

Project Title: Evaluation of Yield and Protein of Soft White Spring Wheat Under Irrigated and Dryland Condition – 2017

Objective: To evaluate nitrogen use response of soft white spring wheat varieties on yield and quality

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#### Methods:

The experiment was conducted to determine the optimal nitrogen (N) requirement of four soft white spring wheat varieties (Alpowa, Alturas, Penewawa, and UI-Stone) under irrigated and dryland conditions. The unfertilized check treatment had 40 lbs total N per acre based on spring soil sampling and the fertilized treatments remained the same as 2016 experiment (138, 178, 218 and 258 lbs/A of total N). Urea (46-0-0) was used as N source and applied using a 20-foot boom fertilizer spreader. The fertilizer was mixed into the soil and culti-packed before planting. The dryland environment received 3 inches of rain, and the irrigated environment received an additional 6.6 inches of water. Other management information is presented in Table 1.

#### Summary:

In 2017, UI-Stone and Alturas had higher yields compared with Alpowa and Penewawa under irrigated condition (Table 2, Figure 1). UI-Stone consistently had the lowest protein content which is advantageous for this market class. Dryland environment resulted in lower yields compared to the irrigated, and no significant difference was observed between UI-Stone, Alturas, and Alpowa. Higher protein contents were observed in dryland conditions. For both environments, no increase in protein was observed after applying more than 138 lbs/A of N. Ideally, 8.5 to 10.5% protein is recommended. Therefore, there is an opportunity for reduction of N input for this market class regardless of environment. Alpowa consistently had the highest falling number (FN) across environments whereas Alturas consistently had the lowest FN. Nevertheless, none of them was lower than 300 seconds (Table 2), but we suspect that further lowering of FN in Alturas is expected during wet and cold August months.

In general, dryland environment had lower adjusted gross income compared to the irrigated. Year 2017 was a hot and drought year (Table 1). UI-Stone was the most profitable variety in both environments, but in dryland, it was not significantly different than Alturas and Alpowa (Figure 1). The N treatment did not affect yield and applying 138 lbs/A of nitrogen increased the protein content to a higher level than the industry requirement resulting in price discounts. Thus, further reduction of N lower than the 138 lbs/A guarantees better gross adjusted income (Figure 2).

Table 1. Agronomic management information

Soil Type: Flathead Fine Sandy Loam	Seed treatment: Cruiser Maxx Vibrance
Planted / Emerged: May 1 <sup>st</sup> / May 11 <sup>th</sup>	Applied herbicide @4-leaf: Huskie
Target plants: 25/ft <sup>2</sup>	Fungicide @ Flag leaf: Tilt
Total Water: 3 in (Rain) + 6.6 in (Irrigation)	Nutrient applied: K <sub>2</sub> O = 33 lbs/A (KCl)
Harvested: Aug 16 <sup>th</sup> and 17 <sup>th</sup>	P <sub>2</sub> O <sub>5</sub> = 84 lbs/A (MAP)

Table 2. Means of the respective varieties, nitrogen treatments, and environment

Variety	HT in		YLD bu/A		PRO %		FN sec		TWT lb/bu	
	Irr	Dry	Irr	Dry	Irr	Dry	Irr	Dry	Irr	Dry
<b>40 lbs/A Total Nitrogen (No added fertilizer)</b>										
Alpowa	64.9	68.7	88.7	70.1	10.0	11.4	376.75	405.5	62.6	60.0
Alturas	63.8	67.9	102.0	67.8	10.1	11.0	301.8	310.3	62.0	59.1
Penewawa	66.0	66.2	90.8	67.2	10.0	11.3	351.3	355.3	62.4	59.7
UI-Stone	64.7	67.6	101.1	76.3	9.6	11.3	315.0	374.3	62.1	60.4
<b>138 lbs/A Total Nitrogen</b>										
Alpowa	65.2	67.3	97.2	65.9	12.3	12.7	424.0	410.3	62.7	60.2
Alturas	67.2	66.0	108.7	66.2	11.5	12.3	315.3	317.8	62.5	59.8
Penewawa	67.0	64.5	95.8	58.3	12.6	12.7	376.0	357.0	62.5	59.3
UI-Stone	66.5	65.3	116.0	67.0	11.3	12.7	358.0	378.0	62.6	59.9
<b>178 lbs/A Total Nitrogen</b>										
Alpowa	66.6	67.7	89.5	67.4	12.7	12.5	417.0	408.0	62.6	60.5
Alturas	65.35	64.8	102.6	65.0	12.0	12.4	302.0	320.3	62.9	60.0
Penewawa	65.4	66.2	87.1	66.4	12.7	12.6	339.3	335.5	62.0	60.2
UI-Stone	64.6	96.1	101.4	68.1	11.5	12.8	343.8	375.5	62.8	60.2
<b>218 lbs/A Total Nitrogen</b>										
Alpowa	67.5	67.4	96.8	65.6	12.4	12.9	400.5	417.0	62.4	60.1
Alturas	66.6	68.5	104.1	70.4	11.7	12.5	303.3	333.0	62.7	59.7
Penewawa	65.7	67.4	93.1	65.4	12.8	13.0	347.0	357.0	62.3	59.2
UI-Stone	66.4	65.5	106.3	73.0	11.6	12.5	345.5	393.3	63.0	60.8
<b>258 lbs/A Total Nitrogen</b>										
Alpowa	64.3	66.3	90.2	67.1	12.7	12.9	379.0	401.0	62.5	60.1
Alturas	66.3	67.3	109.4	68.2	11.6	12.5	304.8	331.5	62.7	60.3
Penewawa	67.3	64.2	91.7	58.0	12.8	13.2	368.5	332.8	62.0	59.4
UI-Stone	63.8	65.4	107.6	68.1	11.6	13.1	331.8	360.5	63.0	60.1
PR>F <sub>(0.05)</sub> -N	0.4381		0.7169		<0.0001		0.2196		0.2613	
PR>F <sub>(0.05)</sub> -E	0.3527		0.0016		0.0029		0.2315		<0.0001	
PR>F <sub>(0.05)</sub> -N x E	0.3262		0.1134		0.0094		0.4437		0.734	

HT: Height, YLD: Yield, PRO: Protein, FN: Falling Numbers, TWT: Test Weight.

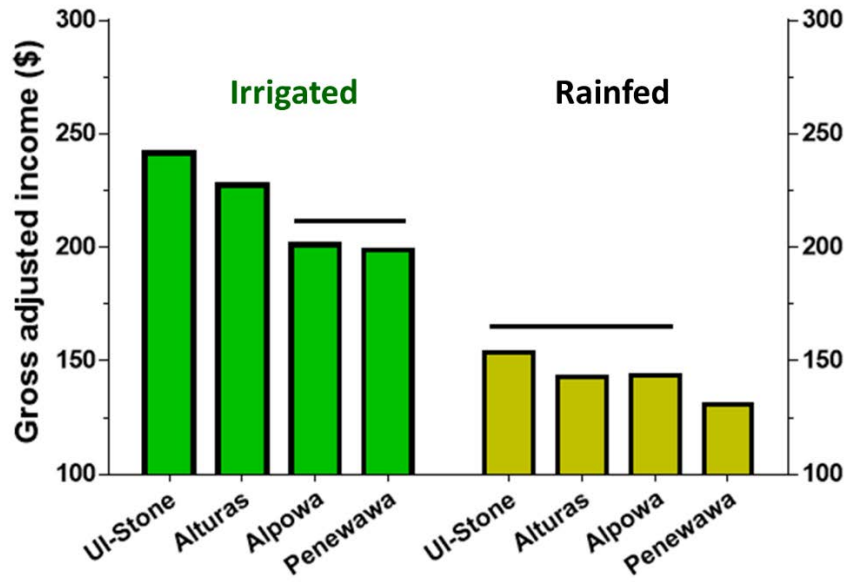


Figure 1. Adjusted gross income by variety. Lines on top of the bar charts indicate equivalency of the N treatments.

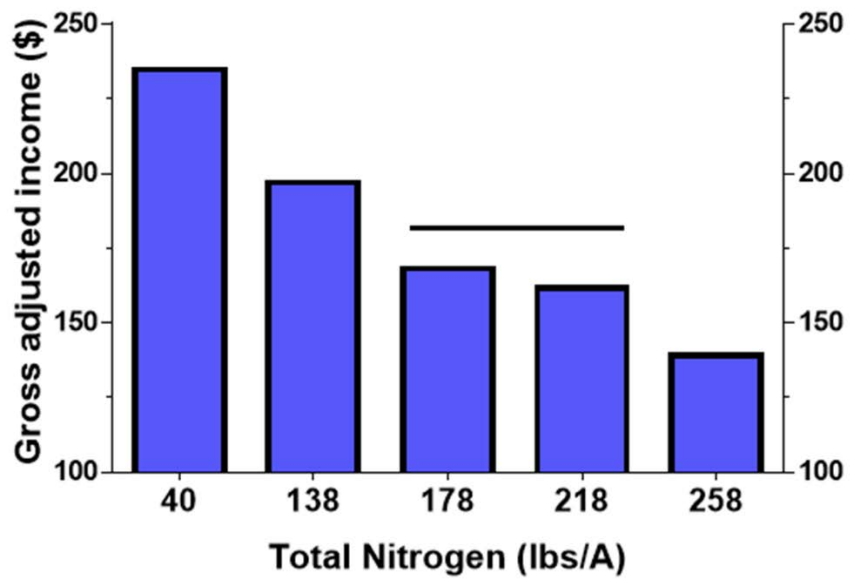


Figure 2. Adjusted gross income of applied additional N from the reference check 40 lbs/N. Lines on top of the bar charts indicate equivalency of the varieties.