

Impact of Defoliation Timing

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Introduction:

Throughout sugarbeet harvest in the Red River Valley of Minnesota and North Dakota, there are many periods of “start” and “stop”; as temperatures change, harvest delivery schedules must adjust so that sugarbeets are put into long-term storage piles in the best condition possible. However, the fluid nature of harvest can be hard to plan for. It has become common practice for some growers to defoliate large sections of a field, or even a whole field, regardless of whether harvest is ongoing. In some instances, these defoliated sugarbeets remain in the field for multiple days before being harvested. An experiment was designed to study what happens to the yield and quality of those sugarbeets as the interval from defoliation to harvest increases.

Objective:

- Determine the effect of early defoliation on sugarbeet quality and yield

Methods:

- Experiments were conducted near Foxhome (2021 & 2023) and Nashua, MN (2022)
- Randomized complete block design with six replicates, utilizing the two top-selling varieties
- Three row plots; 22-inch rows; plots were 5.5 ft wide by 25 ft long
- Plots were treated the same all season and were harvested on the same date, only difference was defoliation date
- Treatments were defoliated 7, 5, 3, and 1 day prior to harvest date, and defoliated and harvested same day
- Data were analyzed using ANOVA in ARM version 2024.4



Sugarbeet Leaves = Solar Panels
The longer the leaves are left on the sugarbeet, the longer they have to “charge up” the sugar content

Results:



Figure 1. Sugarbeets defoliated same day as harvested; photo taken on harvest date.



Figure 2. Sugarbeets defoliated 1 day prior to harvest; photo taken on harvest date.



Figure 3. Sugarbeets defoliated 3 days prior to harvest; photo taken on harvest date.



Figure 4. Sugarbeets defoliated 5 days prior to harvest; photo taken on harvest date.



Figure 5. Sugarbeets defoliated 7 days prior to harvest; photo taken on harvest date.

Results:

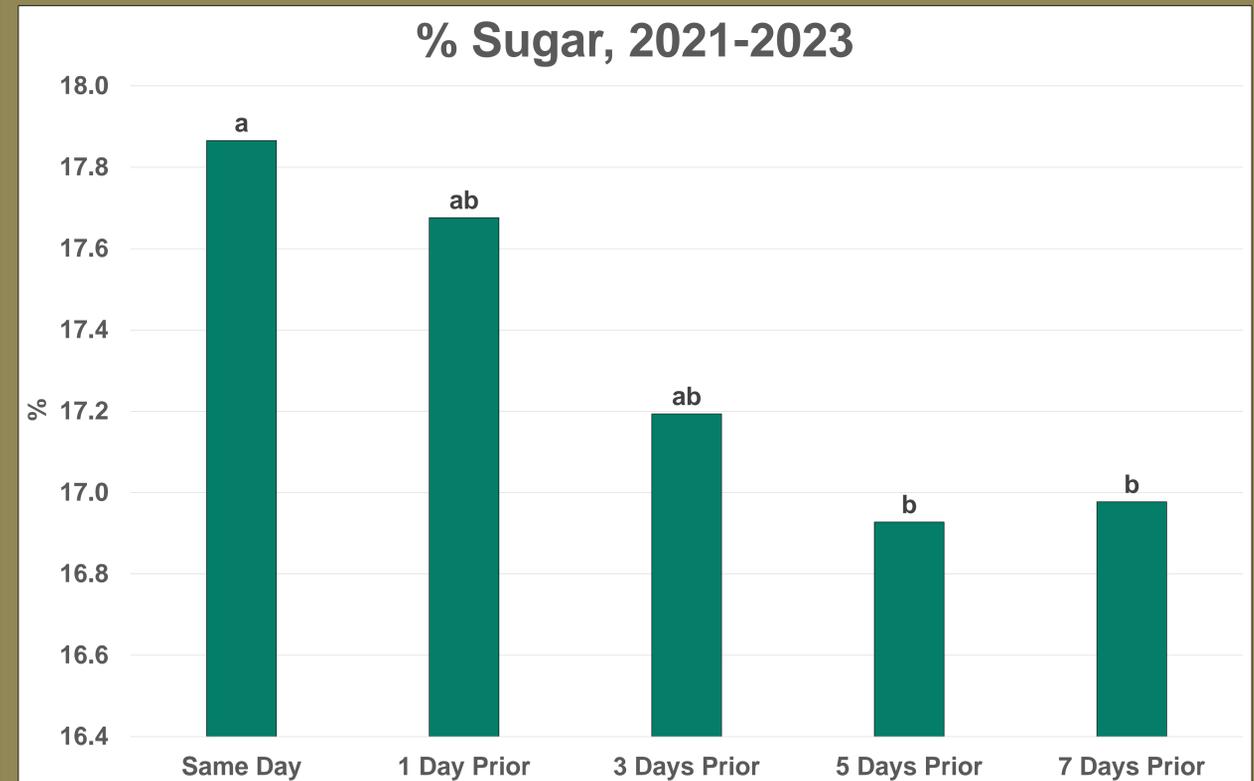


Figure 6. Impact of defoliation date and harvest date on % sugar. Means that do not share a letter are significantly different ($p = 0.10$).

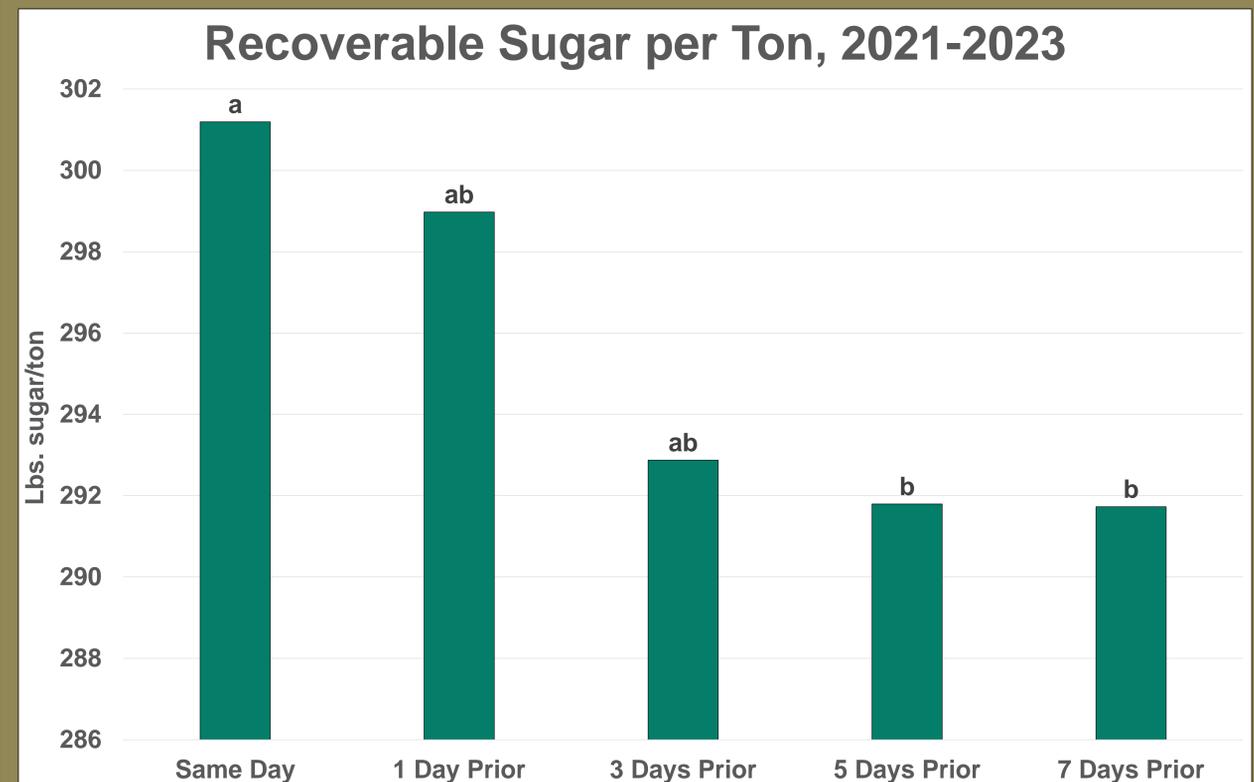


Figure 7. Impact of defoliation date and harvest date on pounds of recoverable sugar per ton of sugarbeets. Means that do not share a letter are significantly different ($p=0.10$).

Conclusion:

- More regrowth can be seen as the number of days defoliated ahead of the harvest date increases
- Regrowth comes at the expense of stored sugar in the root
 - Sugarbeet is tapping into its energy reserves (stored sugar) to regrow leaves
- Sugarbeet quality decreases as time between defoliation and harvest increases
- Decrease in % sugar of 0.2 just by defoliating one day prior to harvest
- Average reduction of 65 pounds of recoverable sugar per acre just by defoliating 24 hours ahead of the harvester
- Average loss in revenue of \$15/day for the first 5 days that sugarbeets were defoliated ahead of the harvest date
 - Almost \$2,325 per day across an entire quarter section
- A grower would break even paying the defoliator operator \$97/hour to defoliate directly in front of the harvester

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