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water spouts

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Irrigation Workshop in Bismarck Thursday, Dec. 5

The workshop will be at the Best Western Ramkota Hotel as part of the North Dakota Water Users Association's annual convention. NDSU Extension, the North Dakota Irrigation Association and the North Dakota Water Users Association sponsor the workshop.

The convention will include an irrigation and water products exposition. As part of the workshop, we are planning a session on subirrigation, water retention and reuse and another session on irrigation and bioenergy. More information about the workshop will be in the October issue of *Water Spouts*.

2019 Irrigation Show and Education Week Dec. 2-6

The Irrigation Association will be hosting its annual show during the week of Dec. 2-6 in the Las Vegas Convention Center. In addition to the irrigation exposition with more than 500 exhibitors from around the world, the event will include five days of seminars, technical programs and educational classes. For more information, go to www.irrigation.org/2019show.

When to Stop Irrigating

With the delayed planting this year, the irrigation season may be a couple of weeks longer than normal, assuming we do not receive an early frost. In most parts of North Dakota, we have received timely rains that have resulted in good growing conditions but heat units are slightly behind normal.

Maturity and dry-down are going to be delayed and, therefore, examining the crop to determine its stage of maturity is important. Knowing the indicators of physiological maturity of the crops being irrigated and checking soil moisture levels will help you determine when irrigation no longer is needed.

Corn should be irrigated until sufficient soil moisture is available to ensure that the milk layer of the kernel moves down to the tip of the kernel or black layer formation (physiological maturity).

To check the milk line, break an ear of corn in half. The milk line is clearly visible on the kernels as the border between the yellow and the dull milky color. When the line is half way down the kernel, the last irrigation should be applied through a sprinkler system.

For flood irrigation, the last irrigation should occur when the milk line is about a quarter of the way down the kernels.

The location of the milk line should be checked at several locations in the field. A video showing the progression of the milk line can be found at www.youtube.com/watch?v=X8q3ID4Dt0.

With normal growing degree days (GDD), physiological maturity is reached about 55 days after 75% of the plants have visible silks. The grain moisture may range from 32% to 40% at the time, depending on the hybrid. Yellow dent corn is usually well dented at physiological maturity.

Dry edible beans: The last irrigation should be when the first pods are filling, or irrigation should be stopped when 50% of the leaves are yellowing on the plants.

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When overwatered, indeterminate varieties (pinto) may continue to vine and set flower with delayed maturity.

For navy beans, physiological maturity is reached when at least 80% of the pods show yellowing and are mostly ripe, with 40% of the leaves still green. Pinto beans are physiologically mature when 80% of the pods show yellowing and are mostly ripe and only 30% of the leaves are still green.

Beans within pods should not show evidence of any green. If the beans have begun to dry, irrigation will not be needed because the beans no longer are removing much water from the soil profile.

Soybeans should be irrigated until sufficient moisture is available to allow full bean development and pod fill. This stage is when leaves are yellowing (75% to 80%) and all pods are filled, with the lower pods just starting to turn brown.

At physiological maturity, pods are all yellow and more than 65% of the lower pods have turned brown. Beans within pods should have little evidence of green and should be shrinking.

Studies show that yellow pods sprinkled with brown are the best clue of physiological maturity. Usually if one or two pods show this symptom on the upper two or more nodes of the plant, it has reached physiological maturity. Also, soybeans should be tolerant of a killing frost at this time.

Sunflowers should be irrigated until sufficient moisture is available for the sunflower achenes (seeds) to fill. This is when the backs of the heads turn from a lime green to a yellow green and ray petals are completely dried.

Potatoes will utilize soil moisture until harvest. The maturation stage begins with canopy senescence as older leaves gradually turn brown and die. Research has shown that final irrigation can be used to reduce bruising during the harvesting process.

On sandy soils, soil moisture content between 60% and 80% of field capacity (40% to 20% moisture depletion) provides conditions for a desirable soil load into the harvester, with optimum separation of potatoes and soil and a minimum of physical tuber damage. If soil is dry before harvest, a final irrigation should be applied at least one week prior to harvest to raise the soil moisture level and also raise the tuber hydration level.

Alfalfa should be irrigated to maintain active growth until growth is stopped by a hard frost. Alfalfa going into the winter with adequate soil moisture has a much better chance of little or no winterkill.

Sugarbeets will utilize moisture until harvest time. Irrigation usually is terminated seven to 14 days before harvest to allow the soil to dry.

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Renting Irrigated Land – A Checklist

Renting irrigated land sometimes can be tricky. So, to prevent any surprises, we recommend a field visit to inspect the land and equipment the year prior to, not the winter before renting. If you can, observe the system up close and, if possible, in operation.

Soil and Cropping History

Check on the soil texture in the field to be rented using the county soil survey books or the digitized soil maps on the Natural Resources Conservation Service (NRCS) Websoil Survey at <https://websoilsurvey.nrcs.usda.gov/> to try to answer the following questions:

- Are the soils uniform or do they differ within the field?
- Are the soil types acceptable for the crop you plan to grow?
- Does the soil have good tilth and soil structure? (affects water infiltration)
- Does the soil have any restrictions, such as rocks/clods, salt or sodium-affected soils?
- What is the current organic matter content in the soil?
- Will soil samples be taken and tested in the fall or do you have to do it in the spring?
- What is the current cropping rotation?
- Will manure be applied to all or parts of the field?
- What type of residue will be on the field next year?
- Is a weed history/map available to indicate if weeds will be a problem in your crop?
- What chemicals were applied previously and what are the rotation restrictions?
- Is the previous crop a host to disease or insects you are concerned about?
- Does the field have erosion problems?

The Water Supply: Pump(s), Motor/Engine(s) and Well(s)

- What is the condition of the electric panel boxes (main controls, pivot panel, switches, etc.)?
 - o Make sure the power is off at the main breaker, then open doors, inspect seals, and look for dirt and moisture.
- Are the boxes, conduits and motors sealed to prevent entry of mice?
- What is the condition of the well and pump?
- What is the condition of the piping, valves, flow meter, pressure gauge and any obvious pipe leaks?
- Is a maintenance history available for the pump and motor/engine?
- If the water supply is a well, when was it drilled and put into operation?
- Has a pump test ever been performed and what were the results?
 - o **Caution:** A pump test only gives a snapshot of operation at the time of the test; it does not prove sustained pumping capacity.
- What is the “sustained” yield of the well (gallons per minute) in July and August and can the owner provide evidence?
- Is the well pumping any sand?
 - o Check the sand trap at the end of the pivot.
- Does the water supply have a “low flow” risk in July and August during drought conditions?

Irrigation Equipment and Center Pivot

- Does the center pivot complete a full or partial circle?
 - o This can be very important if you intend to use chemigation.
- Does the system have all of the required chemigation safety equipment?
- Does the owner have a printout of the current sprinkler package on the center pivot?
- On each center pivot tower:
 - o What is the condition of the gearboxes on each tower?
 - o Has the oil been checked and/or replaced periodically?
 - o Are the U-joints solid?
 - o What is the condition of the tires?
 - o Are the boots in good shape or leaking?

- If you can see the center pivot in operation, do all the sprinklers rotate freely?
- How many years have the sprinkler heads and pressure regulators been on the center pivot?
 - o If more than seven years, many may have worn nozzles and the pressure regulators may not work properly.
- If you are unsure about the condition of the equipment, have a qualified dealer inspect and/or service the system (ask if the owner would split the cost).

Some Contract or Lease Considerations

- Who pays the pumping costs?
- Who will operate the system on a daily basis, the owner or renter?
- Who will pay for major and minor repairs?
 - o The lease should specify what constitutes major and minor repairs.
- What are the terms and length of the lease?
 - o Is either party interested in sharing the risks/benefits?
 - o Is the landowner willing/capable of doing some of the field work (preplant tillage, irrigating, spraying)?
- What will be the cropping rotation on a multiyear lease?
- How will the renter leave the land?
 - o Will it be “ready to plant” the next year or “as is,” which could mean deep ruts and other problems?
- Is the land coming out of the Conservation Reserve Program?
 - o The first and maybe the second year’s rent should be less or flexible to reflect lower yield and higher cost of tillage and fertilizer.

This article was adapted from information compiled by James Weigel when he was the Extension irrigation specialist in Carrington.

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County commissions, North Dakota State University and U.S. Department of Agriculture cooperating.

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Point Your Center Pivot in the Right Direction

In wind and sleet, the center pivot is a rather fragile machine. From October to April, the worst storms and highest winds generally come from the **northwest or southeast**. Ice storms and blizzards have damaged many center pivots that were parked pointing in the wrong direction (figure at right). Properly parking a pivot will present the smallest surface area to the wind.

Exceptions are center pivots that border windbreaks. In this case, the pivot should be parked next to the windbreak. On hilly fields where the pivot point is at or near the top of the hill, the center pivot should be parked going down the steepest hill.

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