water spouts

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

Upcoming NDSU Field Days

Casselton Agronomy Seed Farm	July 12	(701) 347-4743
Hettinger Research Extension Center	July 13	(701) 567-4323
Dickinson Research Extension Center	July 14	(701) 483-2348
Williston Research Extension Center	July 15	(701) 774-4315
Carrington Research Extension Center	July 20	(701) 652-2951
Minot North Central Research Extension Center	July 21	(701) 857-7677
Langdon Research Extension Center	July 22	(701) 256-2582
Oakes Irrigation Research Site	July 28	(701) 742-2189
Williston Area Nesson Valley Irrigation Research Site	July 29	(701) 774-4315
Williston Mon-Dak Ag Open http://ag-open.com/	Aug. 3-5	(701) 577-8110
Potato Field Day NPPGA – Larimore, Inkster, Hoople	Aug. 26	(218) 773-3633

NDSU Irrigation Field Tour at Nesson Valley on Thursday, July 29

The NDSU Williston Research Extension Center (WREC) will be hosting an irrigation field tour on Thursday, July 29, starting at 9 a.m. CDT at the NDSU Nesson Valley Research and Demonstration project. The tour will conclude at noon followed by lunch. The project is approximately 24 miles east of Williston on North Dakota Highway 1804.

This will be the first time the WREC will host the irrigation field tour at Nesson Valley. In 2002, the Nesson Valley Research and Demonstration project was initiated, land was bought, water lines installed and linear sprinkle systems constructed. For the past five years, the WREC has been developing the research and demonstration trials implemented for the irrigation project.

Topics discussed at the tour include current research projects, crop variety trials, crop rotational studies, water management, carbon sequestration, tillage, potato variety advancement and pulse crop irrigation. Speakers for the tour will be Tyler Tjelde, WREC irrigation specialist; Neil Riveland, WREC agronomist; Jay Jabro, Agricultural Research Service-Sidney, Mont.; Tom Scherer, NDSU Extension Service agricultural engineer; Jeff Miller, University of Minnesota; and Paul Hendrickson, irrigation specialist at the NDSU Carrington Research Extension Center.

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Summer Water Tours – North Dakota Water Education Foundation

This summer the North Dakota Water Education Foundation will offer six water tours. These tours provide a firsthand look at North Dakota's critical water issues. Registration is $15 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to North Dakota Water magazine.

Irrigation on the Missouri – July 8

The Missouri Slope Irrigation Development Association is a partner on this tour. Starting in Mandan, the tour will follow the Lewis and Clark Trail on the western side of the Missouri River. Traveling by motorized coach, the tour will stop at a farm using remote monitoring to operate an irrigation system, visit a corn maze and stop at Standing Rock Farms (several center pivots), Northern Lights Dairy, Prairie Knights Casino and other areas of interest. The tour will end in Mandan.

North Central/Minot Area – July 14

This tour focuses on the Northwest Area Water Supply (NAWS) project. The NAWS is a regional water system that uses Missouri River water for municipal, rural and industrial purposes in northwestern and north-central North Dakota. The tour begins and ends in Minot with a stop at the high-service pump station (the heart of the NAWS water delivery system). It also will allow participants to explore the impact of high-quality water for the towns of Berthold and Kenmare, and include stops at the Mouse River Park flood control system in Mohall and the Minot wastewater treatment system.

Go to *www.ndwater.com* to register online 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

Get Your Irrigation System Ready; Rainy Weather Sometimes Can Fool You

Throughout this spring and early summer, practically all of North Dakota has been receiving a steady supply of rain, which generally has negated the use of irrigation. Some areas have too much water on the ground, which has caused either delayed planting or no planting at all. However, variable rainfall events can fool you into thinking that enough water is in the root zone and you delay starting the irrigation system until it's too late.

With average weather conditions, most irrigated crops will use 0.25 to 0.30 inch of water each day during July and August. To determine when to turn on the irrigation system and schedule irrigation, knowing how much rain is received at each field and having some estimate of the daily water use of your irrigated crop is important.

To measure rainfall, I recommend having two accurate rain gauges with at least 2-inch-diameter openings. They should be in opposite corners of the field and situated based on the prevailing weather conditions in your area. For instance, during the summer, many storms come from the west and southwest in the eastern part of the state, so the rain gauges should be in the southwestern and northeastern corners. However, these conditions may not apply in other parts of the state.

You have two easy ways to obtain daily estimates of crop water use. The first is to visit your local county Extension Service office and get a copy of publication AE-792, "Irrigation Scheduling by the Checkbook Method," or download a copy from *www.ag.ndsu.edu/pubs/irrigate.html*. This publication has tables that allow you to estimate the daily water use for corn, wheat, barley, soybeans, pinto beans, potatoes, sunflowers, sugar beets and alfalfa. To estimate the daily crop water use, you need to know the maximum air temperature and the number of weeks since crop emergence. The second method is to access the information on the North Dakota Agricultural Weather Network website: *http://ndawn.ndsu.nodak.edu/*. Select "Applications" in the menu on the left side of the page and then select "Crop Water Use" maps or tables.

The map display will show the crop water use estimates for the 72 weather stations on NDAWN for any crop and period of time that you select. In addition, you can view a "deficit" map for each crop. The deficit is displayed as the crop water use amount minus the rain amount received at each weather station. Numerical tables with the crop water use estimates also can be obtained for each weather station. Even with accurate measurement of rainfall and crop water use, you still need to check the soil moisture in the field periodically during the season. Checking the soil moisture at several sites in a field about every two weeks during the growing season is a highly recommended practice.

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The Page Aquifer

The Page aquifer underlies about 462 square miles in northwestern Cass, southeastern Steele and southwestern Trail counties (Figure 1). The aquifer consists of lacustrine, deltaic and glacio-fluvial sand and gravel deposits. The thickness of the aquifer ranges from 10 to 150 feet.

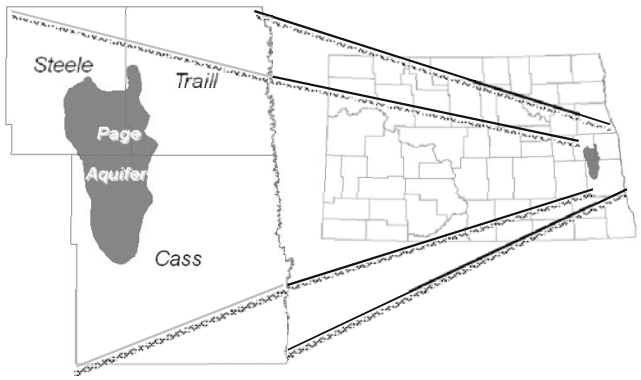

Figure 1. Geographic location of the Page aquifer in North Dakota

Nearly 15,000 acres of irrigation development use water from the Page aquifer under 42 perfected water permits. Historical reported water use for irrigation ranges from 1.5 (1994) to 8.1 inches (1980) per acre, with an average of 4.5 inches per acre annually (Figure 2).

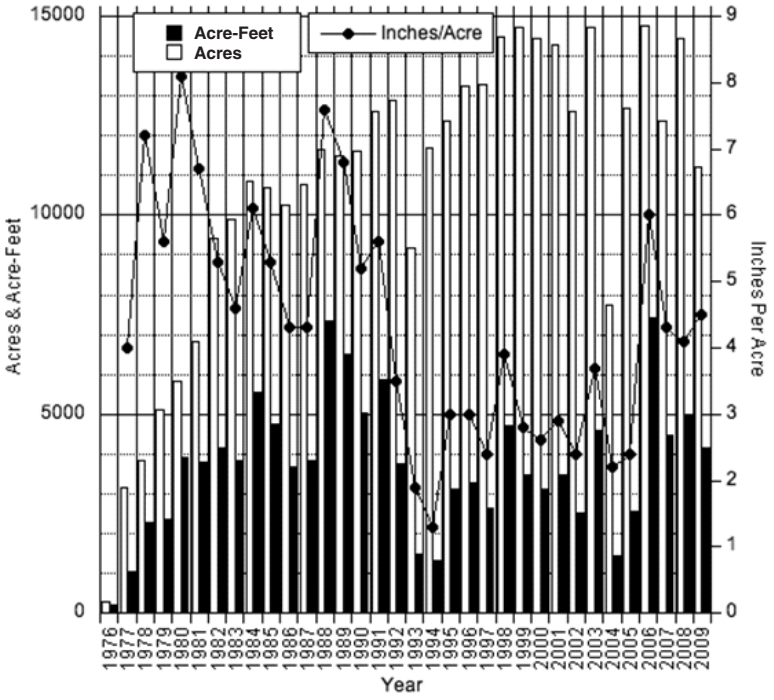

Figure 2. Annual irrigation water use from the Page aquifer

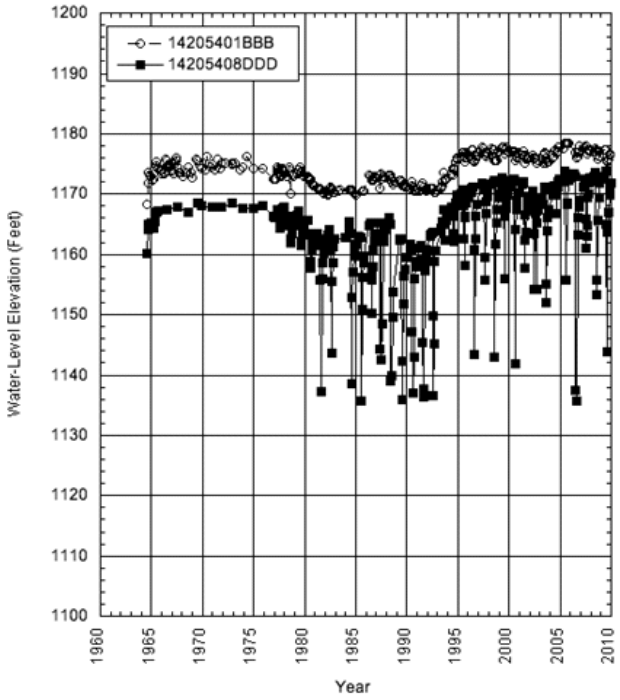

Figure 3. Hydrograph showing water levels at observation wells 14205401BBB and 14205408DDD

Two rural water districts use water from the Page aquifer. The rural water districts provide water to thousands of rural residents in addition to more than 20 communities in Cass and Traill counties. The maximum water use was in 2004, when the two districts reported a total of 434 acre-feet.

Fifteen permit applications for water from the Page aquifer are pending. The aquifer has reached maturity from a development standpoint, and any additional development is pending the results of a ground water model. The ground water model is necessary to determine how much additional water can be allocated without an undue impact to existing permit holders.

Eighty-five observation wells are monitored on a monthly basis from the Page aquifer. Figure 3 shows representative hydrographs from two observation wells completed in the aquifer. Water levels in the aquifer respond directly to fluctuations in precipitation. A decline in water levels occurred in the early 1980s and from 1988 to 1992 due to dry climatic conditions and increased irrigation use. Because of wetter climatic conditions from 1993 to the present, the water levels have risen above the water levels prior to irrigation development in 1976. Observation well 14205408DDD shows dramatic declines in water levels due to the proximity of this well to pumping irrigation wells in the area. On the contrary, observation well 14205401BBB is far enough away from any irrigation wells to show dramatic declines due to pumping.

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Irrigation Scheduling and Small Rainfall Events

The rain gauge reads 0.12 from yesterday's light rain, you received no rain the day before and you do not expect rain today. Should you enter this amount in your irrigation scheduling program or worksheet? The purpose of this article is to simplify your irrigation scheduling practices by discussing small rainfall events and their impact on the soil water balance used for irrigation scheduling.

Irrigation scheduling – determining when and how much water to apply – is discussed here in the context of online scheduling tools such as the Irrigation Scheduler on the North Dakota Agricultural Weather Network website or publications such as NDSU's "Irrigation Scheduling by the Checkbook Method" (AE-792, Revised). These tools contain worksheets in which the user records rainfall and net irrigation, and crop water use either is computed by the program or entered by the user. The models then compute an estimate of the amount or balance of water available to the crop.

The rainfall that enters the soil is net rainfall. The crop canopy intercepts and holds some rainfall, where it evaporates before it enters the soil. Since this rain does not reach the root zone, it does not contribute to the soil water balance and should not be entered into the worksheet.

As the first water droplets hit dry foliage, they splatter, with most of the water dropping off. However, some water adheres to the plant and forms a film. Based on computer

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modeling and lysimeter studies, Allen Thompson, agricultural engineer at the University of Missouri, estimated that a fully developed corn crop can hold between 0.05 and 0.10 inch of water on the leaves and stalks. The amount depends on wind speed, air turbulence and other atmospheric conditions. He suggests neglecting rainfall events smaller than 0.10 inch for irrigation scheduling purposes. This does not mean you should subtract 0.10 from larger rainfall events because you would gain little accuracy by doing so.

To put this amount in perspective, suppose a sprinkler irrigation system applies enough water to supply the irrigated area with 1 inch of water. An efficiency of 85 percent translates into a loss of 0.15 inch. For applications of 0.50 to 0.75 inch, the efficiency may drop to 80 percent, which translates into losses of 0.10 to 0.15 inch. In addition to canopy evaporation, irrigation system inefficiencies include losses from drift and evaporation as water droplets travel through the air.

Other factors influence the contribution of small rainfall events to the soil water balance. Even if the top inch of soil is wet from a small rain, evaporation from the soil surface may make this additional water unavailable to the crop.

The rate of evaporation from the soil surface increases when the surface is wet because the ability of water to move through soil increases with the wetness of the soil.

Common experience tells us that rainfall is variable with location, even within a single field. When small amounts are measured in a rain gauge, some areas within a field may have received no rain. Thus you simply may want to neglect amounts less than 0.10 to avoid the risk of underirrigating parts of a field. Another way to address this problem is to install more than one rain gauge in each field and schedule irrigations accordingly.

In summary, a general guide is that rainfall amounts smaller than 0.10 inch can be ignored for irrigation scheduling purposes. These small rainfall amounts do not need to be entered into soil water balance calculations.

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