Malt Barley Response to Nitrogen Rates Under Sprinkler Irrigation, Ric Rodriguez Farm, Heart Mountain 2007

Mike Killen, UW Powell Research and Extension Center;
Sandy Frost, UW Cooperative Extension, Park County

The University of Wyoming, Powell Research and Extension Center in cooperation with Ric Rodriguez Farms conducted a study designed to evaluate grain yield, protein and quality response of barley grown under sprinkler irrigation to different nitrogen application rates. With increased use of center pivot irrigation in the Big Horn Basin, growers are questioning accepted agronomic practices normally used in furrow irrigation systems. Several producers reported unacceptable protein levels in malt barley following sugar beets grown under sprinkler irrigation when following recommended nitrogen application rates for the area.

Materials and Methods

In 2007 a study was conducted on the Ric Rodriguez Farm located on Heart Mountain in Park County, Wyoming. The field had a cropping history of beets in 2006. On 13 March, plots were established 8 ft by 20 ft with four replications in a RCBD. Treatments were applied consisting of six nitrogen rates in increments of 25 lbs of Nitrogen per acre using urea (46-0-0) from 0 lb N to 125 lb N/acre. In addition, three treatments were applied with the addition of 50 lbs Phosphorus (11-52-0) per acre. The field was worked with a field cultivator, and harrowed the same day, and planted by the grower using the variety Coors Moravian 69. The grower followed his normal irrigation practices for the growing season. Plots were harvested using a Wintersteiger plot combine on 6 August. Samples of each plot were collected and sent to Coors for quality evaluation. Data were analyzed using SAS procedures for analysis of variance. The results are presented below.

Table 1. Malt barley response to nitrogen rates under sprinkler irrigation, Ric Rodriguez Farm, 2007.

Nitrogen Rate	Grain Yield	Protein	Lodge 1=upright 9=flat	Height	Plump	Test	Color
Lbs N/acre	bu/a	%	1-9	in	%	lb/bu	
0	112.5	8.09	1.0	20.9	97.0	47.8	49.8
25	134.9	8.14	1.0	24.7	95.4	48.2	49.0
50	152.5	8.45	1.5	26.3	95.4	48.0	49.2
75	164.3	8.7	2.3	28.1	95.2	48.1	50.2
100	164.6	9.4	2.3	29.6	94.8	47.8	50.0
125	167.9	9.9	4.3	29.7	95.9	47.6	49.8
Mean	**149**	**8.79**	**2.0**	**26.5**	**95.6**	**47.9**	**49.7**
LSD $_{0.05}$	**12.7**	**0.57**	**0.7**	**3.4**	**NS**	**NS**	**NS**
CV%	**5.6**	**4.2**	**21.1**	**1.07**	**1.6**	**1.5**	**1.3**

NS= Non significant (0.05)

Results and Discussion

A grain yield increase was observed with increasing nitrogen rates. A rate of 75 lbs N/acre produced 164 bu/acre. Additional Nitrogen over 75 lbs N/acre increased yields only marginally. Percent protein increased with additional Nitrogen up to 9.9% at 125 lbs N/acre. However, protein levels never exceeded levels unacceptable to malting companies. Barely height and lodging increased with increasing Nitrogen rates. The effect of Nitrogen rate on plump %, test weight or color was not statistically significant. No response was observed with an addition of 50 lbs Phosphorus/acre (data not presented).

No conclusions can be drawn on maximum Nitrogen rates in regards to achieving acceptable protein levels under sprinkler irrigation. The variety Moravian 69 is known for producing low protein barley as was the case in this study. The experiment should be repeated using a variety that tends to have higher protein levels.

Appreciation is extended to Ric Rodriguez for his cooperation and to Coors Brewing Company for processing the samples for quality.