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Finding the "sweet" spot: Nitrogen strategies for variable sugarbeet harvest timings.

Early sugarbeet (*Beta vulgaris L.*) harvest is a new challenge facing the Michigan sugarbeet industry. Due to sugar processing capacity limitations, earlier sugarbeet harvest is necessary to ensure beet processing is complete by mid- to late-March. Few data indicate how early or how late N can be applied and the subsequent effects on sugar quality. The objective of this field study was to evaluate the influence of harvest timing, planter-applied starter fertilizer, and in-season N fertilizer strategies on root yield, sugar quality, and in-season plant growth and development. Studies were arranged as a randomized complete block split-plot design with four replications. Main plots consisted of two harvest dates (early and conventional). Fertilizer strategy was the subplot factor and split into 1) two rates of starter N fertilizer (28-0-0) (0 and 60 lbs. N A) applied 2 inches to the side and 2 inches below the seed (2x2) at planting, and 2) seven sidedress (SD) in-season N fertilizer strategies. In-season N fertilizer strategies included: no N fertilizer application, 60 lbs. N band applied early June, 100 lbs. N A band applied early June, 60 lbs. N band applied early July, 100 lbs. N A band applied early July, 60 lbs. N band applied early August, and 100 lbs. N A band applied early August. In 2023, sugarbeet root yield and % sucrose were significantly impacted by harvest date with conventional harvest yielding +17.8 T/A and +4.3% greater sucrose compared to early harvest. For early harvest 2023, sidedress application timings had no impact on root yield where starter fertilizer was not applied. With starter fertilizer application during early harvest 2023, the low rate August SD and no SD treatments reduced root yield compared to remaining SD strategies. Starter decreased % sucrose -0.55 and -0.57% only for the June SD low and no SD treatments, respectively, during early harvest 2023. For conventional harvest 2023, an interaction between starter fertilizer and sidedress strategy occurred when starter was not applied. Due to starter fertilizer removing some yield variability, earlier N SD application resulted in greater root yield when starter was not applied. No interactions on % sucrose occurred for conventional harvest across fertilizer strategies. In 2024, early harvest root yield was greatest with June SD but no differences between low and high rates of June SD application. The June low SD rate yielded significantly greater than the low rates of July and August SD. Similarly, the June high SD rate yielded greater than the similar N SD rates applied in July and August. Results are not intended to highlight the downside or benefit from any single N management practice but rather to gather more data that will allow growers to remain flexible with N management strategies and allow growers to adjust in-season N practices based on variable harvest and climate scenarios.