



BLACKFOOT CHALLENGE WEEKLY IRRIGATION REPORT

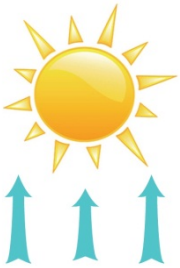
Friday May 29, 2015

Relatively cool temperatures kept **crop water use at about 1 inch this week** for most crops (Chart Page 4). Scattered showers produced about ¼ inch for most cropland areas with a little more near Lincoln. It was another good week to boost soil moisture levels and those who kept the sprinklers on and headgates open made progress. Plan to have crop root zones full before low streamflows. Drought continues to be the main discussion in local, national and world agriculture. A google search of “drought” produces 60,000,000 hits. So shower with a friend, put a brick in the toilet tank and dust off that drought plan. A condensed overview of the entire irrigation season is presented on the last page of this report as a reminder to plan ahead. More information about irrigation is available on the Challenge website.



WEATHER - COOL AGAIN LAST WEEK BUT WARMING NOW

Cool temperatures and scattered light showers dominated this last week across Blackfoot drainage croplands. Warmer temperatures and scattered light showers are expected next week. The 30 and 90 day forecasts continue to indicate above normal temperatures and normal rainfall. Low streamflows are predicted to continue.



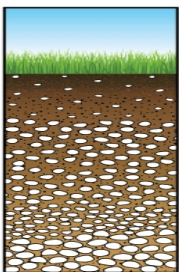
CROP WATER USE - MODERATE (NEAR NORMAL)

Crop water use was about 1 inch for all crops last week - near normal - due to cool temperatures and scattered showers (higher humidity). It will be slightly over 1 inch next week with warming temperatures and continuing possible showers. The table and chart on Page 4 illustrate crop water use throughout the whole season.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS¹	SEASON TOTAL²
HAY CROPS	1.1	1.2 (1.0 - 1.3)	5.8
PASTURE	0.8	1.0 (0.9 - 1.2)	5.2
SPRING GRAINS (planted May1)	0.5	0.7 (0.6 - 0.8)	1.2
WINTER WHEAT	1.2	1.3 (1.1 - 1.4)	6.8
LAWNS	1.0	1.1 (1.0 - 1.3)	5.9

¹Expected water use (range if weather becomes cooler or hotter than expected)

²Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but now include April



SOIL MOISTURE - THE RACE TO FILL IT UP!

Moderate temperatures and crop water use made it easier to boost soil moisture last week by irrigating. Don't be fooled by green plants that are just sitting there waiting for rainfall or irrigation but not growing much. They need water - so irrigate if you can. Most local soils hold 3 to 5 inches of water in a three-foot root zone which can last 2 to 4 weeks in June. This is a great buffer for breakdowns and schedule conflicts as well as low stream flows.

WEEKLY TIPS

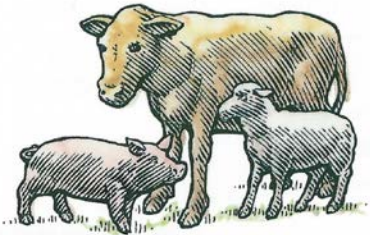
Keep Irrigating While Water Supplies Last

To irrigate or not to irrigate is not the question! Whether you get your weather predictions from satellites or the spots on toads, all indications suggest increasing drought conditions. The best thing irrigators can do for their crops and basin-wide water supply is to irrigate well now and be prepared to cut back when streamflows fall to critical levels. Check your soil moisture with a soil probe or shovel and irrigate until the soil is moist to a depth of 3 feet for hay and pasture crops or 2 feet for annual crops. If it looks and feels moist – you’re good. If it’s dusty and dry – keep irrigating. This applies to both sprinkler and flood systems. Many flood irrigators will be surprised how quickly soils dry out after irrigating – just look!

Irrigation and Water Quality

Nutrients are identified as one water quality concern in the watershed. Local agricultural nutrients include animal wastes and commercial fertilizers. There are no large confined animal feeding operations in the Blackfoot drainage. Grazing animal wastes are deposited directly on fields by animals or collected from pens/barns/corrals and applied using spreaders. Manure is sometimes mechanically treated in the field but not usually incorporated into the soil.

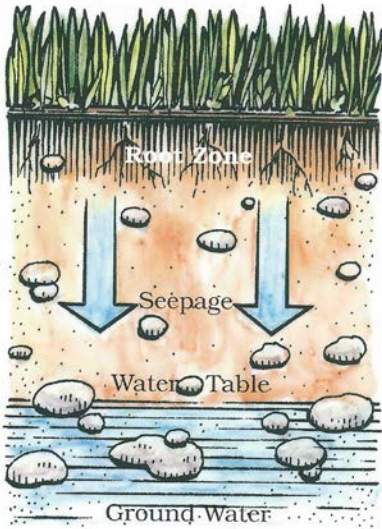
Commercial fertilizers are generally applied at relatively low rates to Blackfoot croplands due to cool climate, limited productivity, thrifty growers and other factors. Most of these cropland soils have very high nutrient holding capacities and can easily retain applied fertilizers within the upper root zone. It’s in the growers’ financial interest to keep these nutrients in the crop root zone. During a 1995 study, we calculated that the amount of nitrogen in the manure produced by Montana livestock was roughly equivalent to the amount purchased as fertilizer each year (figure below). So - that’s gold in them thar cowpies.



ANIMAL WASTE IN MONTANA

	CATTLE	SWINE
Number of farm animals*	2,500,000	215,000
Tons of manure produced annually	27,500,000	514,000
Yards of manure produced annually	32,130,000	615,000
Tons of nitrogen in this manure	158,500	
Tons of nitrogen fertilizer sold annually	120,000	
Fertilizer value of nitrogen in manure**	\$70,000,000	

Nutrient seepage to groundwater is not a major concern on Blackfoot croplands for the reasons just mentioned and due to the dry climate. Annual evaporation/transpiration is over 30 inches and effective precipitation is less than 10 inches. Most precipitation, snowmelt and irrigation water is held within the crop root zone until taken up by plants. Little water actually passes through most cropland soils to reach groundwater. Irrigation can provide enough water to cause deep percolation but the amount needed is greater than applied by most irrigators, especially those with sprinkler systems.



DANGER – NUTRIENTS LEAKING OUT OF THE SOIL INTO GROUNDWATER

The local situations most likely to lose nutrients to groundwater are on porous/sandy/rocky soils left by high-energy streams. The largest areas of these soils in the Blackfoot drainage are at Kleinsmidt Flats and Clearwater Junction Flats. Porous rocky and sandy soils also occur along all local streams on adjacent nearly-level stream terraces. These soils also occur around local lakes.

- Prevent by:
- Apply fertilizer at low rates
 - Apply in multiple applications
 - Apply using sprinkler system (fertigation)
 - Not over-irrigating
 - Storing nutrients elsewhere

DANGER – NUTRIENTS REACHING SURFACE WATER OVERLAND

The local situations most likely to lose nutrients from fertilizer and animal waste overland to surface waters are non-porous (clay) soils near streams that are flood irrigated.

- Prevent by:
- Manage flood irrigation to reduce or eliminate tailwater
 - Discharge tailwater to downhill croplands so vegetation will remove nutrients

Drought in 2015

OK, I know, enough with the drought talk! But to keep up-to-date *Water Supply Forecasts* are available on the Challenge Website (<http://blackfootchallenge.org/Articles/?p=1589>). Streamflows and snowpacks remain at half their normal levels. Predictions do not currently include monsoons sufficient to avoid very low flows. Here are some hints for reducing water use taken from our irrigation guide that has more detail and is available at: <http://blackfootchallenge.org/Articles/wp-content/uploads/2013/06/BFIrrigationGuideFinalv3.0.pdf>

- Fill Up Your Soil - NOW - and Try to Keep it Near Full
- Know how much you apply – check with rain gauges or flow meter
- Apply More Water At Each Application
- Improve Irrigation System Performance
- Save Water for Critical Growth Periods

For more information contact Jennifer Schoonen, Blackfoot Challenge Water Steward, 406-360-6445 or Barry Dutton, Professional Soil Scientist, 406-240-7798 barry@landandwaterconsulting.net

BLACKFOOT 2015 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

	RAIN ¹	2015 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE POTENTIAL CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
5/1/2015	0.01	0.80	0.90	0.10	0.00	1.10	0.90	0.50	0.80	0.20
5/8/2015	0.01	1.10	1.00	0.20	0.00	1.20	1.10	0.70	0.90	0.30
5/15/2015	0.10	1.10	0.90	0.20	0.00	1.20	1.00	0.80	1.00	0.50
5/22/2015	0.25	0.80	0.60	0.25	0.20	0.90	0.80	1.00	1.10	0.70
5/29/2015	0.25	1.10	0.80	0.40	0.30	1.20	1.00	1.20	1.20	0.80
6/5/2015								1.30	1.30	0.90
6/12/2015								1.40	1.50	1.00
6/19/2015								1.50	1.70	1.10
6/26/2015								1.50	1.90	1.10
7/3/2015								1.50	2.00	1.20
7/10/2015								1.60	2.10	1.30
7/17/2015								1.60	2.00	1.20
7/24/2015								1.50	1.90	1.10
7/31/2015								1.50	2.20	1.10
8/7/2015								1.40	1.70	1.00
8/14/2015								1.20	1.50	0.90
8/21/2015								1.00	1.30	0.70
8/28/2015								0.80	1.00	0.50
9/4/2015								0.60	0.80	0.40
9/11/2015								0.50	0.70	0.30
9/18/2015								0.50	0.70	0.30
9/25/2015								0.40	0.60	0.20
9/30/2015								0.40	0.60	0.20
TOTAL	1.12	5.80	5.20	1.15	0.50	6.80	5.90	24.40	30.50	17.00

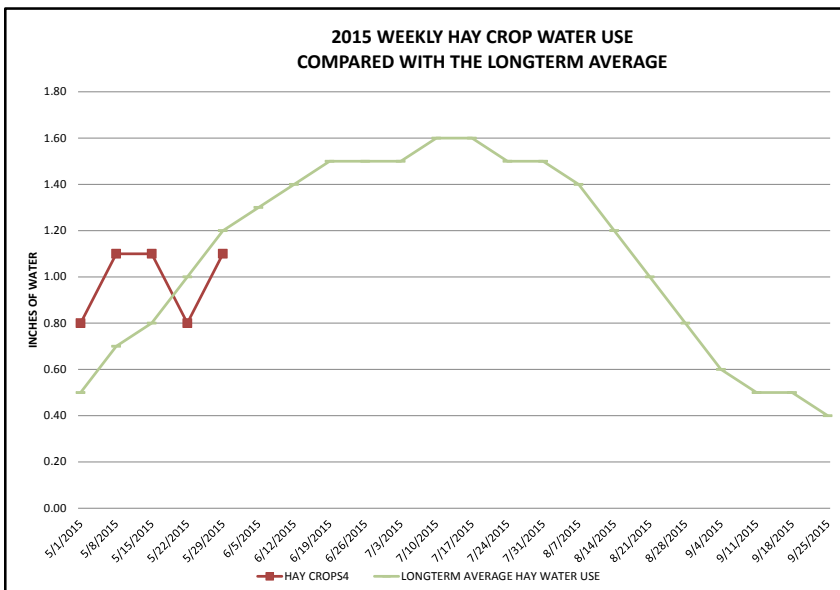
¹ Rainfall should be reduced to account for immediate evaporation from crop and soil surfaces (0.1-May and Sept, 0.15-June and August, 0.2-July)

² This years maximum water use by healthy crops that are well-fertilized and irrigated, disease and insect-free. Will vary across the drainage.

³ Average water use for each crop each week based on long-term historic data.

⁴ Hay Crop water use should be reduced by approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.

CROP WATER USE IS ABOVE AVERAGE SO FAR THIS SEASON (RED LINE)



THE BLACKFOOT DRAINAGE IRRIGATION SEASON IN BRIEF

This is a summary of general activities and recommendations with more detail provided throughout our irrigation guide.

APRIL – GET READY AND PLAN YOUR IRRIGATION STRATEGY!

- Get your irrigation system ready – perform maintenance and test system.
- Evaluate weather conditions and predictions then plan for drought if needed.



MAY – CHECK SOIL MOISTURE & BE READY FOR UNUSUAL HEAT OR COLD!

- Check the soil moisture content at the start of growing season (May 1) and fill up the soil to its water holding capacity during early irrigations (2-4 inches).
- Watch for dry soil conditions, especially with new plantings and apply water to ensure good germination and emergence.
- Irrigate deeply at least once early in the season to promote deep root growth.
- Apply 2-5 inches of irrigation to hay and pasture crops in May depending on weather. Apply 0-2 inches to spring grains and new plantings as needed based on weather and growth. Apply extra water to fill up the soil (2-4 in).

JUNE – THIS IS THE TIME TO MAKE YOUR BIGGEST EFFORT SO POUR IT ON!

- Apply 6-8 inches of irrigation in June to hay and pasture crops and winter wheat depending on weather. Apply 5-8 inches to spring grains and new plantings as needed based on weather and growth.
- Consider irrigating deeply to fill up soil root zone and promote deep root growth.
- Be sure small grains are irrigated well during their critical periods of boot, bloom and early heading.



JULY – POUR IT ON UNTIL HARVEST AND RETURN QUICKLY

- Apply 1 - 2 ½ inches of irrigation per week in July to all crops - depending on weather.
- Cutting is a critical stress period for hay crops, especially alfalfa so irrigate deeply to fill up the root zone before cutting then get back across the field quickly after cutting. Crop water use declines when hay is cut so this is a good opportunity to fill up the soil again. Irrigate at least once after cutting.
- Stop irrigating small grains at the milk to soft dough stage but be sure there are 1- 2 inches of soil moisture left at this stage to prevent kernels from shrinking.

AUGUST- KEEP IRRIGATING SMALL GRAINS UNTIL KERNELS MATURE, BE DROUGHT AWARE!

- Apply 1 - 2 inches of irrigation per week in August to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed.
- Many folks irrigate for pasture following their one hay cutting. Irrigate according to how much pasture you seek and with consideration for other water needs in the drainage, especially in drought years.
- Reduce river withdrawals by rotating systems and reducing the amount of irrigation at one time.



SEPTEMBER – APPLY AS NEEDED/AVAILABLE & GET READY FOR SPRING!

- Apply ½ - 1 ½ inches of irrigation per week in September to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed. Prepare the system for winter and an early start next spring.