Project Title: Response of Egan Spring Wheat to Nitrogen and Irrigation

Objective: To evaluate nitrogen and water inputs response of Egan spring wheat yield and quality

Personnel: Jessica A. Torrion, John Garner

Methods:

Egan spring wheat was grown under four nitrogen levels and four irrigation levels as a strip-split plot, randomized complete block design with four replications, where irrigation levels represent the whole plot factor, and nitrogen as a strip factor. Irrigation treatments included 50 percent evapotranspiration (ET), 75ET, 100ET, and a rainfed check. The four nitrogen treatments included an unfertilized check for N, 52, 102, and 152 lbs/A added nitrogen. The check had an initial 98 lbs/A soil N. The resulting total N for the treatments were 98 (check), 150, 200, and 250 Total lb of N per acre. For simplicity, treatments are labeled as Total N and not added N.

Table 1: Management information

Seeding Date:	4/22/16	Herbicide:	5/17/16
Julian Date:	113		Huskie 11 fl oz/A + Axial 16.4 fl oz/A
Seeding Rate:	25 plnts/sqft	Insecticide:	6/27/16
Previous Crop:	Alfalfa		1.92 fl oz/A Warrior II
Tillage:	Conventional	Harvest Date:	8/18/16
Irrigation:	Yes	Julian Date:	231
Soil Type:	Fine sandy loam		
Soil Test:	57-10-95		
Fertilizer:	(__)-63-148		

Summary:

Nitrogen treatments had no significant effect on yield, but irrigation treatments did (Fig.1). Yield of 50ET was equivalent to 75ET or 100ET which means that the supposedly deficit 50ET had not affected Egan's yield. The smaller amount of irrigation applied at each of the irrigation events must have improved the capture and storage of rainfall events occurred in between irrigation events. This strategy, however, can be adapted with care.

Protein responded with N applied until 200 lbs total N treatment. Egan has a high falling number and any effect by either irrigation or nitrogen is less of a concern. This one-year-only preliminary data suggests that for adjusted gross income, one should stay within 98-150 lbs total N/A and the conservative and risky 50ET irrigation application as long as it is done right.

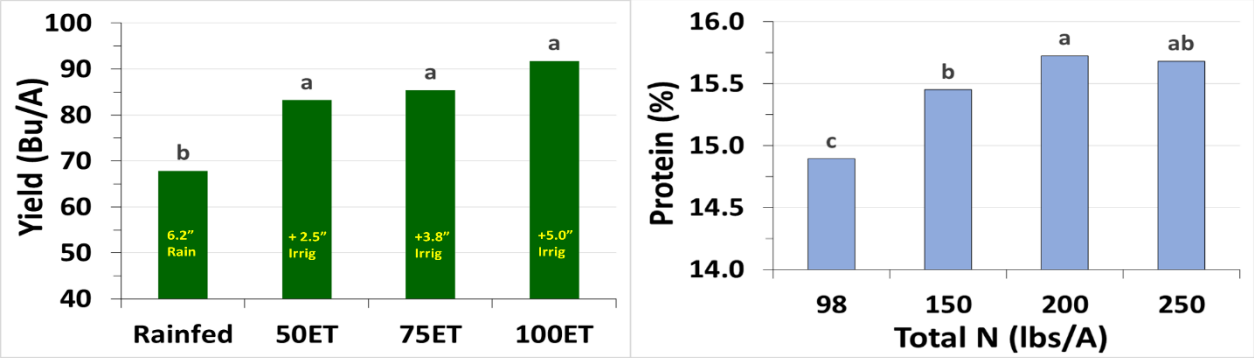

Figure 1. Yield response to water regimes (right) and protein response to total Nitrogen (left). Same letter assignment denotes nonsignificance at α = 0.05.

Table 2. Detailed data of the nitrogen and irrigation effects on Egan spring wheat agronomic performance

Total Nitrogen lbs/A	HT in	YLD bu/A	PRO %	TWT lb/bu	TKW g	FN sec
			Rainfed			
98	35.3	66.1	15.18	61.5	39.5	537.5
150	35.5	69.1	15.45	61.5	39.6	508.8
200	35.3	65.4	15.58	61.2	39.8	507.3
250	35.3	70.9	15.53	61.0	38.6	526.3
			Deficit Irrigation (50 ET)			
98	37.5	86.7	14.53	62.5	43.1	521.3
150	37.3	83.9	15.38	62.3	42.9	509.5
200	37.3	75.0	15.75	62.1	43.0	487.0
250	37.5	87.1	15.85	62.1	42.8	500.0
			Slightly Deficit Irrigation (75 ET)			
98	37.3	85.2	14.90	62.4	42.6	507.3
150	37.3	86.2	15.43	62.5	43.3	510.8
200	36.3	82.0	15.83	62.4	42.9	488.0
250	37.8	88.0	15.70	62.1	42.2	475.8
			Full Irrigation (100 ET)			
98	38.3	93.7	14.98	62.6	42.0	501.5
150	38.8	89.9	15.55	62.4	42.1	498.0
200	38.5	87.5	15.75	62.3	41.9	492.5
250	39.5	95.8	15.65	62.3	40.9	463.5
$Pr>F_{(0.05)-I}$	0.0302	0.0025	0.9621	0.0001	<.0001	0.0254
$Pr>F_{(0.05)-N}$	0.3963	0.2948	0.0001	0.0041	0.3817	0.0472
$Pr>F_{(0.05)-I\times N}$	0.6214	0.5526	0.0662	0.3801	0.9667	0.4698

HT: height, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number.