

Effects of Sugarbeet Factory Spent Lime on Crop Production in a 4-Year Crop Rotation of Wheat, Sugarbeet, Barley, Potato, Wheat, and Sugarbeet.

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Introduction

Sidney Sugars contracts on average 30,000 acres of sugarbeets yearly. Each year there is approximately 16-18 thousand tons of spent lime produced as a by-product of the beet sugar purification process. There is approximately 75 years of the spent lime available at the Sidney Sugars facility. Is this a product that can be utilized to improve soil health, increase nutrients in the soil, and/or improve crop production? Research has been conducted in eastern ND and western MN demonstrating the benefits of lime on the soil and crop production. Some of the benefits reported from this work are long term control of Aphanomyces and addition of phosphorus and other micro nutrients. No negative responses from the lime were determined. How will this lime affect the sugarbeet production and how will other rotational crops be affected by the addition of lime to the soil? Will the results differ in western ND where the soil pH is upper 7 – low 8, compared to eastern ND and northwestern MN where pH is low 7.

Methods and Experimental Design

The study will be conducted at the Nesson Valley Irrigation Research Site (48°09'75" N, 103°06'32" W), approximately 28 miles east of Williston, ND. The soil type is a Lihen sandy loam (sandy, mixed, frigid Entic Haplustoll), consisting of very deep, somewhat excessively or well drained, nearly level soil that formed in sandy alluvium, glacio-fluvial, and eolian deposits in places over till or sedimentary bedrock (Soil Survey of Williams County, ND 1991).

The experimental design is a Randomized Complete Block Design (RCBD) with four replications. Each plot will be 25 ft. by 75 ft. with lime rates randomized for each plot. The treatments consist of six lime rates (0, 2.5, 5, 10, 15, 20) tons per acre applied only once for the duration of the project. Prior to lime application soil sampling was conducted on each plot. Analysis will include Nitrogen, Phosphorus, Potassium, Sodium, Calcium, Magnesium, Sulfur, EC, pH, and organic matter. Lime application occurred in spring 2016 for each plot at the treatment rate. Lime was incorporated using a mulcher prior to planting wheat.

Wheat was planted May 3 and after emergence plant growth observed to identify any differences between treatments. Plant heights prior to harvest and yields were measured from each plot and data statistically analyzed. Soil sampling occurred following harvest of each plot.

Year 1 Results

Effects of Spent Lime on durum wheat show no significant differences in yield between treatments (Table 1). Significant differences ($P < 0.05$) between protein and test weight were observed among treatments but the relationship between treatments does not reflect the addition of spent lime. Plant growth was not influenced by the addition of spent lime.

Soil samples had not been analyzed by time this report was prepared. When the results are received, the data will be analyzed to compare soil chemical properties on six treatments.

Table 1. Irrigated Durum			WREC - Nesson Valley 2016	
Treatment Spent Lime tons/a	Plant Height inch	Protein ¹ 2016 %	Test Weight lb/bu	Yield 2016 bu/a
0	39	16.4	56.3	66.1
2.5	39	16.4	56.9	64.2
5	39	16.1	57.1	64.8
10	39	16.5	56.5	63.4
15	39	16.2	57.4	67.3
20	39	16.6	56.8	63.0
Mean	39.0	16.4	56.8	64.8
C.V.%	-	1.5	0.6	8.4
LSD 5%	-	0.31	0.45	n.s.
Planted: 5/3/2016			Harvested: 8/16/2016	
Protein ¹ = reported on an as is moisture basis				