

## Project Title: Sweet Corn Soil Nitrate Survey

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### Introduction

High fertilizer input costs have many growers re-evaluating their fertility rates, especially nitrogen. OMAFRA conducted on-farm sweet corn nitrogen response trials at 27 sites from 2003-2010. These studies found that the existing OMAFRA nitrogen fertilizer rate of 80 lb/acre was adequate for most mid-to-late season processing sweet corn crops. Early-planted crops grown on coarser textured soils may respond to higher levels of nitrogen fertilizer.

With nitrogen currently priced at \$1.47/lb (urea ammonium nitrate) the most economical rate of nitrogen drops to 50 lbs/acre, based on the 2003-2010 study data. Most sweet corn growers would be concerned that these rates are too low to support a high yielding crop.

The use of the pre-side dress nitrate test (PSNT) can be a valuable tool to help growers select the most economical rate of nitrogen while reducing the risk of under-applying and falling short of their yield goal. From an environmental perspective, it also reduces the likelihood of over-applying nitrogen fertilizers and risking losses through leaching or denitrification (production of greenhouse gasses).

Table 1. PSNT Rates based on the 2002-2010 Sweet Corn Nitrogen Study

Pre Side Dress Nitrate Test levels	Side Dress Nitrogen Rate
0-10 ppm	120 lbs/ac
11-20 ppm	80 lbs/ac
21-30 ppm	40 lbs/ac
> 30 ppm	no additional nitrogen required

Historically, sweet corn growers have been hesitant to use the PSNT to develop their fertility program. The test itself is labour intensive and many growers lack the experience and confidence to apply it across all their acreage. The 2023 survey provided the Ontario processing sweet corn industry with real-time information regarding soil nitrate levels across the growing region from mid-June through July. This will give growers an opportunity to fine-tune their application rates as well as an opportunity to gain more exposure and confidence in this technology.

### Methodology

Soil nitrate sampling was conducted at 28 grower sites in consultation with the field staff at Nortera. Sites were selected based on crop stage, geography and the growers intention to side-dress their nitrogen fertilizer. Pre-plant nitrogen rates at survey sites ranged from 0-118 lbs/acre. A preference was given to sites receiving less than 50 lbs/acre nitrogen in pre-plant plus planter applications, however due to a limited availability of potential sites, the survey was extended to include a wider range of rates.

Samples were taken at the 4-8 leaf stage of corn development over the course of 4-weeks. Sample breakdowns were as follows:

June 20, 2023 – 5 sites (Glanworth-Lambeth)

June 28, 2023 – 5 sites (Lambeth, Wheatly, Belmont)

July 10, 2023 – 8 sites (Strathroy, Dresden)

July 18, 2023 – 10 sites (St. Thomas, Glanworth, Chatham, Lambeth)

Samples were analyzed at Honeyland Ag Services in Ailsa Craig and the weekly results were communicated to the growers directly by Nortera and in the OMAFRA blog, ONvegetables.com

Post-harvest sampling was conducted at each survey site post-harvest to determine the amounts of residual nitrate left at the end of the season. Two sets of samples were taken at the 0-12" and 12-24" depths.

### **PSNT Results**

Late June PSNT levels were lower than expected. Likely due to the dry soil conditions throughout June. Almost all of the fields were at or below the 10 ppm baseline, indicating a strong response to side-dress nitrogen applications at that time. Based on the 2003-2010 study results, a side-dress nitrogen rate of 120 lbs/acre would have been recommended at 7/10 sites sampled in June. This is considerably higher than the standard OMAFRA rate of 80 lbs/acre.

For the July sampling dates, soil nitrate levels had increased and were generally in the 10-30 ppm range, indicating a moderate-to-low response to side-dress nitrogen at that time. See Table 1. *PSNT Rates based on the 2002-2010 Sweet Corn Nitrogen Study*, below. Over the course of the survey, there were no sites that exceeded the 30 ppm threshold at which there would be no expected response from additional fertilizer nitrogen.

See Figure 1, *Pre-Side Dress Nitrate Levels by Sampling Date*, below.

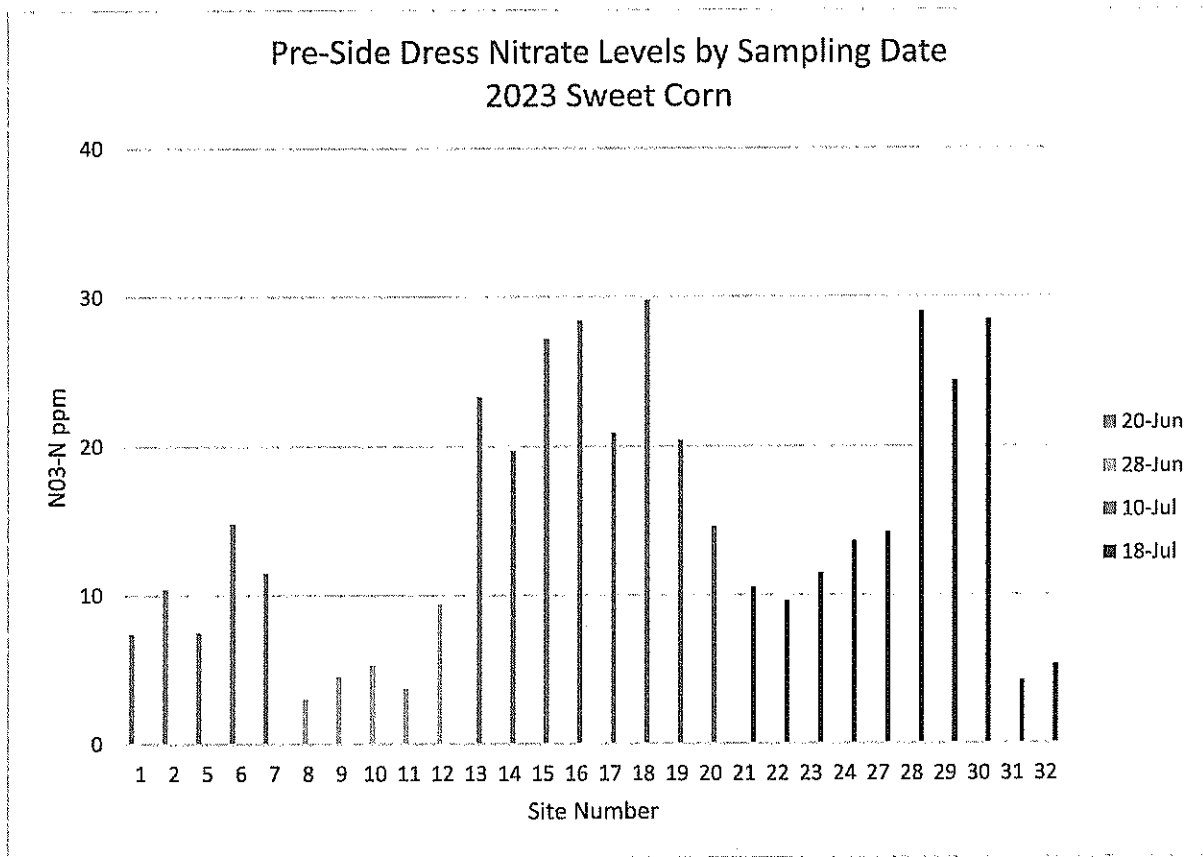
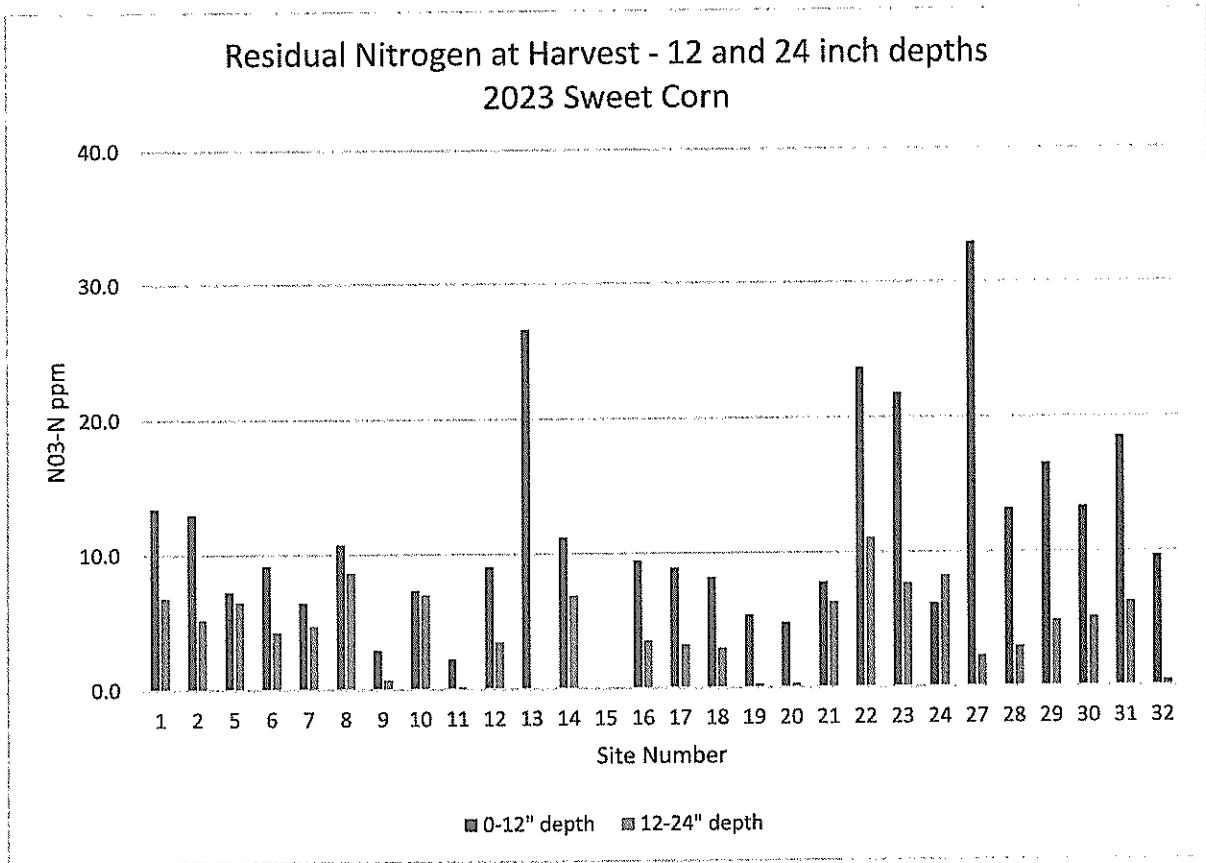


Figure 1, Pre-Side Dress Nitrate Levels by Sampling Date.

**Residual Soil Nitrate Levels**

Nitrate-nitrogen levels at harvest can be used as an indicator of the amount of nitrogen “left over” in the soil after crop removal. Low levels of nitrates in the fall are desirable to minimize losses due to leaching. Management practices such as cover crops may also help to reduce the potential for nitrate losses.

The residual soil nitrate data collected in this survey will be further evaluated as grower agronomic information on fertilizer rates and field yields becomes available.



**Benefits/Outcome**

It is hoped that this survey and its results will help to increase the awareness of the PSNT as a tool for sweet corn nitrogen management across the processing sweet corn grower base allowing growers to become more comfortable with adjusting their soil nitrogen fertility program based on in-season trends and soil test information.

The 2023 Soil Nitrate Survey was being conducted by OMAFRA staff Elaine Roddy, Danny Jeffries and Colin Elgie with the support of Dan Oliver (Nortera). This project was funded by the Ontario Processing Vegetable Growers.