early in the fall, held at 35 to 40 degrees through the winter, warmed in the spring, and then held below 60 degrees as long as possible into the summer to help minimize insect activity.

A cooling or warming zone moves through the grain in the same direction as the airflow. The rate of movement depends on the airflow rate and the length of fan operation. When the fan is turned off, movement of the zone stops. Movement resumes when the fan is turned back on. When changing grain temperatures, run the fan continuously until the cooling or warming zone has been moved completely through the grain.

Upward airflow within the bin is preferred because the top of the grain mass is the last area to change temperature. This makes it easier to determine if the zone has moved completely through the grain.

Uniform airflow distribution is necessary for the most satisfactory temperature control. Uniform airflow requires clean grain, a level grain surface, and a well-designed aeration system, preferably with a fully perforated floor.

A common concern is running aeration fans during rainy or humid weather. Rewetting grain normally is not a problem during the short time it takes to move a cooling or warming zone through the grain. Usually the effects of operating a fan during damp conditions are more than offset by the time the fan is operated under more favorable conditions.

Routinely monitor grain conditions to verify that the desired temperature control is achieved. Generally, grain should be inspected at least once a month during the winter and every two weeks at other times of the year. Measure and record the temperature at several locations within the grain mass. Without records, it is difficult to determine whether elevated temperatures are caused by normally occurring outside temperatures or by heating due to mold activity. Use a grain probe to locate any moisture pockets where molds will develop rapidly as temperatures warm.

Extreme caution should be exercised when checking grain. Bridged grain is very dangerous and can collapse, possibly suffocating someone who may have been walking on top of it at the time. Use a safety harness, lifeline and grab rope, and have a second person outside the bin in case of an emergency.

For more information, refer to University of Nebraska–Lincoln Extension NebGuides G84-692, Aeration of Stored Grain, and G94-1199, Management to Maintain Stored Grain Quality.

David Shelton
Extension Agricultural Engineer

Regulations affecting land application of manure

The Nebraska crop producer is generally free of regulations concerning land application of manure, while the owners of large animal feeding operations (CAFOs) must comply with regulations and record keeping requirements. The CAFO is freed from some regulatory demands if it gives up ownership of manure within the premises of the CAFO.

If the crop producer or a third party, such as a commercial applicator engaged by the crop producer (but not by the CAFO), removes the manure from the premises of the CAFO and transports and land-applies the manure in the crop producer's field, most regulations do not apply. The crop producer can rent, but not borrow, application equipment from the CAFO when the CAFO is giving up responsibility for the manure.

The crop producer is **not** required to conduct certain practices before manure application, although it would probably be economically and agronomically beneficial to do so. The crop producer who is applying manure is **not** required to develop a nutrient management plan, soil test, or to have the manure analyzed for nutrient content. The crop producer is responsible for "discharges" associated with major manure spills or leaks, or movements of large amounts of manure into surface waters such as might occur by stockpiling manure in an area of concentrated water flow, e.g. in a waterway.

Continued on page 209

Determining nitrogen availability from manure

Estimating nutrient availability from manure is not a major concern with most nutrients as a large proportion is available upon application and/or the amounts applied in a typical manure application are more than needed for the first crop. Nitrogen availability is not so easily estimated.

Manure nitrogen is primarily in two forms: organic nitrogen and ammonium-nitrogen. Manure analysis reports should give the contents for each form. These two forms of nitrogen are very different.

The next issue of *CropWatch* will address issues affecting manure use.

Ammonium-N is immediately available to crops but is easily lost to the atmosphere if the manure is not injected or incorporated into the soil, or moved into the soil with precipitation or irrigation water. If the manure is injected or immediately incorporated into the soil, 95-100% of the ammonium nitrogen is retained for crop use, but all ammonium nitrogen may be lost if the manure is not incorporated within a week after application (*Table 1*).

Organic N is largely contained in undigested feedstuffs which need to decompose before the N is available to crops. The amount of organic N that becomes available to the first crop following application is estimated to vary from 15% for composted manure to 45% for some poultry manure (*Table 2, page 197*). Much of the organic N will become available to subsequent crops and this is estimated to be 15, 7 and 4% of the applied organic N that will be available to the second, third and fourth crop, respectively.

Table 1. Proportion of ammonium N retained for crop use following manure application.

Side-dress application		Pre-plant application and incorporated	Solid man.	Liquid man.
Incorporated	1.0			
Sprinkler irrigation	0.5	Immediately	0.95	0.95
Furrow irrigation	0.9	One day later	0.50	0.70
Pre-plant application		Two days later	0.25	0.50
Not incorporated	0.0	Three days later	0.15	0.35
		Seven or more days later	0.00	0.00

Table 2. Proportion of organic-N in manure estimated to be available to the first crop after application.

Beef/Dairy		Poultry	
Solid (e.g. feedlot)	0.25	Deep pit	0.45
Stored liquid	0.35	Solid with litter	0.30
Compost	0.15	Solid without litter	0.35
Swine			
Fresh	0.50	Stored liquid	0.35

Example 1: Estimating nitrogen available from manure

Consider a feedlot manure that contains 4 lb ammonium-N and 16 lb organic N per ton. You want to determine how much nitrogen will be available to your next corn crop if manure is applied at 20 t/ac. The manure will be incorporated two days after application.

1. Determine ammonium N that will be available. The manure contains 4 lb/t and 25% will remain after losses to the atmosphere (see *Table 1* for incorporation two days later). Therefore, the manure will supply 1 lb/t, or 20 lb of N per acre with an application rate of 20 t/ac (4 lb/t x 25% x 20 t/ac = 20 lb/ac of ammonium-N).

2. Determine organic N that will be available. The manure contains 16 lb of organic N per ton, but only 25% will be available to the first crop (see *Table 2* for Beef/Dairy solid manure). Therefore, the manure will 4 lb per ton of organic N, or 80 lb of N per acre with an application rate of 20 t/ac (16 lb/t x 25% x 20 t/ac = 80 lb/ac of organic N).

3. The total N available to the next crop is estimated to be 20 (ammonium N) plus 80 (organic N) = 100 lb N per acre.

4. In addition, this manure application is estimated to supply 48 lb (16 x 20 x 15%) to the second crop, 22.5 lb (16 x 20 x 7%) to the third crop, and 13 lb (16 x 20 x 4%) to the third crop.

Charles Wortmann, Extension Nutrient Management Specialist

Regulations *(Continued from page 208)*

The CAFO is responsible for complying with regulations concerning manure application when the CAFO owns or rents the land, or has a written land application agreement with the land owner that the land is available to the CAFO for stockpiling or application of manure. Areas designated as groundwater protection areas may have local regulations that affect the crop producer who applies manure and/or fertilizer nitrogen. In these cases, sampling for soil nitrate-N and limiting nitrogen application to the crop's needs may be required.

Charles Wortmann, Extension Nutrient Management Specialist

UNL Mobile Plant Diagnostic Lab revved up for on-site field testing and disease identification

A new mobile lab gives University of Nebraska-Lincoln Extension the ability to diagnose crop diseases on-site.

The Mobile Plant Diagnostic Lab was funded by the U.S. Department of Homeland Security and UNL Extension, said Loren Giesler, plant pathologist in the university's Institute of Agriculture and Natural Resources.

"The goal of the mobile lab is to be available to respond to any potential agrosecurity threat," he said. This includes detecting and reporting new or unusual pathogens in Nebraska crops whether they occur intentionally, accidentally or naturally.

In addition, the lab will be available at UNL Extension field days throughout the state for farmers to bring in plant samples. "This will increase public awareness of plant pathogens and aid farmers in diagnosing plant diseases," Giesler said. Before the mobile lab, farmers had to mail plant samples to the university's Plant and Pest Diagnostic Clinic in Lincoln, a process that could take several days before results are known. The mobile lab eliminates the wait for test results.

"If a grower brings a plant sample to a field day, it most likely can be diagnosed on-site before they go home," he said.

Among the diseases the mobile lab could detect is soybean rust, which first was detected in the United States last fall in several southeastern states. If soybean rust would enter Nebraska, the mobile lab would allow UNL plant pathologists to test for the disease on-site.

"We could know within two hours if the plant sample tested positive for soybean rust," Giesler said.

Extension Plant Pathologist Loren Giesler loads a molecular diagnostic tool that quickly identifies plant pathogens. The lab is equipped with the latest technologies, allowing UNL scientists to inform state and federal agencies quickly about detected diseases and to receive information from national experts while still at the site. (IANR Photo)

The lab is equipped with the latest technology and equipment, including molecular diagnostic tools and satellite transmission, which would allow UNL to inform state and federal agencies quickly about detection of any disease as well as link them to national experts through digital media.

"Whether detecting a disease as serious as soybean rust or identifying a more common disease, such as brown spot in soybean, stripe rust in wheat or gray leaf spot in corn, the lab gives extension a valuable resource for controlling and containing plant diseases," Giesler said.

Sandi Alswager Karstens
IANR News

The University of Nebraska Extension Mobile Plant Diagnostic Lab is now available to visit sus-pected disease sites or set up at ag meetings so farmers can bring in samples. The lab is funded by the U.S. Department of Homeland Security and UNL Extension. (IANR photo)