



# Nitrogen Management for Corn: Pre-Sidedress Soil Nitrate Test (PSNT)



## GHG Taking Charge Team Factsheet

The Pre-sidedress Soil Nitrate Test (PSNT) can be used to improve fertilizer nitrogen recommendations for silage or grain corn production. The factsheet Nitrogen Management for Corn: General Fertilizer Recommendations can be used to estimate the corn fertilizer nitrogen requirement using average values for manure, crop and soil nitrogen credits. However, the actual nitrogen benefits from these sources can vary from field-to-field and year-to-year. The PSNT uses a soil sample taken when the corn is at the six-leaf stage (about 8 to 10" high) to decide how much sidedress nitrogen fertilizer to apply on an individual field. This factsheet outlines preliminary recommendations for fertilizer nitrogen management for corn based on the PSNT.

### Why good nitrogen management?

Sound nitrogen management makes good economic and environmental sense. Good nitrogen management allows manure and fertilizer nitrogen applications to be tailored to meet the nitrogen requirement of the crop. As a result, fertilizer nitrogen input costs are minimized with no loss in yield. In addition, proper nitrogen management reduces the risk of nitrate leaching to groundwater, and reduces the risk of nitrous oxide emissions, a greenhouse gas.

### How does the PSNT work?

The main sources of the plant available nitrogen for a corn crop include fertilizer, manure, mineralization, and carry-over of nitrogen from the previous growing season. Mineralization is the release of nitrogen from the soil organic matter and crop residues through soil microbial activity. The PSNT takes some of the guesswork out of making fertilizer nitrogen recommendations by providing better estimates of the plant available nitrogen supplied by manure, mineralization and carry-over of nitrogen from the previous growing season.

A soil sample is taken at the corn six-leaf stage, just prior to the period of rapid corn growth and nitrogen uptake, and tested for nitrate concentration. Corn nitrogen uptake is small until this time. A low

rate of nitrogen (20 to 30 kg N/ha) applied with the planter plus soil mineralization will supply sufficient nitrogen to meet the crop nitrogen requirement until this time. A sidedress application of fertilizer nitrogen is then chosen based on the PSNT.

### How should I use the PSNT?

To get the most out of the PSNT, it should be used as part of a nitrogen management system with the following steps:

- ✓ Manage manure according to the environmental guidelines.
- ✓ Do not apply a pre-plant broadcast of nitrogen. The corn does not require nitrogen early in the growing season. The fertilizer application may also interfere with the test result.



*The PSNT test is taken when the corn plant is at the six-leaf stage, or approximately 8 to 10" high*

- ✓ Apply a low rate of nitrogen (20 to 30 kg N/ha) banded with the planter. Nitrogen banded by the planter is not measured by the PSNT.
- ✓ Use the PSNT to decide how much, if any, fertilizer nitrogen to apply at sidedress.

*Cautionary Note: Nitrogen mineralization is delayed in soils that experience flooding conditions or are unusually cool and wet in spring. These soils have been found to have lower than expected PSNT values, and the rate of fertilizer nitrogen required at sidedress may be overestimated.*

### How do I soil sample for the PSNT?

- ✓ Sample to 30 cm (1 ft) depth midway between corn rows to avoid fertilizer banded with the planter.
- ✓ Take more than 10 soil cores per field when the corn is at the six-leaf stage (approximately 8 to 10" tall).
- ✓ Keep the sample cool until it reaches the lab - a picnic cooler is a handy way to do this. The sample can also be frozen. If stored warm, nitrate concentration in the sample will increase and give a fertilizer nitrogen recommendation which is lower than required. Have the sample analysed for nitrate-N concentration in ppm.

### How do I use the PSNT to decide how much nitrogen fertilizer to apply?

- ✓ No yield response to sidedress nitrogen application is expected for corn fields that have a PSNT value greater than 25 ppm.
- ✓ For PSNT test values less than 25 ppm, use Table 1 to decide how much fertilizer nitrogen to apply at sidedress.

**Table 1. Sidedress fertilizer nitrogen recommendations based on the PSNT.**

PSNT test value (ppm)	Sidedress N rate (kg N/ha)
25 or higher	0
20 - 24	30
15 - 19	60
10 - 14	90
less than 10	120

- ✓ No test is perfect, and the PSNT is no exception. The recommendations should make sense given the manure and cropping history, the soil texture and organic matter content, and the spring conditions.

*Cautionary Note: The PSNT recommendations in Table 1 are preliminary recommendations based on information adapted from regions with similar soil and climatic conditions and based on some local field testing.*

### Contacts:

For further information on the PSNT or on the general fertilizer nitrogen recommendations for corn, contact your local Crop Development Officer (1-888-NBAGRIC or 1-888-622-4742) or Nutrient Management Specialist (506-453-2109) with the New Brunswick Department of Agriculture, Fisheries, and Aquaculture at 1-888-NBAGRIC (1-888-622-4742) or contact your Agri-Environmental Club Coordinator.

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