

Site Specific Irrigation Scheduling - Now on the NDAWN Website

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A new web-based irrigation scheduling tool that is part of the North Dakota Agricultural Weather (NDAWN) website has been developed to make it much easier to track soil water content in a field. Irrigation water management, of which irrigation scheduling is a part, has commonly 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% but still, many irrigators do not use scientific irrigation water management on a regular basis. The most frequent complaints by 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 3 days to apply an inch of water and this requires close irrigation water management. There is more leeway with a gravity system because they rarely have 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 now 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 website. Crop properties are well known for the major irrigated crops in North Dakota.

The site-specific irrigation scheduler can be accessed on the NDAWN website (<http://ndawn.ndsu.nodak.edu/>). To use the irrigation scheduler, you need to login to the NDAWN website 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 and follow the instructions on the page that comes up. If you already have an account enter the username and password. If you are new to the system, sign up for a new user account.

After you login to the NDAWN website you can access the *Irrigation Scheduler* through the **Applications** menu on the left side of the NDAWN homepage. 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 an aerial photomap of North Dakota, two drop down menus for selecting a county and township and a *help* link. The aerial photos were taken in 2005.

You can “zoom” to your field two ways. The first is common to GIS systems; hold down the left button on the mouse to draw a box on the map around the area to highlight. You can draw a box around the entire county or just half of it. Each time you draw the box it will zoom in closer to your field. The second method is to use the drop down menus to select your county and township. You can select a county without selecting a township. Unorganized townships are not listed. If you select the county and township an aerial photo of the township will appear and you can then use the mouse to draw a box to highlight your field. When you have found your field and put a red box around it, it may take some time to draw the boundaries of the soils in the field. 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 will then 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. Default dates are already entered based on National Agriculture Statistic Service (NASS) crop data collected over the years. 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 there are three tabs above the crop information. The tab labeled **Soil Properties** will show you the average water holding capacity for each soil layer.

If the checkbook is created for the current growing season, the water use values for the selected crop will be automatically 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. If you have selected alfalfa, there is a box that can be checked if you cut alfalfa on that day. In addition, if you go out to the field and check the soil moisture and it doesn't match what the checkbook predicts, in this box you can adjust the soil moisture value for the selected soils in the field.

You can also 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.

One problem we have noticed. If you use Internet Explorer 6.0, the checkbook pages will not print properly. We have not been able to resolve this problem and recommend you use the either the Firefox 2 or Opera 9 web browsers. Both are free. You can get access to them by clicking on the buttons at the bottom of the NDAWN webpage.