NDSU EXTENSION SERVICE

water spouts

No. 191 AUGUST 2001

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

Field Days and Irrigation Tours for 2001

MDT - Mountain Daylight Time

Location	Date	Time	Phone
Staples, Minnesota Central Lakes Ag Center Commercial Blueberry clinic	Aug. 1	6 to 9 p.m.	(218) 894-5196
Staples, Minnesota Central Lakes Ag Center Dry Bean, Soybean Diseases Horticulture Tour	Aug. 2	8:30 a.m.	(218) 894-5196
Dawson 2 miles north of I-94 exit Irrigation Potato Research	Aug. 7	9 a.m.	(701) 231-7076
Williston Mon-Dak Ag Field Tours Irrigation Demo Fields	Aug. 8	9 a.m.	(701) 572-8880
Oakes Irrigation Research Site	Aug. 14	9 a.m.	(701) 742-2189

Tom Scherer (701) 231-7239
NDSU Extension Agricultural Engineer
tscherer@ndsuext.nodak.edu

Interested in Irrigated Potato Research?

The second annual potato field day will be held at the irrigated potato research site near Dawson on Tuesday, Aug. 7 from 9 a.m. until noon. The research site is located 2 miles north of the Dawson exit on I-94. The field day is sponsored by NDSU and the Red River Valley Potato Growers Association.

The field day will be followed by a noon lunch courtesy of AVIKO. A tour of research and demonstration plots by NDSU experiment station personnel will include variety trials, sugar end trials, weeds and herbicides, disease plots, and planting configurations to improve irrigation water management.

Speakers will include George Kegode, NDSU weed research; Harlene Hatterman-Valenti, NDSU high value crops research; Bryce Farnsworth, NDSU potato breeding; Dean Steele, NDSU irrigation research; Duane Preston, NDSU Extension potato specialist; Marty Glynn, potato processing research; Gary Secor and Neil Gudmestad, NDSU plant pathologists. There is no charge and the public is invited. It is anticipated that university, regulatory, grower, industry, and agribusiness representatives will attend.

Gary Secor 701-231-7076
NDSU Plant Pathology Department
Gary_Secor@ndsu.nodak.edu

Interested in High Value Crops?

On Tuesday, Aug. 14, the Oakes Irrigation Research Site will have its annual field day. The Oakes Research Site is located 4 miles south of Oakes on state highway 1. The morning tour will start at 9:00 a.m. and will feature the following talks:

- White mold control in edible beans. In addition to the regular fungicide treatments, some herbicide and calcium treatments will be discussed.
- Potato planting configurations. From a water management point of view, is it better to plant potatoes on a hill, as we do now, or would it be better to plant them in a furrow?
- Corn hybrid update and a discussion on public/private corn inbred development.

- Irrigation best management practices research update. How do you get the best economical yield with the least inputs and protect water resources at the same time?
- What crops are best to plant the year before potato? Can vegetables fit into a crop rotation with potato?
- Lunch will be served at noon. During lunch, there will be a demonstration on seed spacing versus tractor speed. How fast can you drive and still get accurate seed placement?

The afternoon tour will feature:

- Marketing of onions and other vegetables. Some new marketing opportunities are now available and will be discussed.
- Using cover crops in pumpkins for soil improvement and weed control.
- Weed control in onion and cabbage. Some new herbicides for weed control and a better look at the old options.
- Variety trial results for onion and cabbage.
- New crop update — Artichokes choke.

The tour should end about 3:30 p.m.

Richard Greenland (701) 742-2189
Research Supervisor, Oakes Irrigation Research Site
Rgreenla@ndsuext.nodak.edu

Frost Damage To Crops And Maturity

A killing frost occurs when the air at plant level reaches a temperature that kills the plant tissue. If you have frost damage, it is the result of plant tissue death.

Critical stages and temperatures for various major crops are described as follows:

Wheat, durum and other small grains: Air temperatures below 32° Fahrenheit (zero degrees Centigrade), the freezing point of water, will cause sterile spiklets if the plant is in the late boot through the flowering stage. In the milk stage, temperatures below 32° F will create shriveled kernels. Frozen immature spikes will turn white. After mid-dough stage, temperatures as low as 25° F will result in bran damage, some kernel shriveling and possible germination reduction. The bran damage will change test weight and probably will be discounted in the market. Grain that may be saved for conditioning to planting seed should be tested for germination and vigor.

Flax is most susceptible during flowering and early boll stage. Immature seeds can be killed by temperatures from 28-32° Fahrenheit. After flax reaches the dough stage it is more resistant to frost.

Sunflower: Most susceptible at bud and flowering stage. Temperatures of 28° F and 30° F can result in damaged buds and sterile sections or rings in the flowering head. After pollination and petal drop sunflower can withstand temperatures as low as 25° F with only minor damage. Twenty-five degree temperatures at the bud stage will often damage the stalk below the bud and seeds will not develop.

Soybean: Easily damaged by light frosts in the 28°-32° range. Beans that are still green and soft will shrivel. Stalks rapidly turn dark green to brown and will not recover. Beans in pods that have turned yellow will mature normally. Some green beans will turn yellow after 30-40 days of storage.

Pinto and navy beans are very sensitive to frost (30-32° range). Earlier pods with yellow to brown color are sufficiently mature to escape damage. Late green pods or flowers are easily damaged by frost. Green beans will shrivel but should be left in the field until dry in order to separate them from mature beans.

Corn: Usually damaged by temperatures in 28° range or lower. Corn is usually physiologically mature 50-55 days after the 50% silking date. Colder temperatures will kill the entire stalk. If only leaves above the ear are frosted, kernel development will continue. If the entire stalk and leaves are frozen, kernel development will cease and soft shriveled corn will result. If corn is at around 35 percent moisture or if black layer has formed at base of kernel, the plant is physiologically mature and kernels will develop normally despite frost. Frosted immature corn is best used for silage or fodder.

Other crops: Most other crops such as buckwheat and proso millet are easily damaged in flower to milk stage. Buckwheat is reported by the Canadians to be very sensitive to frost prior to the mid-dough stage.

Potato tops will turn black but tubers are not usually damaged by light frosts.

Sugarbeets are very resistant to frost.

Alfalfa can withstand light damage to tops but if frozen to ground level will not recover and should be harvested as soon as possible.

Remember, temperatures of 32° at weather stations or the farmstead may result in temperatures of 28°to 29°F in low-lying areas of fields. In addition, time of exposure to freezing temperatures will influence degree of damage. Two other factors that can influence critical frost temperatures are soil moisture and wind velocity.

Duane R. Berglund (701) 231-8135
NDSU Extension Agronomist
dberglun@ndsuext.nodak.edu

Do Center Pivot Wheel Tracks Bother You?

Every irrigator with a center pivot knows that wheel tracks can turn into ruts in some parts of their fields. Deep wheel tracks can cause significant damage to the center pivot as well as tillage and harvesting equipment. Deep wheel tracks are generally caused by saturated conditions that reduce the weight-bearing capacity of soil. Deep wheel tracks are usually found where water collects in low spots or under the first and second towers from the pivot point. If you have deep wheel tracks in your fields, now is the time to start making some changes to correct them for the next growing season.

The 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 collects naturally.
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.

Here are some of the **mechanical** changes you can do to help your pivot system to 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 located 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 only be moved in one direction.
5. The sprinklers near the tower can be located on "boombacks." The boomback allows the sprinkler to apply water to the soil behind the wheel so that the track is dry when the tower passes. As in the previous suggestion, the pivot can only be moved in one direction.

Tom Scherer (701) 231-7239
Extension Agricultural Engineer
tscherer@ndsuext.nodak.edu

Estimating Crop Water Use in August

Often we think of July as a critical irrigation month for row crops and alfalfa, but August is probably more important for crop development and maturity.

Average water use for the months of July and August of common irrigated crops is shown on the following table.

	Average Water Use (inches)	
	July	**August**
Corn	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

Crops use more water in July than August and the average rainfall amounts are correspondingly greater in July. The average rainfall in July is 2.75 inches in Carrington and 2.35

NDSU Extension Service
Agricultural and Biosystems Engineering
P.O. Box 5626
Fargo, ND 58105-5626

inches at Oakes, whereas the average rainfall in August for both locations is about 2 inches. This indicates that the irrigation water demand is probably greater in August than in July. Couple this together with declining water levels in wells and streams during August and it becomes obvious that irrigation water management becomes very important.

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

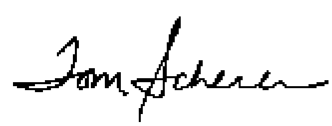
Crop water use tables published in AE-792, Irrigation Scheduling by the Checkbook Method show that water use is similar for most full season crops. The following table shows the estimated daily water use based on maximum temperature.

Maximum Air Temperature	Estimated Daily Water Use
50-59° F	0.08 inch
60-69° F	0.13 inch
70-79° F	0.19 inch
80-89° F	0.24 inch
90-99° F	0.29 inch

More site-specific crop water use estimates can be obtained from this web address:

www.ext.nodak.edu/weather/ndawn/

Remember this table and the values from the website give the actual water use by the crop. 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 inches per acre must be pumped to get a net 0.22 inches into the soil for the crop to use. Likewise, if you want to apply a net of an inch of water to the crop, you will need to pump 1.18 inches.



Tom Scherer (701) 231-7239
NDSU Extension Agricultural Engineer
tscherer@ndsuext.nodak.edu