

Guide to

Plant Sap Analysis



Advancing Eco Agriculture

Helping growers make more money with regenerative agriculture since 2006.

Element		Current Value	Good		
Total Sugars	%	1.1	3.6 - 4.9	1	
	%	1.5			
pH	NA	6.2	6.2 - 6.6	1	
	NA	6.5			
EC	mS/cm	15.3	10.1 - 11.6	1	
	mS/cm	16.0			
Potassium	ppm	9925	5505 - 6713	1	
	ppm	11454			
Calcium	ppm	872	1322 - 2298	1	
	ppm	738			
Magnesium	ppm	1343	768 - 1269	1	
	ppm	1236			
Sodium	ppm	4	10 - 18	1	
	ppm	8			
Ammonium	ppm	198	10 - 30	1	
	ppm	151			
Nitrate	ppm	32	10 - 30	1	
	ppm	27			
N in Nitrate	ppm	7	4 - 6	1	
	ppm	6			
Total Nitrogen	ppm	1454	426 - 570	1	
	ppm	1056			
Chloride	ppm	97	158 - 222	1	
	ppm	191			
Sulfur	ppm	131	116 - 163	1	
	ppm	147			
Phosphorus	ppm	848	413 - 536	1	
	ppm	990			
Silica	ppm	16.8	24.7 - 48.5	1	
	ppm	29.6			
Iron	ppm	3.16	10.49 - 19.19	1	
	ppm	7.27			
Manganese	ppm	20.30	24.99 - 46.99	1	
	ppm	20.38			
Zinc	ppm	7.08	6.79 - 17.93	1	
	ppm	2.39			
Boron	ppm	5.40	12.64 - 18.2	1	
	ppm	8.48			
Copper	ppm	1.45	3.95 - 8.47	1	
	ppm	1.17			
Molybdenum	ppm	0.05	1.57 - 3.38	1	
	ppm	0.06			
Cobalt	ppm	0.05	0.83 - 1.93	1	
	ppm	0.07			
Aluminium	ppm	1.40	1.92 - 3.7	1	
	ppm	3.31			

This example demonstrates the data from sap analysis with young leaves shown as light green bars and old leaves shown as dark green bars. Sap analysis allows you to track data over multiple sap tests over time.

Plant Sap Analysis

The Key to Unlocking Plant Nutrition

Advancing Eco Agriculture leads in plant sap analysis data interpretation.

In 2014, John Kempf and the AEA team endeavored to make Plant Sap Analysis technology available to growers in the US. Our growers have been working smarter with sap data ever since. Whether you are continuing a multi-year history of sampling on commodity crops or looking for a partner to plan an intensive sampling protocol on specialty crops, we are ready to share our insight.

AEA provides the most experience and proficiency in:

- Designing sample collection protocols
- Interpreting results
- Aligning test results to real-world outcomes

Sap analysis data indicates the current nutrient levels in a crop at the time of sampling. This testing exposes nutrient excesses and deficiencies before symptoms can be observed in the field, allowing for proactive nutrition management that reduces pest and disease pressure and maximizes quality.

In this way, we are able to proactively address pathogens, diseases, and other challenges as your plants progress through life cycle phases. In this guide, we've outlined the steps involved to carry out successful sap analysis.

Your AEA consultant will guide you to the most suitable sap lab partner based on parameters such as your location and crops. We can also answer questions about the timing and number of samples to consider. There are specific protocols for collection, labeling, and shipping sap samples.

COLLECT LEAF SAMPLES



Always refer to the specific instructions from your selected lab. Before collecting any samples, ensure all bags, labels, and shipping materials, etc., are on hand.

Common Guidelines for the Collection of Leaves for Sap Analysis:

- Avoid collecting samples within 2 days after any foliar applications to reduce the chance of false readings due to leaf residue.
 - Collect leaf material for sampling before 9 am. This is when the sap is equally distributed between the xylem and the phloem, and when the test will yield the most accurate results.
 - Collect 100 grams of leaves, or about a quart-sized bag, of young leaves. Repeat with old leaves, keeping them separate from the young leaves. Remove the petiole (leaf stem) and other non-leaf plant material.
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- 1 Ensure labels are accurate with your name/farm name, date of collection, crop, cultivar, location, and any other required information. Pest and disease information cannot be put on the label.
- 2 Collect samples, placing young and old leaves into their corresponding bags.
- 3 Dry the leaf samples. If leaves are wet from dew, rain, or irrigation, they must be dried before shipping. You may dry leaves at a later time, rather than while sampling in the field. One method of drying leaves is to spread collected material in a single layer with towels above and below. Very gently press to collect moisture without damaging leaves. Avoid creasing, crushing, or bruising the leaves. Samples do not have to be 100% dry, but remove as much water as possible. Leaf quality degrades quickly when samples are wet and this reduces the accuracy of the data.
- 4 Affix labels to outside of each sample bag. Ensure labels remain clean, dry, and legible.
- 5 Gently press excess air from bags and seal.
- 6 Place samples in cooler or refrigerator until shipment.

Collection Guidelines

In these illustrations, old leaf samples are shown in dark green and young leaf samples in light green. Notice how the old leaf samples are not necessarily the very oldest leaves at the bottom of the plant or branch. These leaves may be too dry or senesced, so it is better to pull the oldest fully functioning, healthy, green leaves for old leaf samples.

The young leaf samples should be taken directly below new, unfurling leaves, about 3-4 leaves back from the growing point. The newest leaves do not carry out full photosynthesis, therefore they do not provide accurate results in the sap analysis.

Do not include the leaf stem, or petiole, that is attached to the base of the leaf, as that will produce inaccurate data and may invalidate your sample such that no results will be provided.

Pro Tip: Photograph filled and labeled bags in the field with the sampled crop visible in the background. Take additional photos to correlate with specific issues, and save for your personal reference.

Collection of Old vs. Young Leaves



Tree Fruit



Annual Vining Crops



Grass and Forage Crops



Berry and Perennial Crops



Annual Vegetable Crops



Annual Grain Crops



Old Leaves



Young Leaves

SHIP LEAF SAMPLES



BEFORE starting leaf collection, contact your selected shipper (FedEx, UPS, etc.) to ensure prompt delivery for optimal sample integrity for best results. Overnight shipping is ideal. Second-day delivery is adequate. Avoid three-plus day shipping times.

Some labs have specific timelines for receiving samples. Check with your provider for more details.

Shipping Guidelines

- Samples must remain cool, but not frozen, before and during shipping to keep leaves in best condition.
- Commercial, sealed, freeze-packs are the only acceptable option for inclusion in the package. **Do NOT use bags of ice or other frozen items as they may damage shipping boxes and ruin samples. Wet boxes are routinely rejected.**
- When using freeze-packs, wrap samples in bubble wrap or multiple layers of plastic bags to prevent contact with leaf material and labels. This prevents smearing of label ink and tissue damage to the sample.
- If sample has less than one day in transit, and/or the temperatures along the shipping route will be cool, you may choose, at your discretion and risk, to ship without freeze-packs.
- Pack samples in a sturdy box (do not use soft-sided or padded envelopes) that fits all materials snugly, without cramming.

INTERPRET RESULTS AND PLAN



Results will be emailed to you within 7 days. A consultant will either email their interpretation and product recommendations to you, or schedule a call to discuss the results and make recommendations. Consulting fees may apply.

Create a Custom Regenerative Program

If you are a new customer, the development of a custom program will require consultation to determine the materials and methods applicable to your operation.

If you already have an AEA program in place, data from on-going sap analysis is used to further customize your nutrition programs throughout the season.

Observe and Measure Crop Health and Quality

Sap analysis provides the most detailed and current crop nutrition data. However, there is no replacement for the grower's experience, and sap analysis is not meant to replace tools like forage quality analysis, fruit firmness, size measurements, moisture and protein content, yield data, etc.

Plan Next Season

As you review accumulated annual results, you will see how trends in sap results have correlated to nutrient applications, weather conditions, and crop results. These observations will help you and your consultant plan inputs and practices on your operation for the following season.



Advancing Eco Agriculture (AEA) manufactures liquid, mineral plant nutrition products and offers a range of biological treatments that help produce healthier plants and regenerate soils while boosting the quality and yield markers that matter most to growers.

AEA also offers consulting services and custom crop nutrition programs informed by innovative Plant Sap Analysis.

Learn More About Regenerative Agriculture



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