Mark Your Calendar: Irrigation Workshops

Dec. 4, 2014 (Thursday) – Bismarck Ramkota Hotel

This workshop is held in conjunction with the North Dakota Water Users Association’s annual convention held on Dec. 3, 4 and 5. The NDSU Extension Service, North Dakota Irrigation Association and North Dakota Water Users Association sponsor the workshop. The convention will include an irrigation exposition where suppliers display their products and services.

Dec. 11, 2014 – Ernie French Center, Williston Research Extension Center

Contact person is Chet Hill, (701) 774-4315, Chet.Hill@ndsu.edu.

Tom Scherer, (701) 231-7239
Extension Agricultural Engineer
Thomas.Scherer@ndsu.edu

Harvesting, Drying and Storing Late-maturing, High-moisture Corn

Corn reaching maturity about Oct. 1 normally will dry slowly in the field due to cooler ambient temperatures. Standing corn in the field may dry about 1.5 to 3 percentage points per week during October and 1 to 1.5 per week or less during November, assuming normal North Dakota weather conditions.

Corn has a moisture content of about 35 percent when it reaches maturity. If it has a moisture content of 35 percent on Oct. 1, it may dry to only about 25 percent moisture by Nov. 1, assuming normal North Dakota climatic conditions. Field drying normally is more economical until mid-October, and mechanical high-temperature drying normally is more economical after that.

Corn above 21 percent moisture should not be dried using natural-air and low-temperature drying to minimize corn spoilage during drying. Because the drying capacity is extremely poor at temperatures below 35 to 40 degrees, little drying typically is possible using a natural-air system after about Nov. 1. 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.

When outdoor temperatures average near or below freezing, cool the corn to 20 to 25 degrees for winter storage and finish drying in April to early May. Limit the corn depth to about 20 to 22 feet to obtain an airflow rate of 1 to 1.25 cubic feet per minute per bushel, which is necessary to dry the corn before deterioration occurs. Turn fans off during extended periods of rain, snow or fog to minimize the amount of moisture the fans pull into the bin.

Using the maximum drying temperature that will not damage the corn increases the dryer capacity and reduces energy consumption of a high-temperature dryer. Removing a pound of water requires about 20 percent less energy at a drying air temperature of 200 F than at 150 F. Follow the dryer manufacturer’s recommendations, but generally recommended corn drying temperatures are 210 to 230 F.

Be aware that excessively high drying temperatures may result in a lower final test weight and increased breakage susceptibility. In addition, as the drying time increases, high-moisture corn becomes more susceptible to browning.
A cross-flow dryer that moves corn from the inside to the outside of the drying column, varies the corn flow rate across the drying column or varies the corn’s exposure to the drying air should be less prone to cause kernel discoloration. Decreasing the temperature in the lower portion of a multistage dryer also will reduce the potential for heat damage.

Removing debris that accumulates on or in a dryer is more critical when outside air temperatures are cold because condensation can develop on the dryer, creating a wet surface on which debris can collect. The debris may reduce airflow through the dryer, decreasing the dryer’s capacity and creating a fire hazard.

Dry low-test-weight and stressed corn a percentage lower in moisture content than normal because of greater variations of moisture content in the grain mass, increased kernel damage and more foreign material typically has a shorter storage life than mature, good-quality corn.

Therefore, cooling the grain in storage to about 20 to 25 degrees for winter storage in northern corn-growing regions and near freezing in warmer regions is more important for low-test-weight and stressed corn than for mature, sound corn. Check immature and damaged grain more frequently and do not put immature or damaged corn in long-term storage.

Storage in a poly bag is a good temporary storage option, but it does not prevent mold growth or insect infestations. At moisture contents exceeding about 25 percent, ensiling may occur at temperatures above freezing and prevent the corn from being dried and sold in the general market.

Select an elevated, well-drained location with the surface prepared to prevent punctures for the storage bags, and run the bags north and south so solar heating is similar on both sides of the bag. Wildlife can puncture the bags, creating an entrance for moisture and releasing the grain smell, which attracts more wildlife. Monitor the grain temperature at several locations in the bags.

For more information, do an Internet search for “NDSU corn drying.”

Kenneth Hellevang, (701) 231-7243
NDSU Extension Agricultural Engineer, Postharvest and Structures
Kenneth.Hellevang@ndsu.edu

Evapotranspiration Mapping

Evapotranspiration maps are being developed and used by researchers in the Agricultural and Biosystems Engineering Department at NDSU.

Evapotranspiration (ET) includes water evaporation from the soil surface and water transpiration through plant leaves. ET is an important component of the hydrologic cycle, and ET mapping may be used to sample large numbers of fields to better understand ET for different crops or soils, detect differences in ET between irrigated and nonirrigated crops and model water resources.

A variety of methods are available to measure or estimate ET, but most are confined to individual points on the landscape or relatively small areas such as individual fields. Techniques based on remote sensing also have been developed to estimate ET over large areas, such as methods using NASA's Landsat satellite images spanning an area in excess of 100 miles by 100 miles.

In addition to the large coverage area, the Landsat satellites are particularly useful for ET mapping because they include a thermal band and provide resolution that can detect differences in ET from one field to the next.

For example, each pixel in the visible spectrum in a Landsat 5 satellite image is approximately 98 feet by 98 feet, which translates into approximately 30 million pixels in one image. In ideal situations, we can develop an ET estimate for each pixel in an image, hence the reference to “maps” of ET.

One of the ET mapping techniques is called the Surface Energy Balance Algorithm for Land (SEBAL), developed by a team led by Wim Bastiaanssen in the Netherlands. An adaptation of SEBAL by Richard Allen and others in Idaho is called Mapping Evapotranspiration with Internalized Calibration (METRIC).

An example of our application of ET mapping based on a Landsat 5 satellite image is shown in Figure 1. The 400-meter distance shown is approximately 1,300 feet, or the length of a quarter-section center pivot. The field boundaries appear somewhat fuzzy or “pixelated,” which reflects real characteristics on the landscape such as field boundaries, changes in crop types and transitions from irrigated to nonirrigated areas.

Data from weather stations in the North Dakota Agricultural Weather Network (NDAWN) in a study area allow us to compare ET from SEBAL or METRIC with ET values for reference crops using equations such as the Penman ET equation. The ratios of crop ET to reference crop ET commonly are known as crop coefficients and are used for irrigation scheduling.

If an image is cloud-free and other considerations work out, the ET mapping process can be used to develop crop coefficients for every agricultural pixel in an image. If multiple cloud-free images are available throughout a season, a crop coefficient curve can be developed for each pixel. With NDAWN data and a crop curve, ET can be estimated for each pixel for the season.
Our applications of ET mapping have focused on the Devils Lake basin of northeastern North Dakota. For example, a study was conducted to determine whether irrigation might increase ET (compared with nonirrigated crop production) to such an extent that irrigation could help mitigate the flooding problems in the basin.

The relatively hot and dry 2006 season was examined as a best-case scenario for the 1995-2008 period in terms of the need for irrigation and thus the potential for flood mitigation via irrigation. Comparisons of ET for irrigated and nonirrigated crops in the basin were made using SEBAL. We concluded from the study that the gains in ET attributable to irrigation were not sufficient to justify widespread development of irrigation as a flood mitigation effort for the basin.

Dean Steele, (701) 231-7268
NDSU Irrigation and Environmental Engineer
Dean.Steele@ndsu.edu

When Handling Anhydrous Ammonia, Don't Hurry

There is always a feeling of ‘hurry, hurry’ with fall fieldwork. Some years it isn’t so rushed, but it is always there. Fall tillage, moving bales, combining the last of the crop, getting machinery moved home for winter repairs, and applying anhydrous ammonia for next year’s crops; it all has to be done – yesterday. Often enough, hurry is usually a major factor with farm accidents.

Handling and applying anhydrous ammonia is a job that cannot be rushed. Some people do get in a rush and get by without problems, but that won’t last forever, they will probably have trouble some time in their future.

Before stopping in the field to replace an empty nurse tank, line up the equipment so you can always work on it while upwind of all connections to be made. Check to see where the closest water is for an emergency
For more information on this and other topics, see www.ag.ndsu.edu

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Dip if something really goes wrong. Have an escape route from the scene planned out ahead of time.

Always be sure to have your squirt bottle of water in your shirt pocket before you leave the tractor cab or the pickup truck cab. If you should need it and it isn’t there, you will painfully use valuable time in looking for it – if you can see at all. Replace the water daily. Keep it fresh!

Put on all of the basic protective equipment first, before starting work on the equipment. The gloves must be the anhydrous ammonia approved, long cuff rubber gloves. The goggles have to be snug fitting and non-vented to keep the ammonia from getting to your eyes. If the gloves and goggles are left in the kit or your cab, they can’t help you.

Be sure to always place your body upwind from the connection you are working on. This helps to move any escaping ammonia away from you. Have an escape route in mind; so if a problem does develop then you don’t have to use up valuable time in deciding which way to run and what will be in your way.

Disconnecting the empty nurse tank in the field is a job that should not be rushed. Be sure to completely close the liquid withdrawal valve on the nurse tank first. If it is not completely closed before disconnecting, the nurse tank hose will remain pressurized – a dangerous condition!

When connecting the fresh nurse tank to the applicator, always be certain the hose end bleeder valve is closed and the hose end is securely plugged into the applicator before opening the liquid withdrawal valve on the tank. Otherwise an uncontrolled release of anhydrous ammonia will probably occur, placing you at risk!

Do not remove any of the protective equipment, gloves or goggles, until all connections are made and found to be safe. Then, place the protective equipment back in the nurse tank kit, unless you are wearing your own. Be sure of what you are doing, following all the disconnection and reconnection steps in their proper order, and stay safe in your anhydrous ammonia application.

More information on safe handling of anhydrous ammonia can be found in AE-1149 Anhydrous Ammonia: Managing the Risks available at all county Extension offices or online at www.ag.ndsu.edu/publications/landing-pages/crops/anhydrous-ammonia-managing-the-risks-ae-1149

John Nowatzki (701) 231-8213
NDSU Agricultural Machine Systems Specialist
John.Nowatzki@ndsu.edu