Evaluation of Irrigation Benefits on Crop Yields

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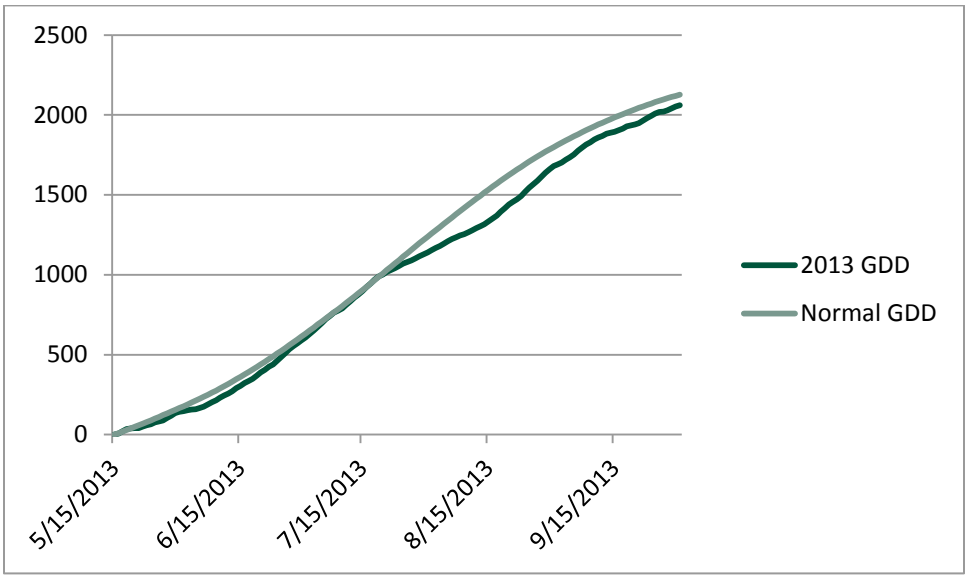
In 2013, the Carrington Research Extension Center experienced a growing season that was extremely unique in respect to the amount of precipitation received. Data received from the North Dakota Agricultural Weather Network (NDAWN) highlights the near-drought conditions by the amount of rainfall between May and September (Table 1). With nearly a six inch rain deficit, the CREC's dryland crop variety trials were put to the test on water-use efficiency. Fortunately, our variety trials are also evaluated under an irrigated environment which allows us to compare variety differences and the amount of yield loss experienced during these dry seasons. Growing degree days (GDD) in 2013 were similarly behind throughout the entire growing season. The following graph represents the short-fall of GDDs in our corn variety trial which was planted on May 15.

Table 1. Rainfall at Carrington, 2013.

Month	2013	Normal
	inch	inch
May	4.02	2.76
June	0.80	3.77
July	1.52	3.39
August	0.48	2.31
September	1.85	1.91
Total	8.67	14.14



Since 1993, the aquifer level at the CREC has been rising from an average of 16 feet below ground level in 1993 to an average of 10 feet below ground level in 2013. This increase has resulted in higher soil moisture levels and more water available to crops. Planting of variety trials in 2013 was extremely late on average due to a high level of snowfall during the spring. The soil held an adequate amount of moisture for a short period after planting as indicated by May rain amount (Table 1). This resulted in good emergence and vigor across variety trials at the start of the growing season. Starting in June however, the amount of rain diminished and the crops started to show signs of stress. We initiated irrigation applications on June 19 and applied nearly two inches of water for the month. The dry conditions continued into July and over 4 inches of water was applied under irrigation throughout that month. By the end of September, a total of 9.04 inches of water was applied to the variety trials.

Table 2. Irrigation at CREC, 2013.

Month	Irrigation	Rainfall	Total
	inch	inch	inch
May	0	4.02	4.02
June	1.94	0.8	2.74
July	4.1	1.52	5.62
August	3	0.48	3.48
September	0	1.85	1.85
Total	9.04	8.67	17.71

The following tables highlight the five varieties within corn, soybeans, and spring wheat that responded the most to irrigation in respect to harvest yield.

Table 3. Top five corn hybrids response to irrigation, 2013.

Brand	Hybrid	Dryland	Irrigated	Increase
		bu/ac	bu/ac	bu/ac
Thunder	4585RR2	115.8	191.0	75.3
NuTech/G2 Genetics	5X-193	123.1	193.4	70.4
NuTech	5B-888	120.7	190.4	69.7
Renk	RK266VT3P	119.6	181.7	62.2
Dyna-Gro	D26VP56	128.8	189.6	60.8

Table 4. Top five Roundup Ready soybean response to irrigation, 2013.

Brand	Variety	Dryland	Irrigated	Increase
		bu/ac	bu/ac	bu/ac
Kruger	K2-0901	27.4	74.1	46.7
Dairyland	DSR-0305/R2Y	24.2	67.3	43.2
Kruger	K2-0601	27.6	69.9	42.2
NuTech/G2 Genetics	6043	25.0	66.8	41.8
REA	62G22	23.8	65.3	41.5

Table 5. Top five spring wheat response to irrigation, 2013.

Variety	Dryland	Irrigated	Increase
	bu/ac	bu/ac	bu/ac
LCS Albany	53.2	83.6	30.5
Velva	49.4	76.9	27.6
Advance	50.3	75.9	25.7
Elgin-ND	55.4	80.4	25.0
Prosper	57.7	81.9	24.2