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water spouts

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Upcoming 2021 NDSU Field Days

Details for the field day at each location listed below were posted to their websites in late June.

July 13	Hettinger Research Extension Center
July 14	Dickinson Research Extension Center
July 14-15	Williston Research Extension Center
July 19	Agronomy Seed Farm, Casselton
July 20	Carrington Research Extension Center
July 21	North Central Research Extension Center
July 22	Langdon Research Extension Center
July 27	Central Grasslands Research Extension Center (10 a.m. - 3 p.m.)
Aug. 4	Oakes Irrigation Research Site

Links to the website for each Research Extension Center can be found at www.ag.ndsu.edu/research/field-days.

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Nesson Research and Development Farm – Irrigation Field Day

The irrigation field day will be held on Thursday, July 15, at the NDSU Irrigated Nesson Research and Development Farm 23 miles east of Williston on North Dakota Highway 1804. Topics will include:

- Irrigated canola production management
- Soybean planting
- Irrigated soybean varieties
- Determination of optimum irrigation amount and timing for enhanced soybean yield, quality, water productivity and soil health in semiarid western North Dakota
- Irrigated cover crop mixes
- Foundation seed increase

Refreshments will be served starting at 8:30 a.m. and the irrigated crop tour will begin at 9 a.m. The irrigated field day will conclude with a noon luncheon sponsored by area businesses.

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Oakes Irrigation Research Site Field Day - Aug. 4

A field day will be held at the NDSU Oakes Irrigation Research Site - Robert Titus Research Farm on Wednesday, Aug. 4, from 9 a.m. to noon, with lunch following the last talk.

The 40-acre site 4.5 miles south of Oakes on North Dakota Highway 1 is a substation of the NDSU Carrington Research Extension Center (CREC).

Michael Wunsch, plant pathologist at the CREC, has been doing extensive research on ways to more effectively control diseases in soybeans, dry beans and sunflowers. Much of his work has been done at the Oakes research site.

The research site has a large number of potato trials, including variety trials. Susie Thompson, NDSU potato breeder, will talk about her new varieties, including reds, yellows, purples and good old-fashioned french fry potatoes.

Planting soybeans before corn? Hans Kandel, agronomist, will talk about his collaborative work with early planted soybeans.

The last two years have brought drought to much of North Dakota. Irrigation efficiency and water management are timely subjects. Tom Scherer and Dean Steele, NDSU irrigation engineers, will cover the basics and latest innovations in water management.

Wind erosion was prevalent this spring. Cover crops are an effective tool to hold soil in place. Mike Ostlie, agronomist, will talk about techniques we are working with to seed cover crops into existing crops, including wide-row corn.

The field day will begin with refreshments at 8:30 a.m. Topics that will be covered and the presenters are:

- 9:05 a.m. **Welcome** – Blaine Schatz, Carrington Research Extension Center director
- 9:10 a.m. **Overview of the Oakes site's projects** – Kelly Cooper, research agronomist
- 9:20 a.m. **White mold studies in soybeans** – Wunsch
- 9:40 a.m. **New potato varieties** – Thompson
- 10:05 a.m. **Pros and cons of planting soybeans early** – Kandel
- 10:25 a.m. **Irrigation in a severe drought** – Scherer
- 10:45 a.m. **Irrigation management sensors** – Steele
- 11:05 a.m. **Irrigated cover crops** – Ostlie

Tour participants also will have the opportunity to review the site's irrigated corn hybrid and soybean performance tests.

For more information, contact the CREC at 701-652-2951 or visit its website at www.ag.ndsu.edu/CarringtonREC.

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Soil Water Sensing With Telemetry for Irrigation Water Management

As the 2021 irrigation season is well underway, knowing the status of soil water in every irrigated field is important. A variety of soil water sensors are available on the market and many of them can be equipped with telemetry packages for remote monitoring.

The telemetry packages typically include a cellular subscription and make the data available via a webpage. These systems can be especially helpful in fields where variable-rate irrigation (VRI) is desirable for irrigation water management due to the spatial variability of soils, topography, crop growth potential and other factors.

This article presents ongoing work by NDSU agricultural engineers to evaluate several types of soil water sensors with telemetry systems. The project is sponsored by the North Dakota Natural Resources Conservation Service (NRCS) and we are working with NRCS engineers to conduct the work. The mention of trade names in this article is for informational purposes only and we are not endorsing or purposely excluding any system. Similar systems are available from other manufacturers and dealers.

The project is being conducted on three quarter-section fields in southeastern North Dakota that have center pivot irrigation systems. Each field has one main monitoring station and four secondary stations. An example of a main station is shown in **Figure 1**.

Each main station consists of the following instrumentation systems with its own telemetry package: 1) FarmQA's AquaSpy sensor, 2) Reinke affiliate CropX's sensor, 3) Valley's AquaTrac Pro reading Watermark blocks and a tipping bucket rain gauge, 4) Valley's AquaTrac Lite reading a Sentek soil water content sensor, 5) Lindsay's FieldNet system reading Watermark blocks. Multiple monitoring stations per field would provide more accurate data for fields with highly variable conditions, but that approach is beyond the scope of this project.

Figure 2 shows a close-up photo of the sensors and some of the tools used to drill installation holes in the soil.

We also will be using a research-grade soil water content sensor (Acclima) that is based on time domain reflectometry (TDR). Four TDR sensors will be placed at each site's main station as well as four secondary stations per field. The secondary stations will be used for checking

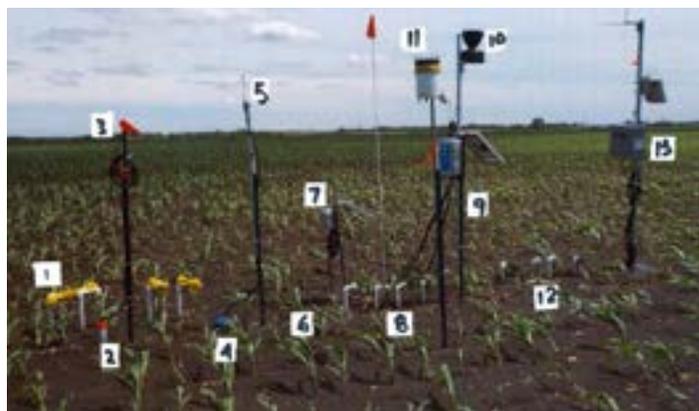


Figure 1. A "main station" monitoring setup for comparison of soil water sensors and telemetry systems.

The items are: 1) Acclima soil water content sensors, 2) AquaSpy sensor, 3) AquaSpy logger and telemetry box, 4) CropX sensor with integrated telemetry, 5) CropX antenna, 6) Sentek sensor, 7) AquaTrac Lite box and telemetry for Sentek sensor, 8) Watermark blocks, 9) AquaTrac Pro logger and telemetry box for Watermark blocks at (8), 10) tipping bucket rain gauge connected to (9), 11) stand-alone tipping bucket rain gauge with logger (no telemetry), 12) Watermark blocks, 13) Lindsay FieldNet logger and telemetry box for Watermark blocks at (12).

Figure 2.
Sensors and tools.

The items are: 1) CropX sensor with telemetry in the blue hemispherical top, 2) Acclima soil water content sensor, 3) Watermark block for AquaTrac system, 4) Watermark block on extension pipe for Lindsay FieldNet system, 5) Sentek sensor, 6) AquaSpy sensor, 7-9) drill bits with extensions and an auger used to drill installation holes in the soil. To indicate size, the yellow item 10 is a ruler 1 foot long and the silver ruler in the center is 1 meter long. Sensors 2, 3 and 4 have PVC extension pipes glued to the sensors to improve the ease of installation and removal.



variable-rate irrigation maps, a topic which is beyond the scope of this article. After analyzing several field readings of the Acclima sensors and corresponding soil cores, our calibration has shown a strong correlation.

Some of the sensors make measurements at multiple depths, while others require a separate sensor installation for each depth of measurement. For example, Watermark and TDR sensors measure at one depth only, so we have installed sensors at 6-, 18-, 30- and 42-inch depths to monitor the top four 1-foot increments of the soil profile. The other systems measure water content at multiple depths with the same sensor.

The Watermark block sensors indicate soil water potential, which measures how tightly water is held in the soil. In other words, the Watermark blocks indicate the current level of plant water stress, or how hard plants must work to extract water from the soil. The other sensors indicate soil water content on a volume basis.

The water content measurements can be converted to depth equivalents of soil water, which are similar to rainfall depths. Water content measurements can be used for determining soil water deficits as part of an irrigation scheduling program.

Any discussion of soil water sensors for irrigation water management would be incomplete without mention of rainfall and irrigation measurements on site. We have installed tipping bucket rain gauges in the irrigated areas and at a nonirrigated edge or corner of each field.

Some of these gauges are included with the sensor, logger and telemetry systems mentioned above, while others have loggers to record data for longer periods of time.

In addition, we have installed Davis Instruments weather stations with telemetry to obtain on-site weather measurements at two of the field sites. We will be using data from the North Dakota Agricultural Weather Network as much as possible.

We will be monitoring and evaluating the sensors for two growing seasons. A goal of the project is to provide demonstrations and training for NRCS technical staff and others. We also anticipate making the findings available via publications and irrigation workshops.

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North Dakota Water Education Foundation – Summer Water Tours

Access to substantial quantities of clean water is important for the developments within North Dakota, and the best way to learn about water projects is to see them in person via a tour.

These tours provide a firsthand look at North Dakota's critical water issues. Registration is \$20 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to *North Dakota Water* magazine.

Tours offered are:

- **July 15** Red River of the North: "Simply Grand"
(Tour begins and ends in Grand Forks)
- **July 20** Fargo-Moorhead Area Diversion Project
(Tour begins and ends in Fargo)
- **July 27** Managing Water Through Garrison Diversion
- **Aug. 10** Managing the Mighty Mouse
(Tour begins and ends in Minot)

For more information about each tour online, go to <https://ndwater.org/events/summer-water-tours/> or send a check made out to NDWEF and mail to PO Box 2254, Bismarck, ND 58502. Please indicate which tour or tours you want to attend and include the number of people. For more information, give us a call or send an email.

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For more information on this and other topics, see www.ag.ndsu.edu

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County commissions, North Dakota State University and U.S. Department of Agriculture cooperating.

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This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881.

Project Safe Send 2021 – Get Rid of Unused Pesticides

Farmers, ranchers, pesticide dealers and applicators, government agencies and homeowners with unusable pesticides can bring them to any of the Project Safe Send Sites listed below.

Project Safe Send is a safe, simple and nonregulatory program that helps people safely and legally get rid of unusable pesticides free of charge. Since 1992, more than 10,000 people have brought in more than 4.7 million pounds of pesticides to Project Safe Send. For more information on transporting your pesticides safely, please go to www.nd.gov/ndda/pesticide-program/project-safe-send.

The program accepts old, unusable or banned pesticides, including herbicides, insecticides, rodenticides and fungicides. For a list of accepted items, go to the Safe Send website (address above and click on Accepted Pesticides). The collected pesticides are shipped out of state for incineration. Project Safe Send is funded through product registration fees paid by pesticide manufacturers.

People are urged to check their storage areas for any unusable pesticides and safely set them aside for Project Safe Send. If the containers are deteriorating or leaking, pack them in larger containers with absorbent materials.

Free heavy-duty plastic bags are available from the North Dakota Department of Agriculture.

Note: Each participant is limited to 5,000 total pounds. Each participant is limited to one shuttle.

8 a.m. - noon (local time) at North Dakota Department of Transportation (NDDOT) facilities

July 13	Bismarck	218 S. Airport Road
July 14	Dickinson	1700 3rd Ave. W., Ste. 101
July 15	Hettinger	121 1st St. N.
July 16	Ashley	520 7th St. S.W.
July 20	Harvey	501 Jackson Ave.
July 21	Minot	1305 Hwy 2 Bypass E.
July 22	Tioga	425 2nd St. S.E.
July 27	Valley City	1524 8th Ave. S.W.
July 28	Wyndmere	7775 Hwy 18

Contact me to preregister.

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