water spouts

No. 245 August 2009

http://www.ext.nodak.edu/extnews/spouts/

Upcoming NDSU Field Day

Potato Field Day Aug. 20 (218) 773-3633
Inkster and Hoople
Northern Plains Potato Growers Association,
www.nppga.org/

Sheyenne River Tour – North Dakota Water Education Foundation

This tour will begin in Valley City. The Sheyenne River runs through seven counties in eastern North Dakota. Along its banks are a fish hatchery, state park, dams and recreational facilities. Learn why the Sheyenne River is part of the discussion regarding the rising Devils Lake and gain a better understanding of the benefits and potential this river plays in the development of the Red River Water Supply project.

Registration is $15 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to the *North Dakota Water* magazine.

To register online, go to *www.ndwater.com* or send a check to NDWEF, P.O. Box 2254, Bismarck, ND 58502. Please indicate which tour you want to attend and include the number of people. For more information on the tours, give us a call or send an e-mail.

North Dakota Water Education Foundation,
(701) 223-8332
Fax (701) 223-4645
Ndwaterusers@btinet.net

Plastic Pesticide Containers to be Collected for Recycling

South Carolina-based Container Services Network LLC has been contracted by the Ag Container Recycling Council (ACRC) to conduct a recycling effort in North Dakota directed at plastic pesticide containers. Containers up to 55 gallons will be collected. The containers must be triple-rinsed or pressure-rinsed. Labels, caps and foil must be removed from the containers.

The containers must be delivered ***before*** the scheduled collection date and the local contact should be called before delivering containers.

Date	Location	Phone Number
Sept. 1, Tuesday	**Mooreton,** Dakota Ag Cooperative	(701) 274-8231
Sept. 1, Tuesday	**Lisbon,** Sunrise Spraying Systems	(701) 683-5501
Sept. 2, Wednesday	**LaMoure**, Dakota Plains Cooperative	(701) 883-5108
Sept. 4, Friday	**Lynchburg**, Maple River Grain	(701) 347-5487
Sept. 8, Tuesday	**Arthur**, Arthur Co.	(701) 967-8312
Sept. 8, Tuesday	**Page**, Tall Towers AG	(701) 668-2302
Sept. 9, Wednesday	**Portland,** Reynolds United	(701) 786-3020
Sept. 9, Wednesday	**Buxton,** Central Valley Aviation	(701) 847-2043
Sept. 9, Wednesday	**Cooperstown,** Triangle Ag	(701) 797-3707
Sept. 11, Friday	**Rugby,** Schneider Aerial	(701) 776-5171
Sept. 14, Monday	**Rolla**, Rolla Flying Service	(701) 477-5145
Sept. 15, Tuesday	**Harvey,** Arthur Co.	(701) 324-2248
Sept. 15, Tuesday	**Harvey,** Farmers Union Oil	(701) 324-4450
Sept. 15, Tuesday	**Rugby**, Schneider Aerial	(701) 776-5171
Sept. 16, Wednesday	**Mohall,** Farmers Union Oil	(701) 756-6814

The ACRC is a nonprofit organization *(www.acrecycle.org/)* that collects and recycles plastic crop protection products or pesticide containers. ACRC member companies formulate, produce, package and distribute crop protection and other pesticide products.

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What's the Yield Impact of an Inch of Irrigation Water?

At this time of year, the weather is hot, the crop is close to full development and total seasonal crop water use exceeds rain plus stored soil moisture.

Have you ever wondered what each inch of applied irrigation water has on final yield? Fortunately, through the years many researchers have performed experiments to determine water productivity.

Water productivity is the crop response to water. It is the slope of crop water use versus yield graph and indicates the additional amount of yield for each additional inch of irrigation. In the following table are yield estimates obtained from several research reports (mainly from North Dakota, Minnesota and South Dakota) for each crop. The table shows a range of yield responses probably due to soil types, growing conditions, crop varieties and geographic locations where the research was performed.

Crop	Yield increase per inch applied water per acre
Wheat	4 to 5 bushels
Corn	8 to 14 bushels
Corn Silage	1.25 to 1.75 tons
Alfalfa	0.2 to 0.25 ton
Pinto Beans	250 to 300 pounds
Potatoes	2,200 to 2,900 pounds
Sunflowers	170 to 190 pounds
Sugar beets	1.5 to 1.7 tons

These numbers assume that stored soil moisture and rainfall are less than the required seasonal crop water use during the growing season and that the difference is provided by irrigation. You can look at seasonal crop water use estimates using the North Dakota Agricultural Weather Network (NDAWN) Web site at *http://ndawn.ndsu.nodak.edu/*. Go to "Applications" on the left side menu and select "Crop Water Use," then "Tables."

Here is something to remember about these yield increase estimates: They are accurate only for irrigation water applied to bring the growing season crop water use total to its maximum. Applying more water than the seasonal crop water use plus the water lost due to the application efficiency of the irrigation system will have a very small yield return per inch applied. It is the law of diminishing returns.

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When Can You Stop Irrigating?

Crop physiologic development is related to heat units – referred to as growing degree days (GDD) – received during the growing season. Accumulated GDD for most irrigated crops can be found on the North Dakota Agricultural Weather Network (NDAWN) Web site at *http://ndawn.ndsu.nodak.edu/applications.html*. By comparing this year's GDD with the amount accumulated in a normal year, you can determine when a crop is developing faster or slower than normal.

The heat units for this summer are about two weeks behind the five-year average, which will make determining when to shut off the irrigation system at the end of the growing season difficult. That decision often is a balancing act between ensuring that sufficient moisture is in the soil to take the crop to physiological maturity and reducing pumping costs. Applying irrigation water beyond maturity often is unnecessary and increases pumping costs.

Knowing the physical 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 halfway 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. For more information, visit *http://agebb.missouri.edu/irrigate/tips/lastcorn.htm.*

With normal GDD, physiological maturity is reached about 55 days after 75 percent of the plants have visible silks. The grain moisture may range from 32 percent to 40 percent at the time, depending on the hybrid. Yellow dent corn usually is 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 percent of the leaves are yellowing on the plants. When overwatered, indeterminate varieties (pinto) may continue to vine and set flowers with delayed maturity. For navy beans, physiological maturity is reached when at least 80 percent of the pods show yellowing and are

mostly ripe, with 40 percent of the leaves still green. Pinto beans are physiologically mature when 80 percent of the pods show yellowing and are mostly ripe, and only 30 percent 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.

***Soybean**s* should be irrigated until sufficient moisture is available to allow full bean development and pod fill. This stage is when leaves are yellowing (75 percent to 80 percent) 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 percent 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 yellow green and ray petals are completely dried.

Potatoes will utilize soil moisture until harvest. Maturation stage begins with canopy senescence as older leaves gradually turn brown and die. Research has shown final irrigation can be used to reduce bruising during the harvesting process. On sandy soils, soil moisture content between 60 percent and 80 percent of field capacity (40 percent to 20 percent 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 and tuber hydration levels.

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

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

*Reprinted and revised from a previous Water Spouts article by **Duane R. Berglund**, NDSU Extension Agronomist (retired)*

A Working and Accurate Flow Meter is Important

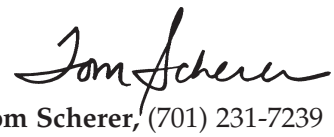
Flow meters appear to be equipment that many irrigators don't use, don't repair and constantly overlook when managing their irrigation systems.

Through the years, I've conducted pumping plant efficiency tests on many irrigation systems and finding the flow meter doesn't work is common. Often it has been that way for many years. North Dakota winters are hard on flow meters, and the freeze/thaw cycles quickly cause the bearings and other moving parts to wear out. This also is true for the other parts of the irrigations system.

Sprinklers on center pivots also are subject to degradation through time. I have received calls from irrigators who want to check the flow rate to their center pivots so they can take advantage of the sprinkler conversion program that is part of the Natural Resource Conservation Service's Environmental Quality Incentive Program (EQIP). Most of these systems have a flow meter but it stopped working years ago. Probably this is the time either to repair the old flow meter (if that's possible) or purchase a new flow meter.

An accurate, working flow meter provides very valuable management information. Accurate flow measurement is important for proper chemigation, selecting and modifying sprinkler nozzles, calculating the application rate of the pivot, checking the production of the well and tracking the performance of the pump.

If your flow meter doesn't work, plan to have it repaired after the season or buy a new one before next irrigation season. If your flow meter is working properly, consider removing it this fall and storing it in a warm place for the winter. Removing it and covering the hole in the pipe with a piece of tin takes only about 15 minutes. If you take care of your flow meter, it will last a long time and provide accurate information on the performance of your irrigation system.



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Web-based Tools to Improve Irrigation Energy Efficiency

Irrigation is a heavy user of energy, and improving energy efficiency is a very desirable goal. Exploring options for improving pumping efficiency is the object of three Web sites you might find useful.

The first Web site (*www.nrcs.usda.gov/technical/energy/*) was developed by the Natural Resources Conservation Service (NRCS). It contains a set of four online energy conservation estimator tools designed to help farmers quickly analyze their energy use. The four topics are irrigation, tillage, animal housing and nitrogen. These tools are designed to increase energy awareness in agriculture and help farmers and ranchers identify where they can reduce energy costs. The results generated are based on NRCS models and illustrate the magnitude of savings for different scenarios.

The energy tool for irrigation enables you to estimate the potential savings associated with pumping water for irrigation. NRCS technical specialists developed this model for crops grown in a specific region based on energy prices and pumping requirements. This tool does not provide field-specific recommendations.

The second Web site, *www.ruralenergy.wisc.edu/conservation/*, was developed for the NRCS by the University of Wisconsin and is an energy self-assessment estimator. It has nine energy conservation modules, one of which is for irrigation. This site requires a little more time and irrigation system-specific information to do a complete evaluation. It will perform energy audits for center pivot, lateral-move, solid-set sprinkler (hand-move), drip/trickle, flood and furrow irrigation systems.

The third Web site *(http://attra.ncat.org/attra-pub/energytips_irrig.html)* contains a well-documented set of energy-saving tips for irrigated agriculture. It was compiled by the National Sustainable Agricultural Information Service. This is an online publication that contains sections dealing with recommended installation of pumps, explanations of electrical use and charges on your power bill, and common causes of wasted energy and hardware improvements, and it explains a simple method to determine irrigation pumping plant efficiency.

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