water spouts

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Mark Your Calendar for These Irrigation Workshops

- **Dec. 3, 2008 – Bismarck Best Western Ramkota Hotel**
  This workshop will be for potential irrigators. Participants are encouraged to bring field-specific information for the proposed irrigation development. This workshop will be held on the first day of the North Dakota Water Users Association's annual convention.

- **Dec. 4, 2008 – Bismarck Best Western Ramkota Hotel**
  This workshop will be held in conjunction with the North Dakota Water Users Association's annual convention. The Missouri Slope Irrigation Development Association (MSIDA), NDSU Extension Service and North Dakota Water Users Association sponsor this workshop. The convention will include an irrigation exposition where suppliers demonstrate their products and services.

- **Dec. 17, 2008 – Ernie French Building, Williston Research Extension Center**
  This workshop will be for existing irrigators in the MonDak region and include topics specific to this area. The NDSU Extension Service will host this workshop. The contact person is Chet Hill, Extension area value-added specialist, Williston, (701) 774-4315, *Chet.Hill@ndsu.edu*.

- **Dec. 18, 2008 – Turtle Lake**
  The details for this workshop have not been finalized at this time. Look for more information in the October issue of *Water Spouts*. The contact is Mike Liane, (701) 662-1364, *Michael.Liane@ndsu.edu*.

More information about the workshops will be mailed in November. If you have any suggestions for topics to cover at the workshops, please give me a call or send an e-mail or letter.

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Postharvest Tips for Later Maturing Corn

Yield potential for corn frozen during the milk stage is low. Ears are difficult to pick and shell, kernel tips may stay on the cobs and grain will be very chaffy. Therefore, green chopping or ensiling whole plants may be the only reasonable options. Corn silage should be harvested at 60 percent to 70 percent moisture. The length of cut should be about 0.5 inch long, with not more than 10 percent to 15 percent being 1 inch or longer. A bunker or horizontal silo should be crowned in the center, have a wall slope of 1:6 to 1:8 and be covered with 6 mil polyethylene. To be effective, the plastic must be held down over the bunker or silo's entire area. Temperatures above 120 degrees after four days indicate that excess air is getting into the silage.

Test weights will be much less, probably 40 to 45 pounds per bushel (lb/bu), for corn frozen in the dough stage. Although corn eventually will dry to acceptable harvest moisture, drying will take at least a week longer than for mature grain. Ear molds likely will develop if warm ambient temperatures follow the frost. The only means of stopping mold growth are drying the grain or ensiling.

Standing corn in the field may dry 0.6 to 0.9 percentage point per day during warm, dry fall days with a breeze. Normally, about one-half percent per nice drying day is expected in North Dakota early in September, but drying may reduce to about 0.3 to 0.4 percentage point during October and 0.15 to 0.2 percentage point or less in November. Immature, frosted corn can mold on the stalk. Based on the equilibrium moisture content for the average monthly temperature and relative humidity, corn might be expected to dry to about 15.5 percent moisture content during September, 16 percent during October and 19 percent during November. Field drying is normally more economical until mid to late October and mechanical high-temperature drying is normally more economical after then.

Shelled corn should be at 25 percent to 30 percent moisture for anaerobic (without oxygen) high-moisture storage in silos or silo bags. Any tears in the plastic bag must be repaired promptly to minimize storage losses. Whole shelled corn can be stored in oxygen-limiting silos, but a medium grind is needed for proper packing in horizontal or conventional upright silos. Wet grain exerts more pressure on the silo than corn silage, so conventional concrete stave silos may require additional hoops or the silo must not be completely filled.

Natural-air and low-temperature drying should be completed as much as possible in October because the drying capacity is extremely poor during the colder temperatures in November. Corn above 21 percent moisture should not be dried using natural-air and low-temperature drying to minimize corn spoilage during drying. An airflow rate of 1.25 cubic feet per minute per bushel (cfm/bu) is recommended to reduce drying time. Adding heat does not permit drying wetter corn and only slightly increases drying speed. The primary effect of adding heat is to reduce the corn moisture content. Natural-air drying in the spring is the most energy and cost-effective method of drying.

Shelled corn can be stored in a grain bin at moisture contents up to about 25 percent if it is kept below 30 degrees using aeration. Corn kernels above about 25 percent moisture may freeze into a clump that causes unloading problems.

Dryers will be operated more hours than usual, so examine them carefully and perform needed maintenance before harvest. Use the maximum allowable drying temperature in a high-temperature dryer to increase dryer capacity and energy efficiency. Be aware that high drying temperatures result in a lower final test weight and increased breakage susceptibility. In addition, as the drying time increases with high-moisture corn, it becomes more susceptible to browning. Use in-storage cooling instead of in-dryer cooling to boost capacity of high-temperature dryers. Cooling corn slowly in a bin rather than in the high-temperature dryer also will reduce the potential for stress cracks in the kernels.

In-storage cooling requires a positive-pressure airflow rate of about 0.20 cfm/bu or 12 cfm/bu-hour of fill rate. Cooling should be started immediately when corn is placed in the bin from the dryer. Dryer capacity is increased 20 percent to 40 percent and about 1 percentage point of moisture is removed during corn cooling. Cooling the corn in the dryer to about 90 degrees before placing it in storage can reduce condensation problems.

Dryeration will increase the dryer capacity about 50 percent to 75 percent, reduce energy used by about 25 percent and remove about 2 to 2.5 points of moisture (0.25 percent for each 10 degrees the corn is cooled). With dryeration, hot corn from the dryer is placed in a dryeration bin with a perforated floor, allowed to steep for four to six hours without air flow, cooled and then moved to a storage bin. A tremendous amount of condensation will occur during the steeping and cooling process, so the corn must be moved to a different bin for storage or spoilage will occur along the bin wall and on the top grain surface.

A dryer that captures the heat from cooling the dry corn and a portion of the air from the final drying portion of the dryer can reduce the energy used to dry the corn by about 20 percent. Newer dryers typically have incorporated features to make them more energy efficient than previous dryers.

Using the maximum drying temperature that will not damage the corn also can reduce energy consumption. The amount of energy required to remove a pound of water is about 20 percent less using a drying air temperature of 200 F than 150 F.

The propane cost for high-temperature drying corn can be estimated using the following formula: cost/bushel per point of moisture removal is equal to 0.022 x propane price/gallon. For example, if the price of propane is $2 per gallon, the drying cost is $0.044/bushel per point of moisture removal (0.022 x $2 = $0.044). At this price for propane, removing 10 percentage points of moisture from 120 bushels of corn will cost about $53 to (120 x 10 x $0.044 = $52.80).

The estimated quantity of propane needed for drying is 0.02 gallon per bushel per point of moisture removed. For example, 24 gallons of propane will be needed to dry 120 bushels of corn from 25 percent to 15 percent (0.02 x 120 bushels x 10 points). This is based on 0.72 pound of water being removed per point of moisture per bushel, 2,500 British thermal units (Btu) of heat required to remove a pound of water in a high-temperature dryer and a propane heat content of 91,500 Btu/gallon.

The weight of water removed during drying can be calculated using the following formula: initial weight = (100 – final moisture content)/100 – initial moisture content) x final weight. For 56-pound corn with an initial moisture of 25 percent and final moisture of 15 percent, the initial weight would be 63.5 pounds per bushel. The weight of moisture removal is 63.5 – 56 = 7.5 pounds per bushel.

Moisture shrink is the reduction in weight as the grain is dried 1 percentage point. Moisture shrink factor = 100 ÷ (100 – final moisture content). The shrink factor drying corn to 15.5 percent is 1.1834. The shrink due to drying corn from 20.5 percent to 15.5 percent would be 5 x 1.1834 = 5.92 percent.

Moisture meters will not provide accurate readings on corn coming from a high-temperature dryer. The error will vary depending on the amount of moisture removed and the drying temperature, but the meter reading may be about 2 percent lower than true moisture. Check the moisture of a sample, place the sample in a closed container for about 12 hours and then check the moisture content again to determine the amount of error. Moisture meter errors increase as corn moisture contents increase, so readings above 25 percent should be considered only estimates.

In addition, moisture meters are affected by grain temperature. If the meter does not measure the grain temperature and adjust the value automatically, then it must be done manually. Even if the meter does it automatically, cool a sample in a sealed container to room temperature before measuring the moisture content. Then compare the moisture content of the room temperature sample to the initial sample to verify that the adjustment is done accurately.

Normally, corn test weight increases about 0.25 pound for each point of moisture removal during high-temperature drying. However, little increase will occur in test weight on immature or frost-damaged corn.

More fines are produced when corn is wet because more aggressive shelling is required, which causes more kernel cracking and breaking. The potential for stress cracks in kernels increases during drying, which leads to more breakage potential during handling. In addition, immature corn contains more small and shriveled kernels. Fines cause storage problems because they spoil faster than whole kernels, they have high airflow resistance and they accumulate in high concentrations under the fill hole unless a spreader or distributor is used. Preferably, the corn should be screen-cleaned before binning to remove fine material, cob pieces and broken kernels.

Immature corn has a shorter storage life than mature corn. Therefore, cooling the grain in storage to about 20 to 25 degrees for winter storage is more important for immature corn than for mature corn. Also, check stored immature corn more frequently. Immature corn should not be stored long term.

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Bringing CRP Land Back into Crop Production

North Dakota has approximately 3 million acres enrolled in the Conservation Reserve Program (CRP), with many contracts expiring in the next few years. Given the recent increases in commodity prices, the interest in converting land in CRP back to crop production is growing. Operators bringing CRP land into crop production will have to decide what management system to use on these fields. Remember, much of the CRP land being brought into crop production is classified as highly erodible and therefore must be managed under an approved conservation program if the operator wants to remain eligible for most U.S. Department of Agriculture benefit programs.

Most CRP contracts follow the federal fiscal year, meaning they begin on Oct. 1 of the year enrolled and expire on Sept. 30 of the final contract year. After a contract expires on Sept. 30, haying, grazing and any tillage practices and/or chemical applications are permitted. For CRP acreage that will be planted to a spring-seeded crop, chemical application may begin after Aug. 2, but tillage is not permitted until Oct. 1. If the acreage will be planted to a fall-seeded crop in the year the contract expires, chemical application and tillage may begin on July 1. If the acreage coming out of CRP is west of the 100th meridian (roughly west of North Dakota Highway 3) and will be seeded to a fall-seeded crop, chemical application and/or tillage may begin prior to July 1 but no earlier than May 1.

Consider the following factors when selecting a crop to plant after CRP: the amount of residue on the field, existing weed populations and which chemical pesticides were used to control weeds on the CRP land, the soil type and the amount of soil moisture present at planting time.

Residue management should focus on the balance of retaining sufficient cover to optimize the beneficial effects with the detrimental effects of too much residue. On CRP fields with plant growth taller than 12 inches, cutting and removing plant materials may be necessary prior to planting or other tillage operations. Haying CRP prior to any management reduces residue and is recommended for no-till systems. Residue burning is discouraged because it will cause the loss of nitrogen and some sulfur, as well as the organic carbon, which can be beneficial to soil tilth and biological health.

Volunteer trees should be removed prior to planting or tillage. Smaller trees can be mowed, while larger trees that later will interfere with tillage or harvesting equipment may require cutting with a dozer blade.

Although fall tillage is preferred to spring tillage, in some years the soil may be too dry in the fall to till effectively, necessitating early spring tillage or planting no-till. Aerator rollers also can be effective in preparing CRP fields for crop production because they cut plant material into short enough lengths, allowing no-till planters to function effectively. The aerator roller sufficiently smoothes the soil surface to allow effective tractor and machinery operation.

Double-chisel plowing followed by either disking or harrowing will prepare CRP fields effectively for seeders with either hoe or disc openers. A single double-disc operation also is effective for smoothing uneven field conditions and would be the only operation necessary to precede planting with no-till single-disc openers. When using row planters for corn or soybeans, using row cleaners may be necessary in heavy-residue areas.

Strip tillage may be a viable option for fields when row crops will be planted subsequently. Strip tillage generally is performed in the fall and can reduce residues effectively in the tilled strip, thus improving early season stand establishment and vigor while leaving substantial residue between the rows to aid in soil conservation and rainfall infiltration.

Depending on the level of tillage used and the type of equipment available for planting, the heavy residues following CRP can be a challenge in establishing an adequate crop stand. Since most land following CRP is prone to erosion, retaining some residue is considered highly desirable. Of the crops likely to be considered for establishment after CRP, corn is probably the most sensitive crop to cool soil temperatures that are associated with excessive crop residues because it normally is planted in early May.

Soybeans, which are planted later in the spring, and cool-season crops, such as wheat and barley, are better able to handle the cooler soils when heavy residues are retained on the soil surface. Small-seeded crops may be difficult to establish under heavy-residue situations if little or limited tillage is performed. Haying the CRP ground can be a cost-effective way to remove excessive vegetation without destroying surface residues needed for erosion control. It also can encourage plant regrowth prior to chemical application, thus improving the effectiveness of the burn-down chemical.

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Perennial CRP grasses, quackgrass, broadleaf weeds and perennial woody plants must be killed for a successful transition from CRP to crop production. The best weed control is achieved when glyphosate is applied to actively growing plants with at least 6 inches of new growth in both the fall and the spring prior to planting. Control from fall applications of glyphosate will be reduced greatly if the application is made under dry conditions when plants are hardened off and dormant from dry and hot weather. Wheatgrasses and quackgrass can be killed by spring glyphosate at 0.75 pound of acid equivalent per acre. Bromegrass is the most difficult CRP grass to control and requires both fall and spring application of glyphosate at 1.5 pounds of acid equivalent per acre.

Soybeans and sunflowers offer the longest time in the spring for an effective burn-down because of their later planting dates. These broadleaf crops also allow for post-emergent grass herbicides to control volunteer CRP grasses. The later planting date of sunflowers may allow for two spring preplant applications of herbicides. Nevertheless, competition from volunteer CRP plants may not make sunflowers the best crop for breaking out CRP land.

In the fall, soils in CRP ground generally have very low levels of stored moisture because the established plants have been extracting water actively from the soil during the growing season. Therefore, if rainfall has been minimal in the fall before crop establishment, probably very little stored soil water is available down to depths for use by crops.

Farmers preparing CRP land for crop production need to be particularly cognizant of soil fertility. Establish a soil fertility program that starts with thorough soil testing. Nitrogen almost certainly will be low and, with the high levels of residue with a high carbon-to-nitrogen ratio, likely will be more slowly released than following a crop without added nitrogen. Phosphorus and potassium levels are not likely to be reduced substantially from levels before the land was placed in CRP because very little have been removed by harvesting a crop, but the nutrients may not be readily available to the crop planted after breakup of CRP land. However, if the CRP land has been hayed during drought years, significant phosphorus and potassium loss may have resulted from forage removal.

Additional information on preparing CRP land for crop production is available in NDSU Extension publication A-1364, “Bringing Land in the Conservation Reserve Program Back into Crop Production or Grazing.”

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