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water spouts

No. 244

July 2009

Upcoming NDSU Field Days and Tours

Oakes July 28 (701) 742-2189
Irrigation Research Site

Nesson Valley July 30 (701) 774-4315
24 miles east of Williston
on Hwy 1804

Williston – MonDak Ag Open Aug. 4-6 (701) 577-8110
Two tours featuring irrigation
Sign up online at
<http://ag-open.com/Registration.aspx>

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

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to develop several processing plants throughout North Dakota to process nonfood sugarbeet feed stock into advanced biofuels. Representatives from cooperating agencies will be on hand to discuss the feasibility and economic impact of this project on North Dakota.

Jim Loken, NDSU graduate research assistant, will discuss weed control studies in onions. Walt Albus, Oakes Irrigation Research Site supervisor, will discuss no-tilled corn rotations utilizing strip till.

Ted Helms, NDSU soybean breeder, will lead a discussion on his work with Natto and Toffu soybean varieties. Ezra Aberle, Carrington Research Extension Center agronomist, will discuss the work at Carrington and Oakes to provide data on the optimum amount for corn stalk removal for biofuels manufacturing.

The NDSU Oakes Irrigation Research Center is 4.5 miles south of Oakes on the west side of North Dakota Highway 1.

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Summer Water Tours – North Dakota Water Education Foundation

In the next month, the North Dakota Water Education Foundation will offer three 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.

North-central North Dakota – July 29

This tour focuses on significant water supply needs because of projects such as the Northwest Area Water Supply (NAWS) and the North Central Rural Water Consortium. The tour will depart from Bottineau with stops at Mystic Horizons, the Lake Metigoshe recreational area and the Wakopa Trail, and includes an extensive tour of the International Peace Gardens.

Field Day at NDSU's Oakes Irrigation Research Site

The North Dakota State University Oakes Irrigation Research Site will hold its annual field day on July 28. Refreshments and rolls will be served starting at 9 a.m., with the tour beginning at 9:30.

Juan Osorno, NDSU dry bean breeder, will discuss dry bean varieties and production. Susie Thompson, NDSU potato breeder, and Nick David, NDSU Extension potato specialist, will address irrigated potato variety studies.

A stop during the tour will be made at a sugar beet variety trial where 16 glyphosate-tolerant varieties are being tested. The trial is a part of the nonfood Sugarbeet to Advanced Biofuels project. The goal of the project is

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County Commissions, NDSU and U.S. Department of Agriculture Cooperating. This publication will be made available in alternative formats for people with disabilities upon request, (701) 231-7881.

Missouri River Expeditions – Aug. 13

This tour leaves from Bismarck with stops at the South Central Regional Water District's new water treatment plant, recreation and historic sites in the Bismarck area, Fort Mandan, Snake Creek Pumping Station and the Garrison Dam National Fish Hatchery. Learn about Missouri River issues such as bank stabilization, fishing, recreation, water use and management, endangered species, natural resources and water quality.

Sheyenne River Tour – Aug. 19

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 offers in the development of the Red River Water Supply project.

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 the foundation a call or send an e-mail.

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

Williston Research Extension Center Irrigation Field Tour

On Thursday, July 30, the NDSU Williston REC will sponsor an irrigation field tour at the NDSU Nesson Valley Research/Demonstration project 24 miles east of Williston on North Dakota Highway 1804. Registration will begin at 8:30 a.m. (CST) and the tour will start at 9 a.m.

Topics on the tour will be:

- **Current irrigation research projects at the site**
Tyler Tjelde, WREC irrigation specialist
- **Crop variety trials**
Neil Riveland, WREC agronomist
- **Crop rotation studies**
Tjelde
- **Irrigation water management**
Bob Evans, Agricultural Research Service, Sidney, Mont.
- **Irrigated crop opportunities**
Eric Bartsch, United Pulse Trading

Lunch will follow the tour. Contact Chet Hill at the center for more information.

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Uniformity of Center Pivot Sprinkler Packages

Sprinkler irrigation systems throw water through the air, which makes them susceptible to the vagaries of wind and weather. Ideally, we want every irrigation system to apply the same amount of water to every square foot of field surface. However, this does not happen because of the wind and weather but also because of mechanical problems. We can't do much about the weather, but we can make sure mechanical problems are not affecting the application uniformity of the sprinkler system.

The average application amount of a sprinkler system can be calculated if you know the area of coverage, the duration of water application, the application efficiency and the flow rate. For example, Table 1 shows the average depth of application in inches for a pivot with different times of rotation and flow rates. The calculations were made using an application efficiency of 85 percent and 128 acres of irrigated coverage. The application efficiency is the ratio of the volume of water that actually gets into the soil for plant use to the volume of water that is pumped.

An application efficiency of 85 percent was selected based on research that showed that for **most** irrigation events, this was a representative value. However, weather conditions during the day can affect this value significantly. In the morning, when the wind is not blowing, the application efficiency might be more than 90 percent for a pivot. But by midafternoon, when the air temperature is high, the relative humidity is low and the wind is greater than 15 miles per hour, the application efficiency might drop to below 50 percent.

Therefore, the average application amount is the ideal amount that we want applied to the every square foot of the surface of the field, assuming that the mechanical aspects of the sprinkler system are not creating any problems. Plugged nozzles, a change of nozzle diameter due to wear, sprinklers not rotating properly, pump wear causing a reduction in pressure or flow rate or both,

and leaks in the piping are some of the more common mechanical problems associated with sprinkler systems.

The only way to determine the uniformity of application under a sprinkler system is to do a “can test.” The test involves putting containers (cans), which are identical and have an opening diameter greater than 3 inches, under the sprinkler system in a set pattern. While the system is running, the flow rate, pressure and area of coverage of the center pivot are measured. For a solid-set sprinkler system such as used on lawns, gardens, golf courses and parks, the cans are put out in a grid pattern. For moving systems, such as travelling big guns and pivots, the cans are put out in one or more lines that are perpendicular to the direction of movement of the system. Along the lines, the cans are equally spaced, typically 10 or 20 feet for pivots.

After the center pivot systems passes over the cans, the catch in each can is measured and recorded. Then they are totaled and the average catch amount is determined. The individual can amounts then are compared with the calculated average depth and any large variations from the average can be used to identify sprinkler application problems. If you are chemigating through a pivot, the uniformity of application can have

Table 1. Average application amounts in inches for a 128-acre pivot with an application efficiency of 85 percent.

Hours for 1 Rotation	— FLOW RATE (gallons per minute) —					
	500	600	700	800	900	1,000
10	0.07	0.09	0.10	0.12	0.13	0.15
15	0.11	0.13	0.15	0.18	0.20	0.22
20	0.15	0.18	0.21	0.23	0.26	0.29
25	0.18	0.22	0.26	0.29	0.33	0.37
30	0.22	0.26	0.31	0.35	0.40	0.44
35	0.26	0.31	0.36	0.41	0.46	0.51
40	0.29	0.35	0.41	0.47	0.53	0.59
45	0.33	0.40	0.46	0.53	0.59	0.66
50	0.37	0.44	0.51	0.59	0.66	0.73
55	0.40	0.48	0.56	0.65	0.73	0.81
60	0.44	0.53	0.62	0.70	0.79	0.88
65	0.48	0.57	0.67	0.76	0.86	0.95
70	0.51	0.62	0.72	0.82	0.92	1.03
75	0.55	0.66	0.77	0.88	0.99	1.10
80	0.59	0.70	0.82	0.94	1.06	1.17
85	0.62	0.75	0.87	1.00	1.12	1.25
90	0.66	0.79	0.92	1.06	1.19	1.32
95	0.70	0.84	0.98	1.12	1.25	1.39
100	0.73	0.88	1.03	1.17	1.32	1.47

a significant effect on how much benefit is derived from the chemical as well as the water.

Frequently, irrigators judge application depth based on a single rain gauge either near the end of the pivot or near the pivot point. Neither of these locations is desirable. A mini can test may be performed by using 14 to 18 identical containers. Plastic cups available in grocery stores make good “cans.” For a typical eight- to 10-tower pivot, two catch cans should be located under each span starting with the second span from the pivot point. The cans should be located at random places between the towers, but not too close to the tower. Stay at least 10 feet from the tower. To continually monitor the application amounts of the pivot, the can could be left in place throughout the growing season.

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Spraying on the Road is Against the Law

In 1989, the North Dakota Legislature passed a law concerning irrigation systems and roads. Section 61-14-16 of the North Dakota Century Code states:

“No person may place, erect, or operate a sprinkler irrigation system, center pivot irrigation system, or other irrigation works or equipment upon or across any highway, street, or road or in such a manner as to willfully allow water from the irrigation works or equipment to flow or fall upon any highway, street, or road.”

A person violating this section is guilty of an infraction.

If you notice that the roads near your pivot are wet after irrigation, the end gun on/off settings need adjusting. In the past, wet roads or a motorist driving into water from the end gun have caused accidents.

This law does not apply to the transportation of irrigation works or equipment upon a highway, street or road. This means a moving irrigation system can be run across a road as long as it isn’t spraying water.

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Average Water Use of Commonly Irrigated Crops in July and August

Average Water Use

	July	August
	----- inches -----	
Corn (grain and silage)	6.6	6.3
Alfalfa	6.6	6.3
Pinto beans	7.0	5.8
Potatoes	7.0	5.5
Soybeans	6.5	5.9
Sunflowers	6.6	6.0

As crops mature, cutting back on irrigation during the latter part of August is common. This can be an expensive mistake. Research has shown that corn, moderately water stressed toward the end of the growing season, had an average yield reduction of 13 percent compared with corn that was fully irrigated to maturity.

More site-specific crop water use estimates can be obtained from the North Dakota Agricultural Weather Network (NDAWN) Web site (<http://ndawn.ndsu.nodak.edu>). Click on Applications on the left side of the page.

Remember, applied irrigation water must be greater to compensate for evaporation and drift losses. Research has shown that 85 percent application efficiency is reasonable for North Dakota.

This means that almost 0.26 inch per acre must be pumped to get a net 0.22 inch into the soil for the crop to use. Likewise, if you pump 1.18 inches of water per acre, only 1 inch will infiltrate into the soil for crop use.



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