

Understanding the Tissue Analysis Report



Tissue testing can be a valuable tool for diagnosing nutritional deficiencies in crops. Plants need certain nutrients in large amounts (macronutrients) and other nutrients in smaller amounts (micronutrients or trace elements). By combining tissue test results with soil tests, you will have good information for effective crop management.

Tissue test results show the nutrient concentration in plant tissue at the time of sampling. It's important to sample plants at the right growth stage and plant part. Refer to the fact sheet [How to Take a Plant Tissue Test](#), which describes tissue sampling techniques.

The [Fruit Crop Tissue Sampling Guide](#), [Vegetable Crop Tissue Sampling](#) and [Field Crop Tissue Sampling Guide](#) explain when to sample each crop and how much tissue is needed for each sample. It also has crop sufficiency charts that show the crop's sufficient nutrient levels. You can compare your test results to the appropriate crop sufficiency chart to find out if your crop is taking up enough nutrients.

Crop sufficiency charts give a range of nutrient levels for good plant growth. Values above the range won't likely increase crop growth and could even be toxic to the crop. If tests show results that are below the range, it can help you to identify a nutrient deficiency that isn't yet visible in the plant. Often, by the time symptoms of nutrient deficiency become visible, the quality and yield might already have been affected.

The tissue test is divided into two main sections, as shown on the sample [Tissue Analysis Report](#). These are

- information on client and sample identification
- results of the tissue test

Client and sample identification

Client number

This is assigned to the producer the first time samples are taken to Laboratory Services. The client number remains the same for future samples.

Accession number

This is the unique identifier assigned by Laboratory Services to a single sample or a set of samples.

Samples reported

This is the date Laboratory Services produced the soil test report.

Samples received

This is the date Laboratory Services receives the samples for analysis.

Lab number

This is assigned by Laboratory Services to an individual sample for tracking and keeping records.

Crop Type

This identifies the type of crop that was sampled.

Sample ID

This is assigned to the sample by the client. It's often a name or a number.

Tissue Test Results

N – nitrogen (%)

Test results show the percentage of total nitrogen in the tissue sample. Nitrogen is the first of three primary macronutrients, which are required in large amounts.

NOTE

N deficiency symptoms

- *Short stems*
- *Light green-yellow leaves*
- *Plant weakness*

Nitrogen facts

- Nitrogen is critical for seed-forming processes, seedling strength, and plant growth.
- It's used to produce many organic molecules such as proteins.
- It has a major effect on crop yield and quality.

P₂O₅ – phosphorus (%)

Test results show the percentage of phosphorus concentrated in the tissue sample. Phosphorus is the second of the three primary macronutrients, which are required in large amounts.

NOTE

P deficiency symptoms

- *Dark green leaves*
- *Red and/or purple coloring*
- *Stunted growth*
- *Reduction in flower and seed production*
- *Delayed maturity*

Phosphorus facts

- Phosphorus is important for seed germination and root development. Fields with low phosphorus levels may not have well-developed root systems, leading to heavily-stressed plants during droughts. These fields will require re-seeding more often.
- It's important for vegetable, fruit, and grain maturity and quality.
- It improves nitrogen absorption by the crop.
- It takes 3.5 kg of phosphorus to change the soil test level by 1 kg/ha, either by adding nutrients or by crops absorbing the nutrients.

K₂O – potassium (%)

Test results show the percentage of potassium in the plant tissue sample. Potassium is the third of the three primary macronutrients, which are required in large amounts.

NOTE

K deficiency symptoms

- *Dead tissue at leaf tip*
- *Dead tissue between veins*
- *Increased disease problems*
- *Yellowing around the leaf margin*

Potassium facts

- Potassium is important for growth, longevity and over-wintering ability of perennial crops.
- Potassium is important for legumes. Nodules on legume roots are filled with bacteria that fix, or convert, nitrogen into a form that's usable by the plant. When legumes are grown on low-potassium soils, the bacteria can't fix as much nitrogen for the plant.
- Potassium is important for disease resistance and affects the taste and color of fruit and vegetables.
- Levels of potassium in soil can decrease much more quickly than levels of phosphorus because crops remove significantly more potassium during harvest.
- It takes 4.0 kg of potassium to change the soil test level by 1 kg/ha, either by adding nutrients or by crops absorbing the nutrients.

Ca – calcium (%)

Test results show the percentage of calcium in the plant tissue sample. Calcium is a secondary nutrient and is taken up by the crop in amounts similar to phosphorus.

NOTE

Ca deficiency symptoms

- *Leaf tips dying back (tip burn)*
- *Deformed or dying terminal buds*
- *Bitter pit, hollow heart and blossom end rot*

Calcium facts

- Calcium is important for cell nutrition.
- It helps plants respond better to environmental and disease stresses.
- It improves plant absorption of other nutrients.

Mg – magnesium (%)

Test results show the percentage of magnesium concentrated in the plant tissue sample. Magnesium is a secondary macronutrient.

Soils in Nova Scotia typically have medium to high levels of magnesium.

NOTE

Mg deficiency symptoms

- *Cupped leaf tips and margins*
- *Yellow dying leaves turning red*
- *Chain-like yellow streaking*
- *Stunting*

Magnesium facts

- Magnesium is important for plant photosynthesis.
- It helps legume nodules fix nitrogen.
- It helps move phosphorus within the plant.
- It helps prevent livestock disorders such as grass tetany and milk fever in cattle.

Fe – iron (ppm)

Test results show the amount of iron in the plant tissue sample. Iron is a micronutrient.

Iron levels are usually adequate in the soil even though it has low crop availability.

NOTE

Fe deficiency symptoms

- *Short and weak stems*
- *Young leaves are yellow with green veins*

Iron facts

- Iron is important for crops that prefer acid soils such as blueberries, strawberries, grain, soybeans, and cole crops such as cabbage and broccoli.
- It's an important part of nitrogen-fixing in legume crops.

Mn – manganese (ppm)

Test results show the amount of manganese in the plant tissue sample. Manganese is a micronutrient. It's naturally high in Maritime acidic podzol soils. The amount available to plants can be reduced by high organic matter and pH levels.

NOTE

Mn deficiency symptoms

- *Dead spots covering the leaf*
- *Small green veins*
- *Leaves may turn yellow, red or purple*

Manganese facts

- Manganese increases seed germination rates and reduces time to harvest because it increases phosphorus and calcium availability to the crop.
- A manganese deficiency can be a problem for soybeans if the field has high pH, heavy clays in the soil and low Mn levels.
- Crops that have a high response to manganese are beans, cereals, soybeans, and vegetables.

Cu – copper (ppm)

Test results show the amount of copper in the plant tissue sample. Copper is a micronutrient.

Copper is an important nutrient for all animals except sheep, where it is toxic even at low levels. Copper levels are usually lower in soils that are sandy or have low organic matter.

NOTE

Cu deficiency symptoms

- *Spotty white areas on the leaves*
- *Young wilted leaves*
- *Leaves may spiral and bend over at right angles*

Copper facts

- High pH levels and high levels of phosphorus, zinc, and iron will decrease copper uptake in plants.
- Crops that respond highly to copper are alfalfa, grain, lettuce, onions, beets, spinach, blueberries, watermelons, and tomatoes.
- Some animal manures have high levels of copper from copper foot baths.
- Toxic affects from applying too much copper can last for years.

Zn – zinc (ppm)

Test results show the amount of zinc in the plant tissue sample. Zinc is a micronutrient. Zinc is important for root development. It can be tied up and unavailable to the crop when soil levels of phosphorus are over 1000 kg/ha.

NOTE

Zn deficiency symptoms

- *Dead spots on older leaves*
- *Thick leaves and short stalks*
- *Yellow streaks on either side of the mid-rib*
- *Leaves can look bleached*

Zinc facts

- Zinc affects the rate of maturation of both seed and stalks.
- Crops that respond highly to zinc are corn, beans, onions, and spinach.

B – boron (ppm)

Test results show the amount of boron in the plant tissue sample. Boron is a micronutrient.

In sensitive crops, boron is important in reducing nutritional disorders that affect marketability. Boron moves easily in the soil (leaches) so fields with low boron levels should receive annual applications when growing sensitive crops. Most fields in Nova Scotia have low levels of boron.

NOTE

B deficiency symptoms

- *Cracked and spotted fruit*
- *Hollow heart, bitter pit*
- *Short stalks and notes*
- *Decrease in number of flowers*
- *Stunting*

Boron facts

- Plant tissue tests can show boron levels better than a soil test.
- Boron is most available to crops when soil has a pH of 5 to 7.
- If levels are too low, below 0.5 ppm, sensitive crops should respond if you apply 1.1 to 2.2 kg/ha.
- Vegetables are sensitive to boron, especially root and cole crops. At levels below 0.7, many vegetables need between 1.1 to 3.3 kg/ha of boron.
- Alfalfa grows and survives longer with higher levels between 1-3 ppm.
- Clovers grow best between 0.5-2.0 ppm.
- Grain, corn, and grass grow best between 0.5-1.5 ppm.
- **Boron is toxic to peas, beans and cucumbers.**

Na – sodium (%)

Test results show the amount of sodium concentrated in the plant tissue sample. Sodium is a micronutrient, or trace element.

Sodium facts

Sodium isn't an important plant nutrient but it's still used by plants in small amounts.