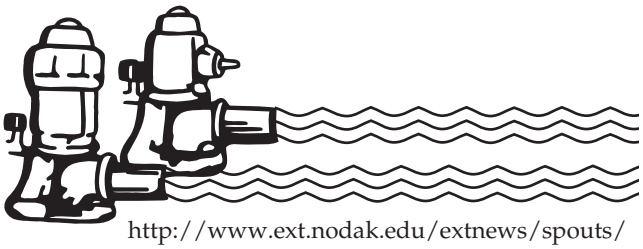

# water spouts

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

No. 217 JULY 2005


## 2005 Field Days and Irrigation Tours

| | | |
|---|---|---|
| **Casselton**<br>Agronomy Seed Farm | July 11 | (701) 347-4743 |
| **Hettinger**<br>Research Extension Center | July 12 | (701) 567-4323 |
| **Dickinson**<br>Research Extension Center | July 13 | (701) 483-2348 |
| **Williston**<br>Research Extension Center | July 14 | (701) 774-4315 |
| **Outlook, Saskatchewan**<br>Canada-Saskatchewan Irrigation Development Center | July 14 | (306) 867-5400 |
| **Carrington**<br>Research Extension Center | July 19 | (701) 652-2951 |
| **Sidney, Mont.**<br>Eastern Ag Research Center | July 19 | (406) 482-2208 |
| **Minot**<br>North Central Research Extension Center | July 20 | (701) 857-7677 |
| **Langdon**<br>Research Extension Center | July 21 | (701) 256-2582 |
| **MSIDA Irrigation Tour**<br>Irrigation in northwestern North Dakota | July 21-22 | (701) 250-4518 ext. 3 |
| **Oakes**<br>Irrigation Research Site<br>Four miles south of Oakes on N.D. Highway 11 | Aug. 9 | (701) 742-2189 |
| **Tappen**<br>Irrigated Potato Field Day<br>I-94, Pettibone exit, north side | Aug. 11 | (218) 773-3633 |

## Missouri Slope Irrigation Development Association (MSIDA) Annual Tour

The MSIDA and North Dakota Irrigation Association will host a summer irrigation tour on Thursday and Friday, July 21-22. The destination will be northwestern North Dakota to view irrigation developments in the semiarid "MonDak" area. This area has seen a lot of irrigation developments in the last few years. One of the tour highlights will be a stop at the new irrigation research facility in Nesson Flats, 35 miles east of Williston.

The tour registration fee is $75 per person and includes a seat on the bus, lunch both days and dinner Thursday evening. Preregistration is required by July 15. A block of 25 rooms has been reserved at the El Rancho Motor Inn. To make a room reservation, call the El Rancho at (701) 572-6321. For more information and to register, call Ken Miller at (701) 250-4518, ext. 3, or Myron Aune at (701) 667-1512.

### Tour Agenda – July 21

| | |
|---|---|
| 7:30-8 a.m. | Meet at Kist Livestock in Mandan |
| 8 a.m. | Bus leaves Kist Livestock |
| 11:30 a.m. | Lunch in Watford City |
| 1-3 p.m. | • Ron Berry farm – five new pivots<br>• David Hardy farm<br>• Dredge to clean out river sediments at pump sites<br>• Irrigation water management using soil moisture blocks |
| 3 p.m. | Agricultural Research Service (ARS) Station in Sidney |
| 5:30 p.m. | Catered dinner at the Confluence Center (where the Yellowstone and Missouri rivers meet) |
| 7:30 p.m. | El Rancho Hotel |

### July 22

Breakfast on your own

| | |
|---|---|
| 8 a.m. | Board bus |
| 8:30 a.m. | Jerry Shae farm, irrigated malting barley |
| 10 a.m. | • Nesson Valley – New NDSU and ARS irrigated research site<br>• Bill Sheldon farm, irrigated potatoes and forage |
| Noon | Lunch in Tioga |
| 2:30 p.m. | David Herzig farm, irrigated pasture |
| 5-5:30 p.m. | Return to Kist Livestock |


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NDSU Extension Service
North Dakota State University

# Irrigated Potato Field Day at Tappen

The Northern Plains Potato Growers Association will host its annual Irrigated Potato Field Day at the irrigation research site three miles east of Tappen on Thursday, Aug. 11, from 9 a.m. to noon. The research site is on the north side of Interstate 94 at the Pettibone exit. At noon, the potato association will host a lunch.

A tour of research and demonstration plots will include Gary Secor and Neil Gudmestad talking about potato disease trials, Susie Thompson speaking about variety trials and Harlene Hatterman-Valenti discussing herbicide trials and potato agronomic trials, including hill configuration, irrigation and fertility.

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# Estimating the Need for Additional N for Corn and Other Crops

During the last few weeks, much of the state has experienced substantial, and often excessive, rainfall. Rainfall is good to a point. However, these rains have resulted in losses of nitrogen (N) from leaching in the central and western parts of the state and both leaching and denitrification in the east. As a result, we have good growth conditions in some fields, but lower available N than is needed to achieve good yields.

Determining rates of N needed to supplement N loss is difficult, even with soil testing and plant analysis. These losses often are very small scale in variability, so sample numbers need to be large to have a good chance to predict N status based on numbers alone.

George Rehm at the University of Minnesota developed the following decision chart. It appeared in the mid-June Minnesota Crop News. With his permission, I reproduce it here (at right) for your use, with my comments.

## More specific guidelines for irrigators

Irrigators have more options than dryland growers. The above checklist is helpful to identify a serious problem. However, sometimes more specific information is required, particularly when a host of water-related problems might result in field yellowing. Soil analysis is helpful for some micronutrient problems, such as with phosphorus (P) and potassium (K). However, soil sampling may not provide the information required to make informed decisions regarding N, and certainly not for sulfur (S). Plant analysis for all crops is more helpful to reveal subtle deficiencies and resolve confounding nutrient issues. Check with a local laboratory to determine whether it analyzes plant samples in a timely manner.

**Decision Table for the Need for Supplemental N**

| | |
|---|---|
| **Question 1: When and how was the N applied?** | |
| A. In the fall, less the 4 inches deep and soil temperatures were above 50 F | 6 |
| B. In the fall, 4 or more inches deep and soil temperatures were above 50 F | 5 |
| C. In the fall, less than 4 inches deep and soil temperatures were below 50 F | 4 |
| D. In the fall, 4 or more inches deep and soil temperatures were below 50 F | 3 |
| E. In early spring (March/April) | 3 |
| F. Broadcast on the soil surface in the fall, unincorporated | 4 |
| G. Broadcast on the soil surface in the fall, incorporated, below 50 F | 3 |
| H. N applied in May, incorporated | 2 |
| **Question 2: What was the predominant spring (May/June) soil condition?** | |
| A. Normal or drier than normal | 1 |
| B. Wetter than normal | 3 |
| C. Standing water in low areas | 4 |
| **Question 3: What does the crop look like?** | |
| A. Crop is tall and moving on in maturity, showing N deficiency* | 5 |
| B. Crop is short and early in maturity, showing N deficiency* | 3 |
| C. Crop is short and early in maturity, showing no N deficiency* | 2 |
| D. Crop is tall, moving on in maturity, green | 1 |
| **TOTAL SCORE** | |

* N deficiency symptoms vary for each crop. Generally, crops are yellow, more so in lower leaves, with upper leaves greener. Lower leaves on corn will become yellow from leaf tip in a V pattern following the midvein, with the V tip aimed toward the stalk.

**Add the points for each of the three questions.**

- Total is 7 or less ..... Supplemental N for yield not necessary
- Total 8 to 9 ..... Supplemental N may or may not be necessary
- Total 10 or more ..... Supplemental N is suggested

Use rates from 30 to 50 pounds of N/acre for most crops. Use high rates for crops with high yield potential and low down-size quality risk from application of N (any crops except flax, barley, sugar beets, safflowers). Also, for canola, if N appears lost, assume that sulfur also was lost and include some in the supplement.

The NDSU Soil Lab can analyze plant tissues, but turn-around time can be slow, as it is set up more for research plant samples than the commercial plant sample business. The largest lab around the area that can provide quick turn-around times is Agvise at Northwood, N.D. Its phone number is (701) 587-6010. It can provide materials and procedures to help growers and consultants obtain the best samples and provide the information they need to help in nutrient deficiency diagnosis.

The plant part and stage of growth of the plants are very important in determining the nutrient status of plant samples. Most nutrient concentrations decrease with maturity, and nutrient concentration within the plant varies for different plant parts. Also, the number from the analysis is valid only for plant parts that researchers previously have investigated and correlated to critical levels of the nutrient for optimal growth and development. The lab will help guide you to the right plant part to sample and preparation procedures for submitting the sample to the lab.

Most irrigation in North Dakota is conducted on coarser-textured soils. Since leaching always is a possibility due to the uncertainty of rainfall amounts, most supplemental N applications through the pivot are about 30 pounds of N. However, if substantial N deficiencies were found, rates could be much higher than that. Practical issues prevent much higher rates from being injected through the center pivot; however, ground equipment could be used for higher rates. For corn, at least 90 percent of the N should be applied before tasseling, with two-thirds to three-fourths of the total amount applied before lay-by time. Dry bean application should be made by pod set.

Plants absorb some of the N from irrigation water through the leaves, but the roots take up the most. Under good soil moisture, and if water moves the fertilizer N to the roots, absorption of supplemental N begins almost immediately.

### Sulfur supplementation

Although less common than N deficiency, if yellowing is seen, particularly in younger leaves on hilltops and eroded areas, S may have leached from the root zone and the crop may require supplementation if not too far advanced. Plant analysis may confirm an S deficiency. Ammonium sulfate or another available sulfate fertilizer could correct a problem. Do not broadcast liquid ammonium thiosulfate on most crops, except through irrigation water or on canola. Canola has a heavy, wax leaf layer after five leaves that prevents serious burning.

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## Chemigation Management

With all the rain we've received the past two months, some of the fertilizer you applied may have been leached below the root zone. If you follow the recommendations laid out in Dave Franzen's article and determine that your crops need more fertilizer, you may have to apply the fertilizer through the center pivot.

The injection of any chemical, such as nitrogen, phosphorus or a pesticide, into irrigation water and applied to the land through an irrigation system is called chemigation. Some people call it fertigation when only nitrogen fertilizer is injected into the water supplying a center pivot. Chemigation is recognized as a best management practice (BMP) for irrigated agriculture. However, to use chemigation to benefit your crop production, you must understand the equipment, management requirements and limitations.

The most common chemicals applied with chemigation in North Dakota are liquid forms of nitrogen, fungicides, herbicides and insecticides. Liquid nitrogen in the form of UAN 28 is the most common chemical injected into irrigation systems. **Do not use** chemigation with volume guns (big guns) due to poor application uniformity and wind drift problems. Chemigation can be used with other forms of sprinkler irrigation, such as wheel rolls and solid-set systems.

The North Dakota Century Code specifies chemigation equipment requirements. The law specifically requires the following equipment:

1. An anti-siphon device on the main water line (chemigation check valve)
2. A backflow device in the chemical line between the injection pump and pipeline
3. A pressure sensor on the pressurized water line (standard equipment on center pivots)
4. An inspection port (to see if the check valve is leaking when the pump is off)
5. An injection port downstream from the anti-siphon device
6. A chemical-resistant injection pump
7. An interlock, either mechanical or electric, between the water pump and the injection pump to shut off the injection pump in case the water pump stops

### Chemigation with center pivots

Sprinkler uniformity is critically important because the objective of chemigation is to apply the same volume of chemical to each square foot of the field surface. A "catch can test" can check sprinkler uniformity. A can test involves measuring the amount of water applied at two or more locations under each span of the pivot. You can do this with rain gauges or plastic cups, but they all must be of identical construction. After the pivot goes over the cans, record the amount in each can and its location in the field. Compute the average application amount and compare the individual can amounts. If any deviates from the average by a large amount, then the sprinklers probably have a problem at that location on the pivot. While running the can test, you should walk the length of the pivot and check for broken sprinklers and pipeline leaks. If you find any, you should fix them before chemigating.

Don't use the end-gun to chemigate with pesticides because of wind drift and usually poor uniformity under the area the end-gun irrigated. Do not chemigate when the wind speed is greater than 10 mph. However, finding days with low wind in North Dakota is difficult. A compromise would be to start chemigating in the early evening, when wind speeds generally decrease.

#### *Injecting Nitrogen*

A question often asked is how much nitrogen (N) should be injected in each chemigation event. The most common liquid fertilizer is UAN 28 and it contains 28 percent nitrogen.

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## Oakes Irrigation Research Site Field Day

The annual Field Day at the Oakes Irrigation Research Site will be Tuesday, Aug. 9, from 9:30 a.m. to 3:30 p.m. The research site is four miles south of Oakes on North Dakota Highway 1.

The full agenda hasn't been developed yet but it will include a discussion of soybean rust by Carl Bradley, marketing vegetables by Rudy Radke, weed control in onions by Carrie Schumacher, and weed control in carrots and sweet corn by Richard Greenland.

The Garrison Diversion Conservancy District will provide lunch, which includes sweet corn, tomatoes and other vegetables grown on the station.

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Amounts injected are from 10 to 30 pounds of actual N per acre (lbs/ac). One gallon of UAN 28 contains 3 pounds of N, so to apply 10 pounds of N per acre, you need to inject 3.3 gallons of liquid UAN 28. To apply 30 pounds of N requires 10 gallons per acre, so for a standard 128-acre pivot, you need a 1,280-gallon tank of UAN 28.

How much to inject depends on the crop, growth stage, amount applied previously, yield goal and soil type. By the time corn is chest high, it has a deep root system, so applying 30 lbs/ac would be reasonable and this may be required only once in the growing season, depending on how much N you previously applied. However, if you have a shallow soil, which restricts full corn root development, you may want to put on two applications of 15 lbs/ac. The root depth of potatoes is only 2 feet, so you may want to apply smaller amounts of perhaps 10 to 20 lbs/ac of N more frequently to prevent N loss in leaching events that summer storms cause.

Another question is how much water should be put on with the N. Since you want to get the N to the roots, chemigating with N during a regular irrigation event is the most desirable. If circumstances are such that you need to apply the N and are not concerned about the amount of water, then the timer should be set to apply at least a quarter of an inch.

### *Injecting Fungicides and Insecticides*

Fungicides either are protectants or systemic. Chemigation-applied protectant fungicides provide protection to the plant by coating the plant's above-ground biomass. The plant absorbs systemic fungicides, providing protection from the inside of the plant through the tissues. For both types of fungicides and insecticides, the object is to cover the plant but not put on too much water, which can wash off the pesticide. Use low-application amounts and typically set the pivot timer at 100 percent, which applies about one- to two- tenths of an inch of water.

### *Injecting Herbicides*

Herbicides have two modes. Either they are applied before or after weed emergence. If you are applying pre-emergent herbicides, then you want the water containing the herbicide to penetrate at least 4 inches into the soil. Selecting an application amount from 0.25 to 0.5 inch will accomplish this very well. If you are applying a postemergent herbicide, then set the pivot timer to 100 percent, resulting in an application amount of about one-tenth of an inch.

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