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water spouts

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Mark Your Calendar for these Irrigation Workshops

■ Dec. 6, 2007 – Bismarck Best Western Ramkota Hotel

This workshop will be held in conjunction with the North Dakota Water Users annual convention. The Missouri Slope Irrigation Development Association (MSIDA), NDSU Extension Service and North Dakota Water Users sponsor this workshop. The convention will include an irrigation exposition where suppliers demonstrate their products and services.

■ Dec. 18, 2007 – Carrington Research Extension Center

This workshop is for new or potential irrigators. Topics to be covered include water permits, water quantity and quality, economics, suitable soils, irrigation water management and irrigation equipment. Contact is Mike Liane, (701) 662-1364, michael.liane@ndsu.edu.

■ Dec. 19, 2007 – Ernie French Building, Williston Research Extension Center

This workshop will be for existing irrigators in the MonDak region, with topics selected specifically for this area. The NDSU Extension Service will host this workshop. Contact person is Chet Hill, Extension area value-added specialist, Williston, (701) 774-4315, chet.hill@ndsu.edu.

More information about the workshops will be mailed in November. If you have any suggestions for topics to cover at the workshops, please give me a call or send me an e-mail or letter.

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Extension Service
North Dakota State University

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Applications for EQIP Will Be “Batched” for Funding Oct. 15, 2007

The Natural Resources Conservation Service (NRCS) accepts applications throughout the year for the Environmental Quality Incentives Program (EQIP). Periodically, NRCS will gather the applications on file and consider them for funding. For fiscal year 2008 funds, this will occur on Oct. 15, 2007. Applicants compete for funding based on the environmental benefit the project will have toward national, state and local resource concerns.

EQIP is a voluntary program that allows agricultural producers to address both local natural resource needs and national resource priorities. With financial and technical assistance from NRCS, eligible participants are able to install or implement structural and management practices to improve animal waste management, *irrigation water management*, grazing land, cropland and other environmental concerns.

For additional information on EQIP or other NRCS conservation programs, go to www.nd.nrcs.usda.gov/ or contact your local NRCS office.

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Site-specific Irrigation Scheduling on the NDAWN Web Site

A new web-based irrigation scheduling tool that is part of the North Dakota Agricultural Weather Network (NDAWN) Web site has been developed to make tracking soil water content in a field much easier. Irrigation water management, of which irrigation scheduling is a part, commonly has been referred to as 50 percent science and 50 percent art. The art part is based on local experience and knowledge of soils and crop growth characteristics. During the last 20 years, the development of agricultural weather networks and irrigation scheduling programs may have shifted the science part to 60 percent, but many irrigators still do not use scientific irrigation water management on a regular basis. The most frequent complaints from irrigators about using science-based irrigation scheduling is that it has a steep learning curve, it takes too much time to gather all the information and they just don't have the time during the growing season.

Scientific irrigation scheduling is based on calculating the soil water balance in an irrigated field. During the growing season, the key decision criteria is to determine when to irrigate and how much to apply. The “when” is determined by the amount of soil water depletion in the root zone. The “how much” is determined by the method of water application, crop growth stage and soil water-holding capacity. Irrigation scheduling works best with center pivots because they take about three days to apply an inch of water and this requires close irrigation water management. A gravity system provides more leeway because it rarely has the ability to apply less than 4 inches during an irrigation set.

The primary pieces of information needed for irrigation scheduling are:

1. Soil properties, in particular the texture, thickness of soil layers and water-holding capacity of each layer.
2. Weather parameters: These include average daily air temperature, daily solar radiation, and date and amount of rain at a specific location.
3. Crop properties: These include effective root depth, water use based on growth stage, planting date and emergence date.
4. Irrigation information: date of application and amount applied on that date.

Most of these parameters can be obtained from readily available electronic sources. The soils data are available through the NRCS’s digitized soil survey database; the crop water use values for various crops and daily weather data are available on the NDAWN Web site. Crop properties are well-known for the major irrigated crops in North Dakota.

The site-specific irrigation scheduler can be accessed by going to the NDAWN Web site (<http://ndawn.ndsu.nodak.edu/>). To use the irrigation scheduler, you need to log in to the NDAWN Web site and create a user name and password. This is necessary for two reasons. It creates an individualized workspace for your fields and provides a certain amount of security so others cannot alter the information you have entered for each field. Click on **Login** at the bottom of the menu on the left side of the NDAWN home page.

After you log in to the NDAWN Web site, you can access the *Irrigation Scheduler* through the **Applications** menu on the left side of the NDAWN home page. When *Irrigation Scheduler* is selected, first-time users will see the Field Creator screen. The purpose of this screen is to allow you to select the location of your irrigated field. It contains a map of North Dakota, two drop-down menus for selecting a county and township and a *help* link.

You can “zoom” to your field two ways. The first is common to GIS systems where you use the mouse to draw a box around the area to highlight it. Each time the box is used, you will magnify the aerial map until you locate your field. The second method is to use the drop-down menus to select your county and township. This will show an aerial photo of the township and you then can use the box to

highlight your field. The aerial photos were taken in 2005. When you have found your field and put a red box around it, drawing the boundaries of the soils in the field may take some time. When this is done, at the bottom of the screen is a text box to enter a name for the field. After you enter a name, click the *save* button.

The Irrigation Scheduler page then will appear with a picture of the field containing yellow lines delineating the various soil types in the field. This is just a picture and no GIS operations can be done to it. Next select from the pull-down menus the year and crop, then enter planting and emergence dates. The three nearest NDAWN weather stations are shown in a pull-down menu, along with distance from your field. You can select one of the three NDAWN weather stations (the closest is shown at the top of the menu) and weather data from the selected station will be used to calculate crop water use values for your checkbook. Click the “*save changes and update table*” button and a checkbook for the three most dominant soils in the field will be created. Notice that three tabs are above the crop information. The tab labeled “**Map Units**” will show you the average water-holding capacity for each soil layer.

If the checkbook is created during the growing season, the water use values for the selected crop automatically will be entered and the checkbook updated every day. You have to enter the rain and irrigation amounts. This is done by clicking on the date on the left side of the checkbook. A box will open that allows you to enter rain and/or irrigation amounts for the selected date. In addition, if you check the soil moisture in the field and it doesn’t match what the checkbook predicts, you can adjust this value for any of the soils in the field.

You also can create a checkbook for a previous year, and in that case, the water use values for the selected crop will be entered for the whole checkbook. Once a checkbook is created, you should not have to do it again in future years.

We wanted to have this available for the 2007 growing season, but ran into some difficulties. This winter, alfalfa will be added to the list of selectable crops. A checkbook for alfalfa is a little more difficult to program because after it is cut, water use drops and then rises as the alfalfa grows.

Please check out the Web site and send me any feedback or suggestions. I will be giving presentations about the Web site at the upcoming irrigation workshops.

This Web Site Can Help You Determine Soil Compatibility for Irrigation

Irrigation increases the productivity and consistency of crop production, but not all soil is suitable for irrigation. If you are considering investing in irrigation, you can use this Web site to examine the soils in your field and it will provide useful information about the irrigability of the soil.

The “North Dakota Irrigation Guide” was developed in the early 1980s as a joint project among many government agencies to classify soils for irrigation that every agency could use. This allowed them to provide consistent information to the public. In the guide, soils were classified as irrigable, nonirrigable and conditional. Irrigable soil can be irrigated with a suitable quality of water under most circumstances. A conditional soil can be irrigated under a high degree of management that will vary, depending on the water quality and soil properties. Nonirrigable soils should not be irrigated. However, sometimes nonirrigable soils are small inclusions in a larger tract of irrigable land and may be irrigated if managed very closely.

The soil classifiers with the Natural Resource Conservation Service (NRCS) office in Bismarck updated the soil irrigability classifications for all soil series in North Dakota. NDSU Extension used the updated irrigability classifications, along with the digitized soil survey database, to create a Geographic Information System (GIS)-based Web site that allows you to look up the soil classification of any location in North Dakota.

The Web site address is

www.ageng.ndsu.nodak.edu/irrigation/index.htm.

On the Web site, the opening page has a map of North Dakota showing the irrigability classifications of the soil. Nonirrigable soils are shown in red, irrigable soils are shown in green and conditional soils are amber. Clicking on the GIS interactive map link will bring up a map where you can zoom into any location in the state (the download time may be a couple of minutes if you have a modem).

When you zoom in on this map, roads, aquifers and irrigation diversion points also will be displayed on the map. To zoom in or out in the view screen, use either the + or – magnifying glass icons on the left side. You also can obtain specific information about the soil in a particular location. After you zoom in to an area about the size of a township, at the bottom of the list of items under the Layers heading on the right side will be “Detailed Irrigability” layers. The one marked “Map East” is for the eastern half of North Dakota and the other, marked “Map West,” is for the western half. If you are in the eastern half of the state, select the radio button next to the “Map East” to make it active. Then go to the left side and select the “I” icon with the black circle around it. Now you can click on any soil shown in the view screen and it will give you the name, number of acres of the soil at that location and the irrigability classification.

This Web site was designed for people interested in developing irrigation and those who want to determine the amount of irrigable soil in a particular part of the state. Check it out and e-mail me if you have any questions.

Managing Center Pivot Wheel Tracks

Every irrigator with a center pivot knows the wheel tracks under each tower can turn into ruts in some parts of his or her fields. Finding wheel tracks up to 6 inches deep is common, even on very sandy soil, but when the wheel track is 12 inches or deeper, that is time for concern. Deep wheel tracks can cause drive wheels on towers to get stuck and trip the safety circuit on a center pivot. They also interfere with tillage and harvesting equipment. Deep wheel tracks generally are caused by saturated conditions that reduce the weight-bearing capacity of soil. The deepest wheel tracks usually are found where water collects in low spots or under the first and second towers from the pivot point. If you have deep wheel tracks at several locations in the field, now is the time to mark where they are and start making plans to correct the problem.

Major factors that affect the depth of pivot wheel tracks are:

1. The soil type: Usually locations with heavier soils (clay, clay loams) have deeper tracks because they remain wet longer due to higher water-holding capacity and slower drainage. Deep wheel tracks commonly form in the low spots where water accumulates. Often the wheel track acts like a drainage canal, where rain and irrigation water run down the wheel track to the low spot.
2. The number of revolutions the pivot makes in the tracks before tillage levels them.
3. The weight supported by each tower: Short spans between towers (130 to 170 feet) have less weight than long spans (180 to 200 feet).
4. The amount of wheel contact area with the soil surface.

You can reduce deep wheel track problems using either management or mechanical solutions. Some of the **management** methods you might use are:

1. Schedule irrigation water applications to avoid unnecessary pivot revolutions.
2. Allow the soil surface to dry between irrigation events, especially the soil in the wheel tracks. Sometimes this option is not feasible after a full crop canopy develops and shades the wheel tracks.
3. Keep tire inflation pressures at the manufacturer’s recommended level. This will maintain the proper amount of tire contact area.
4. If you have deep wheel tracks in a perennial crop, such as alfalfa, consider cutting and harvesting within the circles. If you have deep wheel tracks in only the low areas of your field, consider filling the bottom of the wheel tracks with crushed rock (1 to 3 inches in diameter). This will provide more load support for the towers.
5. During the season, observe the pivot while it operates. If excessive ponding occurs where the deep wheel tracks are formed, you have to reduce the amount of applied water to that location.

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Here are some of the **mechanical** changes you can do to help your pivot system reduce deep wheel tracks:

- 1. Build a road for the tower wheels.**
This can be done by running the system to mark the wheel track location, then using a plow, disc plow or blade to build a ridge where the track is located. Be sure to pull soil from both sides of the track.
- 2. Manufacturers of pivot systems offer a wide range of tire sizes designed to minimize deep wheel tracks.**
However, if you go to larger tires, you may have to increase the size and strength of the drive mechanism.
- 3. Put directional sprinklers on either side of a tower.**
This directs water away from the wheel track. Some growers are using extra-long drop tubes on the two sprinkler locations on either side of a tower. The drop tube drags a weighted, directional sprinkler head that sprays water behind the wheels, thus keeping the wheel track dry.
- 4. Attach track-closing disks to each tower.**
A disk on each side of the track pushes soil into the track as the tower moves through the field. A problem with using this option is the pivot can be moved in only one direction.
- 5. The sprinklers near the tower can be on "boom backs."**
The boom back allows the sprinkler to apply water to the soil behind the wheel so the track is dry when the tower passes. As in the previous suggestion, the pivot can be moved in only one direction.

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