



LAQUA

HORIBA



NITRATE & POTASSIUM SPOTLIGHT WHITE CABBAGE

White cabbage is a high-demand leafy crop that requires balanced nitrate (NO_3^-) and potassium (K^+) nutrition for optimal yield, quality, and storability. Real-time measurement of these nutrients in fresh plant sap provides immediate insights into nutrient uptake and plant health—allowing for in-season fertilization adjustments and better crop management.

Nitrate Spotlight

Role of Nitrate in Cabbage Production

- Supports leaf expansion, protein synthesis, and chlorophyll formation.
- Promotes vigorous vegetative growth needed for large, dense heads.
- Deficiency results in stunted growth, yellowing leaves, and poor head development.

Causes of Nitrate Deficiency

1. Leaching from heavy rainfall or irrigation—common in sandy soils.
2. Inadequate nitrogen applications or poor timing.
3. Cold soil temperatures slowing nitrification.
4. Imbalanced soil pH, reducing nitrogen uptake efficiency.
5. High crop nitrogen demand, especially in rapid growth stages.

Potassium Spotlight

Role of Potassium in Cabbage Production

- Enhances cell turgor, keeping leaves firm and crisp.
- Regulates water balance and stomatal function.
- Improves stress tolerance, disease resistance, and post-harvest quality.

Causes of Potassium Deficiency

1. Low soil K reserves or leaching.
2. Competition with calcium or magnesium affecting uptake.
3. Inadequate in-season potassium supply.
4. High nitrogen-to-potassium imbalance

Sap analysis using the LAQUAtwin ion meters:

A Practical Tool for In-Field Nutrient Diagnosis.

Modern crop management relies on real-time insights to guide nutrient strategies throughout the growing season. Traditional laboratory testing, while accurate, often takes several days to deliver results—limiting a grower's ability to make timely adjustments. The HORIBA LAQUAtwin Nitrate ($\text{NO}_3\text{-11}$) and Potassium (K-11) Ion Meters provide a rapid, on-site alternative, enabling cabbage growers to check the nutrient uptake status of their plants in minutes, directly in the field, greenhouse, or packing shed.

Why Measure Sap Nutrients?

Nutrient levels in fresh plant sap reflect what the plant is actually absorbing and transporting, offering a more accurate picture of nutrient uptake compared to soil-only tests. This method helps detect hidden deficiencies before visible symptoms appear and supports precision management throughout the crop cycle.

Measurement in Fresh Plant Sap Using LAQUATwin Meters

The LAQUATwin Nitrate and Potassium Ion Meters allow for fast, accurate nutrient checks using just a few drops of cabbage leaf sap.

Sampling & Measurement Protocol

1. Collect leaf samples

- Select 20–30 mature outer leaves from randomly selected plants across the field. This ensures that the results are representative of the entire crop.
- Avoid damaged or discolored leaves.

2. Extract sap

- Roll the leaves and place them in a garlic press or manual sap extractor.
- Squeeze enough sap to apply several drops on the sensor.

3. Calibrate your meter

- Before measuring, calibrate the meter using the 150 ppm and 2000 ppm standard solutions provided in the kit. Follow the manufacturer’s instructions for best accuracy.

4. Measurement

- Apply sap drops to fully cover the sensor on the LAQUATwin meter.
- Wait for the stabilization indicator before recording the reading, displayed in ppm NO_3^- (nitrate) or $\text{NO}_3\text{-N}$ (nitrate-nitrogen) and ppm K^+ (potassium ion).

5. Clean the sensor

- After each measurement, rinse the sensor with clean water and gently blot dry to prevent contamination between samples.

6. Repeat and Record

- Conduct 2–3 additional measurements using different leaf samples to confirm consistency.
- Log all readings with date, time, and growth stage for future comparison.

Note: Avoid direct sunlight or high heat. Bring samples indoors and allow them to reach room temperature before testing to avoid measurement drift.

Interpreting SAP results for Cabbage

It’s essential to interpret readings based on the **growth stage** and **target ranges**. For cabbage, nutrient requirements **shift as the crop matures**, typically declining toward harvest as the plant transitions from leaf expansion to head filling.

Growth stage	Nitrate-N ($\text{NO}_3^- \text{ N}$) ppm	Potassium (K^+) ppm
Early leaf expansion	800-1200	2500-3500
Head initiation (cupping)	600-900	3000-4000
Head filling & Maturation	400-700	3500-4500

Note: Local conditions, varieties, and market requirements may influence these targets. Consult with agronomists or extension services for region-specific recommendations.

Best practices for Nitrate and Potassium Management in white Cabbage

Split Fertilizer Applications: Apply nitrogen and potassium in multiple stages based on sap data and crop demand.

Soil Health Management: Integrate organic matter and cover crops to improve nutrient cycling and soil structure.

Water Management: Prevent nutrient leaching by managing irrigation schedules based on soil type and weather conditions.

Regular Sap Monitoring: Check nutrient levels weekly or bi-weekly to stay ahead of nutrient imbalances.

Complement with Soil and Tissue Tests: Use sap analysis alongside traditional lab tests for a comprehensive nutrient management plan.

