In this issue:

- Northern Plains Potato Growers Association Field Day – Aug. 25
- Last Summer Water Tour
- Mobile Drip Irrigation Projects at Kansas State University
- We Quickly Are Approaching the Last Irrigation

Northern Plains Potato Growers Association Field Day – Aug. 25

The Northern Plains Potato Growers Association field day will start at 7 a.m. on Thursday, Aug. 25, at Hoverson Farms, with breakfast followed by research presentations. The tour is on the south side of the intersection of U.S. Highway 2 and North Dakota Highway 18 (about 25 miles west of Grand Forks).

The tour then will proceed to the Forest River Colony near Inkster, N.D., where lunch will be served at noon. A field tour of the irrigated research trials will follow lunch. The tour will conclude with an evening barbeque near Hoople.

Andy Robinson, 701-231-8732
NDSU Extension Potato Agronomist
Andrew.P.Robinson@ndsu.edu

Last Summer Water Tour
Fargo-Moorhead Flood Facilities Tour – Sept. 21 (full day)

Tour stops will include existing flood control facilities and projects under construction. The tour begins and ends in Fargo.

Registration is $20 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to the North Dakota Water magazine.

To register, go to www.ndwater.com/programs and click on “Summer Water Tours” on the left-hand menu or send a check to NDWEF, PO Box 2254, Bismarck, ND 58502. Please include the number of people who will be attending. For more information, give us a call or send an email.

North Dakota Water Education Foundation,
701-223-8332
Fax: 701-223-4645
ndwaterusers@btinet.net

Mobile Drip Irrigation Projects at Kansas State University

(Photograph used with permission from Kansas State University Extension)

Mobile drip irrigation (MDI) is the marriage of center pivot technology and microirrigation technology. Specially designed drip lines are attached to the platform of the center pivot, and they’re basically drug in a circle on the surface.

While the concept of MDI has been around for a while, several new innovations in the design of the drip lines and the method of attachment to the center pivot have renewed interest in the technology.

MDI initially was targeted to small-grain crops grown on fields with limited irrigation capacity, but the potential improvement in irrigation efficiency and crop water productivity for summer grown crops, such as corn, resulted in irrigation producers trying MDI and wanting research conducted to evaluate its irrigation potential and management procedures developed.

A research project at the Southwest Research and Extension Center (SWREC) in Garden City, Kan., was established in 2015 and continues with a comparison of corn production under MDI and in-canopy spray nozzles.

In this study, two levels of irrigation capacity are used: one with an irrigation capacity that should meet crop water needs for most years, and one with a low irrigation capacity, meaning the crop often will experience some yield-limiting water stress each year.

In 2016, three additional sites were established on commercial farms in the area. Two are in the Garden City area and one further east, near Larned, Kan. These sites
complement the SWREC study and include the use of other sensor and management technologies to compare, evaluate and customize the use of these various methods to improve irrigation productivity and water conservation.

The Larned site especially has an emphasis on water conservation. The site is in the rolling sand hills of south-central Kansas in the Big Bend Prairie aquifer. While much of this aquifer has relatively stable water levels, some localized areas have declining issues.

Because the area has sandy soils with less water storage capacity, when compared with the silt loam soils of western Kansas, the irrigation systems must have irrigation capacity near crop water use rates. Therefore, if irrigation efficiency can be improved, then the areas of groundwater decline might be able to be mitigated and allow long-term sustainability.

This site features a side-by-side comparison of MDI and in-canopy spray systems; three spans of the system were split between the two nozzle package options.

MDI requires the crop to be planted in circular rows, which also could be a potential advantage for in-canopy spray nozzles. So in addition to the replicated study within the MDI/spray field, an adjacent pivot field, equipped with the in-canopy spray nozzles and managed to duplicate the MDI/spray field as closely as possible, has been established for a nonreplicated comparison of circular row planting and straight row planting yields. Both field have an array of soil water sensors and plot water meters to aid the evaluation of the systems.

The three demonstration field sites were established through the efforts of individuals and private organizations, industry and state agencies, the latter as part of the State 50 year water vision plan implementation as irrigation technology demonstration farms.

Danny H. Rogers, 785-532-2933
KSRE Agricultural Engineer, Irrigation
drogers@ksu.edu

We Quickly Are Approaching the Last Irrigation

There is no such thing as a normal growing season, and this year is no exception.

Due to a warm, relatively dry spring, planting was completed ahead of normal throughout much of the state. However, June was relatively dry, with below-normal rain amounts in the southern two-thirds of the state and above normal in the northern third.

However, July and early August rain has been widespread and scattered but generally above normal except in the northwest. These conditions can make irrigation water management a challenge.

Crop physiologic development is related to heat units – referred to as growing degree days (GDDs) – received during the growing season. Accumulated GDDs for several irrigated crops can be found on the North Dakota Agricultural Weather Network (NDAWN) website at https://ndawn.ndsu.nodak.edu/ (click on Applications).

By comparing this year’s GDDs with the amount accumulated in a normal year, you can determine when a crop is developing faster or slower than normal. The accumulated GDDs for corn is shown in Figure 1. Most of the state is ahead of a normal year, with a few places slightly below GDD accumulations.
Knowing the physical indicators of physiological maturity of the crops being irrigated and checking soil moisture levels will help you determine when irrigation no longer is needed.

**Corn**

With normal GDD accumulations, corn physiological maturity is reached about 55 days after 75 percent of the plants have visible silks. It should be irrigated until sufficient soil moisture is available to ensure that the milk layer of the kernel moves down to the tip of the kernel, or black layer formation (physiological maturity).

To check the milk line, break an ear of corn in half. The milk line is clearly visible on the kernels as the border between the yellow and the dull milky color. When the line is halfway down the kernel (50 percent milk), the corn will take approximately 10 to 12 days to get to the black layer.

For center pivots, the last irrigation should be applied around the 50 percent milk stage. For flood irrigation, the last irrigation should occur when the milk line is about a quarter of the way down the kernels.

The location of the milk line should be checked at several locations in the field. At black layer formation, the grain moisture may range from 30 to 36 percent, depending on the hybrid. Yellow dent corn usually is well-dented at physiological maturity.

A web application has been developed that will help you predict when the black layer should occur in your fields. Go to https://mygeohub.org/groups/u2u/tools and select Corn GDD.

I used the site to estimate when the black layer would occur for an 85-day corn planted on May 5 in the Bismarck area. Based on accumulated GDDs, the black layer should occur around the second week of September.

**Dry edible beans**

The last irrigation should be when the first pods are filling, or irrigation should be stopped when 50 percent of the leaves have turned yellow. When overwatered, indeterminate varieties (pinto) may continue to vine and set flower, with delayed maturity.

For navy beans, physiological maturity is reached when at least 80 percent of the pods show yellowing and are mostly ripe, with 40 percent of the leaves still green. Pinto beans are physiologically mature when 80 percent of the pods show yellowing and are mostly ripe, and only 30 percent of the leaves are still green.

Beans within pods should not show evidence of any green. If the beans have begun to dry, irrigation will not be needed because the beans no longer are removing much water from the soil profile.

**Soybeans**

Soybeans should be irrigated until sufficient moisture is available to allow full bean development and pod fill. This stage is when leaves are yellowing (75 to 80 percent) and all pods are filled, with the lower pods just starting to turn brown.

At physiological maturity, pods are all yellow and more than 65 percent of the lower pods have turned brown.
Beans within pods should have little evidence of green color and should be shrinking.

Studies show that yellow pods sprinkled with brown are the best clue of physiological maturity. Usually if one or two pods show this symptom on the upper two or more nodes of the plant, it has reached physiological maturity. Also, soybeans should be tolerant of a killing frost at this time.

Sunflowers

Sunflowers should be irrigated until sufficient moisture is available for the sunflower achenes (seeds) to fill. This is when the backs of the heads turn from a lime green to yellow green and ray petals are completely dried.

Potatoes

Potatoes will utilize soil moisture until harvest. Maturation stage begins with canopy senescence as older leaves gradually turn brown and die.

Research has shown final irrigation can be used to reduce bruising during the harvesting process. On sandy soils, soil moisture content between 60 and 80 percent of field capacity (40 to 20 percent moisture depletion) provides conditions for a desirable soil load into the harvester with optimum separation of potatoes and soil and a minimum of physical tuber damage.

If soil is dry before harvest, a final irrigation should be applied at least one week prior to harvest to raise the soil moisture level and raise the tuber hydration level.

Alfalfa

Alfalfa should be irrigated to maintain active growth until growth is stopped by a hard frost. Alfalfa going into the winter with adequate soil moisture has a much better chance of little or no winterkill.

Sugar Beets

Sugar beets will utilize moisture until harvest time. Irrigation usually is terminated seven to 14 days before harvest to allow the soil to dry.

Parts of this article reprinted from an earlier article by Duane Berglund, former NDSU Extension agronomist.

Tom Scherer, 701-231-7239
NDSU Extension Agricultural Engineer
Thomas.Scherer@ndsu.edu