

Research into the Causes of Poor Sugarbeet Growth in Some Areas of the Red River Valley D.W. Franzen, M. Kahn, and D.H. Hopkins

Introduction

Areas of sugarbeets show poor growth and yield in certain areas of the Red River Valley. These areas tend to be on sandy, lower organic matter areas of fields, often on ridges or upland landscape positions. These areas raise relatively good yields of other rotational crops, including potato, corn, wheat and barley, but when seeded to sugarbeets, the areas have lower growth and yields (Figure 1.)

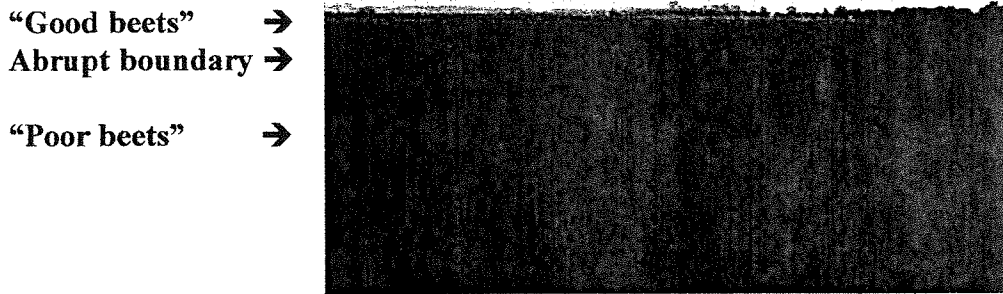


Figure 1. Poor sugarbeet growth in the field near Glyndon, MN.

Initial investigations indicated that in transects from “good” beets to “poor” beets, the most common trend between the two sites studied was soil and plant magnesium (Mg) content. Although one of the sites had high pH, the Mg content was relatively low. The other site had low pH (5.6-6.2), and also had relatively low Mg content in the soil and in the 6-leaf plants. A study was designed to determine whether Mg treatments from various sources, or other suspected or likely treatments would increase sugarbeet vigor and yield.



Figure 2. An abnormal beet.

Normal beets

Methods

Two sites, which were on companion fields to the 2000 transect research, were selected. One site was near Glyndon, MN and the other was near Galchutt, ND. Seven treatments were imposed in plots 10 feet wide and 20 feet long prior to seeding in early May. The treatments were: check, gypsum 200 lb/acre, potassium magnesium sulfate at 80 lb Mg rate and another treatment at 40 lb Mg rate, magnesium sulfate (20% Mg) at a 40 lb Mg rate, sugarbeet waste lime at 2,000 lb/acre and dolomite at 2,000 lb/acre. Each treatment was replicated four times. Following treatment application, the corners of the experiment were geo-referenced, and metal cans were buried about 10 inches deep at the four corners. Flags were removed to allow field work and seeding by the cooperators.

The sites were seeded in mid-May. Plant samples were taken at the 6-leaf stage on 6/18 at Glyndon, and at 6/19 at Galchutt. It was evident at that time that there were serious stand problems at Glyndon and severe root rot problems at Galchutt. It was determined at that time not to pursue some of the intense later plant and soil analysis that was originally planned in the project. Leaf samples were analyzed from each location, although the first replication at Glyndon was abandoned immediately due to lack of plants to constitute a sample.

At Glyndon, in order to salvage some information from the site, an additional study comparing with and without 10 lb Mg as magnesium sulfate foliar spray was applied July 6, when the beets were in the 8 leaf stage. There were four replications in a randomized complete block design. Plots were 10 feet wide by 20 feet long. Although there was some stand variation, the stand was generally better than the original experimental area.

Results-

Observations of the Galchutt site at the beginning of August revealed total collapse of the site. The area surrounding the experiment had been abandoned in mid-June and seeded to soybeans, which also died of natural causes soon afterwards. The Galchutt site was totally abandoned and was not harvested. Most plots contained no beets to harvest. Statistical analysis of the leaf tissue nutrient content and dry matter weights showed no differences between treatments. The root rot intensity and other underlying problems such as compaction streaks through plots were so severe that good data was impossible to obtain from this site.

At Glyndon, there were no differences in dry weight or nutrient analysis between the seven treatments. Stand differences overwhelmed any differences due to treatment if treatments had any effect. There were no differences in yield or sugar content to report at harvest. Only two reps contained enough beets to harvest. There simply wasn't enough good data at this site for differences to be noted.

The foliar treatment of 10 lb Mg/acre had no effect on yield or sugar content.

Summary-

Year 2001 was a disappointing year for this project. No conclusions could be drawn regarding any treatment. Next years study will incorporate both suspicions of remedies from both North Dakota and Minnesota work, focusing on lime/magnesium treatments and also starter P applications.

Methods to be utilized in 2002-

Three fields have been identified: Glyndon, MN, Galchutt, ND, and Larimore, ND. The linear feature to be studied was not present in these fields in the 2001 non-sugarbeet crop, but growers regularly do not see evidence of any abnormality in crops other than sugarbeet. A split-plot randomized complete block design with three replications will be used to study treatment differences. Treatments will be applied preplant. Treatments will be, check, 100 lb/a Mg as magnesium sulfate, 100 lb/a Mg as potassium magnesium sulfate, 50 lb/acre Mg as potassium magnesium sulfate, 2 ton/acre of dolomite limestone, 4 ton/acre of dolomite, 2 ton/acre of sugarbeet waste lime, and 2 lb/acre boron as 14% borate granules. One-half of each plot will be fertilized with 3 gal 10-34-0 per acre at seeding, with the seed. Plots will be seeded to the same variety at each location with seeding equipment and personnel from NDSU. Plots will be over-seeded and thinned to a uniform population. Plants at 6-leaf stage will be collected, weighed for dry matter content and analyzed for plant nutrients. Yield and quality will be taken at harvest.

Acknowledgements

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