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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.

Some of the presentation topics include an update on features of the North Dakota Agricultural Weather Network (NDAWN), remote monitoring of aquifer water levels, water storage for irrigation, using subsurface drain tile systems for subirrigation, solar-powered pumping for irrigation and a special session on irrigation and bioenergy production.

Corn Irrigation Scheduling: Season-ending Checkbooks for Oakes and Nesson Valley

In the June and July issues of *Water Spouts*, I showed graphs of the output from the NDSU spreadsheet irrigation scheduling checkbook

for corn planted at the Oakes and the Nesson Valley Irrigation Research sites. The emergence date was selected as May 28 for both sites.

The season-ending soil-water balance graphs for Oakes and Nesson Valley are shown in **Figures 1 and 2**, respectively. The rain amounts are from the local North Dakota Agricultural Weather Network (NDAWN) station at each site.

I updated the checkbooks every week, and when the predicted soil water deficit approached 50%, I selected the dates and irrigation amounts needed

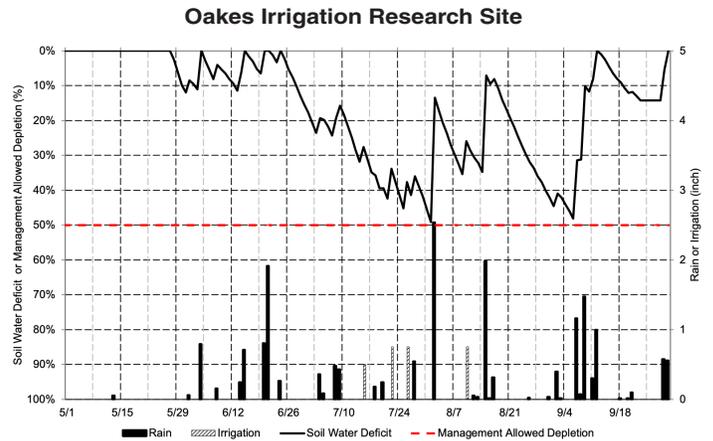


Figure 1. Season-long soil-water balance for irrigated corn at the Oakes Irrigation Research site.

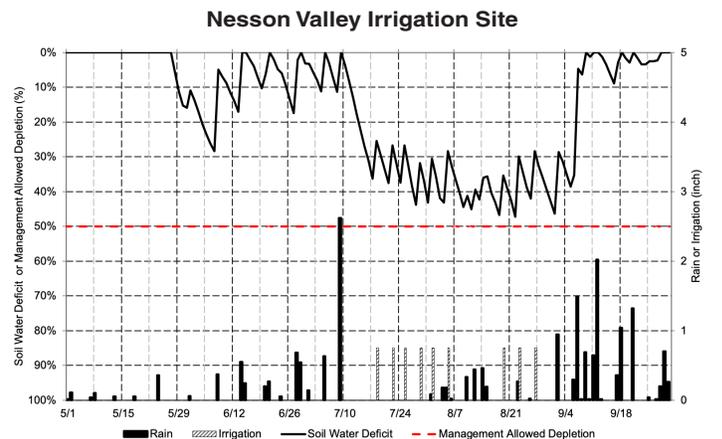


Figure 2. Season-long soil-water balance for irrigated corn at the Nesson Valley Irrigation Research site.

to keep the plant-available soil water in the root zone above 50%. The actual irrigation events at each site were scheduled by the local managers and are probably different than what I entered due to operational considerations, such as improving germination, working around weekends, field days and other work. Plus, the dates of irrigation may have been different if I had been on-site to check the actual soil water content.

At the Oakes site, the estimated corn water use for the season was about 17 inches, but almost 18 inches of rain was recorded from emergence to the end of September. I inserted 2.75 inches of irrigation water into the spreadsheet in July and early August; however, if I could've foretold the future, those irrigations may not have been needed.

At the Nesson site, the estimated corn water use for the season was again about 17 inches, and more than 19 inches of rain was recorded, which is way above average for western North Dakota. Note that most of the rain was received before July 4 and after Sept. 1, and almost 7 inches of irrigation was needed between those dates.

Weather-wise, this growing season was very unusual. Normally, the corn water use would be more than 19 inches for the growing season, but at Oakes and Nesson, the air temperature was above 90 F only four days. Plus, the large number of cloudy, rainy days reduced the amount of solar radiation significantly.

If you are interested in irrigation scheduling with a spreadsheet-based checkbook, you can download it along with an operation manual at www.ag.ndsu.edu/irrigation/irrigation-scheduling.

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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 (Nev.) Convention Center.

In addition to the irrigation exposition with more than 500 exhibitors from around the world, the show includes five days of seminars, technical programs and educational classes.

For more information, go to www.irrigation.org/2019show.

Prepare Your Irrigation Equipment for Winter

Irrigation systems, just like other farm equipment, need regular, routine maintenance, especially when most of the equipment stays outdoors all year. Performing the following maintenance items will help ensure your irrigation equipment is in good shape when you need it next spring.

Pumps and Pipelines

Centrifugal pumps, valves, tanks, etc. should be drained or pumped out to prevent damage from freezing. Some sections of underground pipelines are full of water and need to be pumped, drained or blown out by Dec. 1.

If a pipeline has any air relief valves at high points, before draining the pipeline, check to make sure the air relief valves are not stuck. Often the plastic ball in the valve will stick shut and prevent water from quickly draining to the pump-out point. Much like when a full liter bottle of soda is held upside down, only so much drains out before air has to enter the bottle.

After the water has been drained or pumped, the pipeline should be checked several days later to make sure all the water has been removed.

Protect pump-out risers and other equipment from livestock. Close or cover any openings that might invite animals or rodents to enter.

For oil-lubricated deep-well turbine pumps, after the pump is cold, open the oiler and let oil drip into the line shaft bearings. Rotate the shaft to distribute the oil throughout the entire bearing. The cold oil will adhere to the cold bearings and provide good winter protection.

Check the packing gland around the shaft on the pump head; if it is worn or missing pieces, make a note to replace it with new material next spring. On belt-driven pumps, remove the belts and store them in a dry place.

If you can't remove the belts easily, then reduce the tension on the belts. If the belts are worn or frayed, replace them with new belts in the spring.

Accurate pressure gauges and flow meters are the best way to keep track of the performance of your irrigation pumping system. If possible, remove the flow meter

and pressure gauges and store them where they don't freeze. Cover or plug the holes.

If the flow meter does not work, winter is a good time to have it repaired. Note any broken pressure gauges and replace them with new ones in the spring.

Above-ground Pipelines and Gaskets

Pipes should be stored on racks so that one end is above the ground to permit drainage and air circulation. Protect them from livestock.

Gaskets are an extremely important part of above-ground pipelines (including gated pipe). Flow testing in Nebraska showed that many above-ground pipelines lost from 10% to 35% of the pumped water between the pump and the irrigation system. Cracks and other leaks in the pipelines accounted for some of the lost water, but most of the water was lost due to old or missing gaskets.

If possible, remove the gaskets when storing pipe for winter. Inspect them and obtain replacements for any that are damaged or leaked during use. Store the gaskets in clean water in a place that will not freeze. This prevents them from cracking and drying out.

Do not hang gaskets on a nail or hook. If they cannot be stored in water, place them over a pipe that has a slightly smaller diameter than the gasket and keep them out of direct sunlight. Covering the gaskets to restrict air movement also will help prevent them from drying out and cracking.

If the pipe is to remain in the field, loosen the connectors but don't split all the sections of pipe (some may need to be split to drain water). In the spring, make sure the gaskets are in good condition before inserting in the pipeline.

Chemical Injector Pumps

Chemical injector pumps should be flushed with water, then drained and, if transportable, stored in a clean, dry place. If the pump is belt driven, loosen the belt.

Electrical Motors and Controls

Check all electric motor openings to make sure they are screened properly to keep rodents out. Rodents like to chew on motor winding insulation in the winter. Often, chewed windings result in electrical shorts that can burn out motor windings.

If a screen is damaged or missing, replace it with ¼-inch mesh screen. Remember, a mouse can get into any opening greater than the diameter of a dime. The screen can be left in place during operation without plugging with dust and debris.

Electric motors are best left open to free air movement to keep moisture condensation in the motor to a minimum. Lubricate all bearings and rotate the motor. Change oil in the motor reservoir if discolored.

Check the seals on electrical control panel doors and fix any portions that are broken or missing. Tight seals keep out moisture, dust and rodents. Seal all openings into the electrical control box to prevent rodents from entering and damaging the wiring.

Lock the control box in the "OFF" position. Spraying electrical contacts with contact cleaner will displace dirt and moisture to prevent corrosion.

Internal Combustion Engines

Stationary internal combustion engines require special attention regarding lubrication, the cooling system, ignition, engine openings and the fuel system. Change the oil and filter when the engine is warm, then run the engine briefly to circulate. Clean and replace the air cleaner. The anti-freeze in the radiator should be checked to make sure it is protected to at least minus 30 F.

For gasoline engines, add fuel stabilizer and run the engine, or drain all fuel from the tank, lines and carburetor. For diesel engines, fill the tank.

Do not drain. Replace the fuel filter and leave all lines and injectors filled with diesel fuel. For LP gas engines, drain the vaporizer-regulator (fuel and water lines).

Seal all openings (air cleaner inlet, exhaust, distributor cap and crankcase breather tube) with weatherproof tape. Lubricate all accessories. Loosen belts. Remove the battery, charge it and store in a cool, dry place.

A small amount of maintenance and repair will ensure your irrigation system starts and runs properly next growing season.

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