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water spouts

No. 279

May 2015

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Upcoming 2015 NDSU Field Days

Minot – Canola Day North Central Research Extension Center	June 30	(701) 857-7679
Streeter Central Grasslands Research Extension Center	July 6	(701) 424-3606
Hettinger Research Extension Center	July 7	(701) 567-4323
Dickinson Research Extension Center	July 8	(701) 483-2348
Williston (Mon-Dak Ag Showcase) Research Extension Center	July 9	(701) 774-4315
Nesson Valley Irrigation Research (30 miles east of Williston)	July 10	(701) 774-4315
Casselton Agronomy Seed Farm	July 13	(701) 347-4743
Carrington Research Extension Center	July 14	(701) 652-2951
Minot North Central Research Extension Center	July 15	(701) 857-7679
Langdon Research Extension Center	July 16	(701) 256-2582

Greetings

You probably noticed we did not have an April issue of *Water Spouts*. We had an early planting period this year, and April was dry. For a while, we looked like we were in a drought, but lately, the entire state has received some significant rain amounts. However, the accumulated amounts have varied considerably.

In the past three weeks, some areas received almost 10 inches of rain while others received 2 to 3 inches. Planting of small grains and corn was almost complete before the rain. We hope we will have a soil moisture profile near field capacity to start the irrigation season.

What is interesting is how crop irrigation acres change from year to year. You almost can tell which crop had the best price and economic return based on the number of irrigated acres each year. Below is a table that shows the total acres harvested for 2007 and 2014.

Major Irrigated Crops	2007	2014
Corn	114,671	105,000
Potatoes	33,068	23,500
Small grains (wheat, barley)	30,000	28,000
Alfalfa and hay	17,800	13,700
Dry edible beans	16,805	14,200
Soybeans	15,045	62,000
Sugar beets	13,264	10,500

These figures are based on harvested irrigated acres reported to the Farm Service Agency (FSA).

Note the almost 47,000-acre increase in soybeans and the reduced irrigated acres for all the other crops.

Have a great growing season, and remember to take care of your irrigation system.

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NDSU Potato Blightline

The Plant Pathology Department at North Dakota State University again will be providing the potato Blightline service at no charge to the potato industry of North Dakota and western Minnesota in 2015.

Even though late blight was not present in 2013 and 2014 in our area, a chance exists that late blight will be present in this year if conditions are favorable. The NDSU Blightline is the first place to go to get the most recent blight updates and management information.

This will be the 21st year this service has been provided by NDSU and sponsored by Syngenta Crop Protection.

The hotline gathers data collected from North Dakota Agricultural Weather Network (NDAWN) weather stations in 15 non-irrigated and 12 irrigated production areas in North Dakota and western Minnesota. A computer program (WISDOM) processes the weather data to forecast when conditions are favorable for late blight to occur. The program also provides forecasting information for the development of early blight of potato.

Plant pathologists Gary Secor and Neil Gudmestad, along with Extension potato specialist Andy Robinson, will use the forecast information to make late blight management and fungicide recommendations. They also will notify the industry of the status of late blight and other pertinent potato information for our region. Recommendations are made initially on a weekly basis, but are updated more frequently as severity values increase or late blight is found.

The Blightline will begin Monday, June 1, and will continue through mid-September, depending on disease pressure. The Blightline also will be used to confirm reported late blight sightings and serve as a clearinghouse for national late blight information.

In addition to late blight forecasting, the hotline also provides cumulative P-values for early blight disease forecasting and management recommendations. Finally, it serves to alert growers of other disease and insect issues and posts messages of general interest such as potato field day dates.

The hotline recommendations can be accessed by phone or website. The toll free phone number is (888) 482-7286.

The NDAWN website (<http://ndawn.ndsu.nodak.edu>) for potato disease forecasting contains colored maps of North Dakota to illustrate the late blight severity values (two-day and seasonal), favorable day values and P-day values for early blight throughout North Dakota.

To access the forecasts and maps, go to Applications on the left side of the NDAWN website and click on the potatoes drop-down box.

Current and archival information on late blight and other potato diseases, and research trial data, also can be found at www.ndsu.edu/potato_pathology. You also can connect to the latest blight hotline news and update reminders by text messaging BLIGHTND to 97063 or following @SyngentaSpuds on Twitter.

Growers and scouts are encouraged to send suspect late blight samples to NDSU for positive identification. Late blight is a community disease, and proper identification and prompt notification is important. Leaf samples should be placed in a slightly inflated zip-lock plastic bag without a wet towel and sent to me at: NDSU Dept. 7660, Box 6050, Fargo, ND 58108.

We wish you a successful potato year!

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Check Your Soil Moisture: It's an Important Part of Irrigation Water Management

After a relatively dry fall, no-snow winter and dry spring up to May, soil moisture in many fields will be highly variable. Knowing the status of the soil moisture in your field is necessary for good irrigation water management.

The soil in the root zone provides storage for nutrients and water that plants need for growth and development. Monitoring the amount of soil moisture not only indicates when to start irrigating but also the amount to apply.

Measuring soil moisture accurately always has been difficult. The makeup of soil and the way it interacts with water poses many problems.

Soil is composed of grains of minerals that can vary in size from less than 8/10,000 inch (0.002 millimeter) to more than 1/32 inch (1 millimeter) that are all mixed together. Mixed in with the grains are pieces of organic matter (old roots, crop residue, manure, etc.) that act like sponges and can make up from 0.5 to 6 percent of the soil volume in the root zone. Add water to this mixture in liquid or vapor form, and you can appreciate why measuring soil moisture is difficult.

Basic Soil Moisture Concepts

Soil moisture commonly is expressed as soil water content or soil water potential.

Soil Water Content

The amount of water in a volume of soil often is expressed as the percent of water by weight, percent of water by volume or by the inches of water per foot of soil.

The percent of water by weight is determined by obtaining a soil sample, weighing it, then drying the sample in an oven (at 220 F) for 24 hours and weighing it again when it's dry. The weight of water in the sample is the difference between the wet weight and the dry weight of the soil sample. Divide this amount by the dry weight and multiply by 100 to get the percent of water content by weight.

The percent of water by volume, a more useful value for irrigation design and management, is obtained by multiplying the percent of water content by weight by the bulk density of the soil. The bulk density of the soil is the ratio between the dry weight of a soil sample and the volume of the soil sample with units of grams per cubic centimeter (g/cm³). Agricultural soils can have bulk densities that range from 1.2 to 1.6 g/cm³.

Soil Water Potential

How tightly soil particles and organic matter hold water is a measure of the soil water potential. Soil tension is another term often used to describe soil water potential. Soil tension is a measure of how hard pulling water away from the soil particles is for a plant's roots.

Wet soil gives up water easily and has a low value of tension. Drier soil holds water tightly because the water is bound to the surface of the soil particles and has a high tension.

For irrigation purposes, the amount of water available for plant use is the difference between the soil "field capacity" and the "wilting point." Field capacity is the moisture content at which soil holds water against the force of gravity. This is the moisture content at which many of the large pore spaces between soil particles will drain, but many of the small pore spaces will be full of water.

For most irrigated soils in North Dakota, field capacity is the water content at a soil water tension of 1/10 of a bar (1 bar is almost atmospheric pressure and is equal to 14.5 pounds per square inch).

The wilting point is at which most agricultural crops experience permanent wilting and will not recover. It is the soil water content at a soil water tension of 15 bars. Subtracting the water content by volume at the wilting point from the water content by volume at field capacity and multiplying the difference by 12 will give you the "inches per foot" of available water for plants (Table 1).

Table 1. Range of available water for plants for different soil textures.

Soil Texture	Inches of water per foot of soil
Coarse sand and gravel	0.2 to 0.7
Sands	0.5 to 1.1
Loamy sands	0.7 to 1.4
Sandy loams	1.3 to 1.8
Fine sandy loams	1.7 to 2.2
Loams and silt loams	2.0 to 2.8
Clay loams and silty clay loams	1.7 to 2.5
Silty clays and slays	1.6 to 2.2

However, not all the available water is obtained easily. For irrigation management, we commonly assume that only 50 percent is readily available for plant use. If the amount of water is depleted by more than 50 percent, the plants will experience water stress. If it happens during the critical growth stage of fruiting, yield potential can be affected.

Measuring Soil Moisture

Many methods and devices have been developed to measure soil moisture, and many companies offer these devices for irrigation water management. Some devices measure soil water content and some measure soil water potential.

The standard for soil moisture measurement is the "gravimetric method," and the procedure is described in the section on soil water content. The gravimetric method is used to calibrate and check all the other soil moisture measurement methods.

The "feel method" is the oldest and most common method of checking soil moisture for irrigation management. It involves obtaining a handful of soil from a desired depth and location in the field, then squeezing it to see if it makes a ball. Based on how the soil reacts to the pressure, the moisture content can be determined. For finer soils, an additional indicator is how the soil ribbons when pressed between the thumb and forefinger.

Many crop consultants and experienced irrigators use the feel method, but for new irrigators, it can be a challenge.

Where to Check Soil Moisture

Checking the soil moisture content at many locations in a field can be time-consuming, so the irrigator has to select representative locations. Selection of ideal locations for soil moisture checking should be based on ease of access, and crop and soil types in the field.

The best access for soil sampling would be next to roads or near the pivot access road. However, the locations also should be selected based on the type of soil and crop.

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Summer Water Tours – North Dakota Water Education Foundation

This summer, the North Dakota Water Education Foundation will offer seven water tours. The first tour is on June 5 and the last will be on Oct. 7.

These tours provide a firsthand look at North Dakota's critical water issues. Registration is \$20 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to *North Dakota Water* magazine. Tours offered are:

- Missouri River Expedition – June 5
- Devils Lake Solutions in Action – June 17
- Missouri River Expedition – July 9 (half day)
- Managing the Mighty Mouse – July 24
- Irrigation in North Dakota – July 30

Irrigation is a significant asset to the agricultural industry in North Dakota, and many industries are thriving as a result of irrigated agriculture. This tour will focus on irrigation and the facilities necessary to get

water from the source to the field. Stops will include the Snake Creek Pumping Plant, Lake Audubon, an irrigated farm, the Mile Marker 7.5 Irrigation Project, and Garrison Diversion's McClusky operation and maintenance office. The tour begins and ends in Bismarck.

- Southwest Oil Impact and Water Supply – Aug. 13
- Water in the Bakken – Sept. 9
- Buffalo City (Jamestown) Opportunities and Water Use – Oct. 7

To register for one or more of these tours, go to www.ndwater.com/programs and click on "Summer Water Tours" on the left-hand menu or send a check to NDWEF, P.O. Box 2254, Bismarck, ND 58502. Please indicate which tour or tours you want to attend and include the number of people. For more information, give us a call or send an email.

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