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water spouts

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AUGUST 2005

2005 Field Days and Irrigation Tours

Carberry, Manitoba CMCDC-Carberry Junction of Highways 1 and 5	Aug. 8	(204) 834-6000
Oakes Irrigation Research Site Four miles south of Oakes on North Dakota Highway 11	Aug. 9	(701) 742-2189
Tappen Irrigated Potato Field Day Interstate 94, Pettibone exit, north side	Aug. 11	(218) 773-3633

Field Day at Carberry, Manitoba

The Canada-Manitoba Crop Diversification Centre (CMCDC), at Carberry at the junction of Highways 1 and 5, will host a field day from 1:30 to 4 p.m. Aug. 8. The focus will be on potato nutrient management. The event will include presentations on fertilization and nutrient uptake studies; plant nutrient assessment and variable-rate technologies; water, nutrients and potato yield and quality; potato rotations; use of manure; and riparian areas. For more information, call (204) 834-6000.

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Oakes Irrigation Research Site Field Day

The annual field day at the Oakes Irrigation Research Site will be held 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.

Presentations 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. Vern Hofman, Extension agricultural engineer, will give a demonstration of grain drying and fan requirements.

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

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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 Associates 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 talking about variety trials and Harlene Hatterman-Valenti talking about herbicide trials and potato agronomic trials, including hill configuration, irrigation and fertility.

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Revised Barley Production Pocket Guide

The NDSU Extension Service recently published a revision of the “Barley Production Pocket Guide.” This 92-page pocket-sized publication contains the latest recommendations on a wide range of topics relative to barley production in North Dakota. Topics covered include quality requirements; rotations and field selection; tillage; varietal selection; planting recommendations; irrigation; seed equipment operation; fertility management; disease, weed and insect control; harvesting; drying; and storage. Copies are available from the NDSU Extension Service’s Distribution Center at (701) 231-7883 for \$2 each.

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Pictorial Barley Disease Handbook is Available

Stephen Neate, barley pathologist at NDSU, and Marcia McMullen, NDSU Extension plant pathologist, have developed a photographic reference to common barley diseases in North Dakota. “The Barley Disease Handbook” is UV coated to enable it to be used in the field for analysis and includes sampling procedures for disease testing at NDSU.

The North Dakota Barley Council supplied the production and printing costs of this handbook and the book is to be provided to barley growers in North Dakota at no charge. Copies were provided to county Extension offices, based on barley acreage per county. To obtain a copy, contact your county Extension agricultural agent or the North Dakota Barley Council at (701) 239-7200.

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When to Stop Irrigating

The last irrigation of the season may be the most important. To ensure optimum yields, adequate soil moisture must be available to crops until they are physiologically mature. Applying irrigation water beyond maturity often is unnecessary and increases your pumping costs. For management decisions on final irrigation, you will need to know the current moisture condition of your soil and the amount available for crop use. Both soil texture and effective root zone will determine the amount of water that can be stored for crop utilization.

Stage of crop maturity and weather conditions will affect the time period when the crop continues to use water prior to maturity. Know the signs and symptoms of physiological maturity in crops you are irrigating. Both the extra savings of eliminating unnecessary irrigation and peace of mind that the crop is safe from frost are worthwhile.

Some crops, such as corn, can endure an increased soil water deficit as the crop nears maturity, while others, such as potatoes or alfalfa, should continue to be irrigated until harvest, maturity or frost.

Corn 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). Corn reaches physiological maturity about 55 days after 75 percent of the plants have visible silks. The grain moisture may range from 32 percent to 40 percent at the time, depending on the hybrid. Yellow dent corn usually is well-dented at physiological maturity. Once corn is physiologically mature, the dry-down rate is approximately 0.5 percent moisture loss per day.

Dry edible beans: The last irrigation should be when the first pods are filling, or the irrigation stopped when 50 percent of the leaves are yellowing on the plants. When overwatered, indeterminate varieties (pinto) may continue to vine and set flower with delayed maturity. Navy beans reach physiological maturity when at least 80 percent of the pods show yellowing and are mostly ripe, with 40 percent of the leaves still green in color. Pinto beans are physiologically mature when 80 percent of the pods show yellowing and are mostly ripe, and only 30 percent of the leaves still are green. Beans within pods should not show evidence of any green.

Beans that have begun to dry will not need irrigation because they no longer are removing much water from the soil profile.

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 percent to 80 percent) and all pods are filled, with 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 these signs 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 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 a yellow-green color and ray petals are completely dried.

Potatoes will use 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 percent and 80 percent of field capacity (40 percent 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 should be irrigated to maintain active growth until a hard frost stops the growth. Alfalfa going into the winter with adequate soil moisture has a much better chance of little or no winterkill.

Sugar beets will use moisture until harvest time. You usually can terminate irrigation seven to 14 days before harvest to allow the soil to dry.

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Managing Irrigation in August

With all the rain we received in June and July, growing conditions were looking as though we wouldn't even have to turn on the irrigation systems this summer. But the transition from too much water to soil water deficits on sandy soils happens very quickly, especially when we get a series of 90-degree days. Crop water use is very high during these hot, dry days. Irrigation water management in August is very important for long-season crops such as corn, dry beans, potatoes, sunflowers, sugar beets and soybeans. This is the month when all these crops are filling out their pods, ears or seeds or bulking the tubers and roots. Water stress in August has the greatest impact on yield.

Generally, these crops use more water in July than August because they are in the vegetative growth stage. In addition, the average rainfall amounts are correspondingly greater in July. The average rainfall in July is 2.75 inches in Carrington and 2.35 inches at Oakes, whereas the average rainfall in August for both locations is about 2 inches. This indicates that the irrigation water demand probably is greater in August than in July. Couple this with declining water levels in wells and streams during August, and irrigation water management obviously becomes very important.

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

	Average Water Use	
	July	August
	inches	
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
Sunflowers	7.5	5.2

The average daily water use for these crops is about 0.2 inch, but hot, dry periods where the water use can be more than 0.3 inch on some days are common. Site-specific daily crop water-use estimates can be found on the North Dakota Agricultural Weather Network (NDAWN) Web site at <http://ndawn.ndsu.nodak.edu/>. The crop water-use tables and maps are under the "Applications" link on the left side of the opening page. For more information, look for John Enz's article about the new crop water-use features on the NDAWN Web site in the April 2005 issue of *Water Spouts*.

You also can find crop water-use estimates in NDSU Extension Service publication AE-792, "Irrigation Scheduling by the Checkbook Method," which is available at your county Extension office. This publication has tables showing crop water use for most irrigated crops based on the peak daily air temperature and week past emergence. The tables show that water use is similar for most full-season crops during August. The following table shows the estimated daily water use based on maximum temperature.

Maximum Air Temperature	Estimated Daily Water Use for Long-season Crops in August
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

As crops mature, cutting back on irrigation during the latter part of August is common. This may be an expensive mistake. Research has shown corn that

was moderately water stressed toward the end of the growing season had an average yield reduction of 13 percent, compared with corn that was fully irrigated to maturity.

Whether you use NDAWN or AE-792 to obtain daily crop water-use values to see how much water to apply, remember that the amount of 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 you must pump almost 0.26 inch per acre to get a net 0.22 inch into the soil for the crop to use. Likewise, if you set the pivot timer to apply 0.7 inch of water per acre, only about 0.6 inch will infiltrate into the soil for crop use.



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