



## TESTING FOR SOIL, PLANT, COMPOST, AND WATER QUALITY

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A variety of tests are available to assess soil in the field and greenhouse, plant tissue, compost and water used for agriculture. Test results provide data that can inform management decisions aimed at optimizing crop quantity and/or quality, as well as fertilizer and soil amendment costs.

Conducting tests on a regular basis, even when production looks good visually, can identify when adjustments may be beneficial despite the lack of visual cues. Further, having test results when production is optimal provides a baseline that can be useful to diagnosing problems that may arise in the future.

Each type of test has a specific sampling protocol that must be followed to get results that most accurately reflect the status of the material sampled. Below university (or university affiliated) lab services that are reputable and closely affiliated with Extension support.

There are many private labs offering extensive services; if working with a private lab to test soil, ask if they can use the same soil test extract as your local university lab (in VT, modified Morgan).

Below are tests typically offered by university (or university affiliated) labs that are reputable and closely affiliated with Extension support. There are also many private labs offering testing services; if working with a private lab, ask if they can use the same soil test extract as your local university lab (e.g. modified Morgans).

### “Standard” field soil test

- Measures macro- and micro-nutrient levels, soil pH, and sometimes organic matter and salts (electrical conductivity)
- Treats soil samples with an extract to simulate nutrient release over the growing season. Lab procedures (e.g. extracts) differ, so it is best to stick with the same lab over time to compare results. In the Northeast, most labs use modified Morgan’s extract.
- [UVM Agricultural and Environmental Testing Lab](#) \$17. Heavy metals screen (cadmium, chromium, copper, nickel, lead, zinc) add \$10. [Example of UVM field soil test results](#).
- [UMaine Analytical Lab](#). \$20. [Example of UMaine field soil test results](#).
- [UMass Soil Testing Lab](#), \$20. Does not include organic matter.

### Soil health tests

- [Cornell Assessment of Soil Health](#) \$90 to \$165. Includes standard field test (chemical measurements), plus physical and biological assessments: soil texture, active carbon, aggregate stability, soil respiration, organic carbon, total carbon, total nitrogen and predicted soil protein content and available water capacity. Interpretation of surface and sub-surface compaction provided based on data that farmer performs on-site using a penetrometer (which you can borrow from Extension or NRCS). [Example of CASH results](#).
- Soil Health/Quality Package [thru UMaine Analytical Lab](#) \$80. Field soil test plus texture, aggregate stability, plant-available water, total C/N, active carbon, respiration/biomass, N supply potential, and soil compaction evaluation (of penetrometer readings taken by farmer). [Example of UMaine soil health test results](#).

### Greenhouse / high tunnel soil tests (for in-ground production)

- [UMaine Analytical Lab](#) offers two options:
  - Basic High Tunnel Package (for newer tunnels < 3-year-old) includes the standard field soil test plus soluble salts, nitrate-N and ammonium-N. \$25.
  - Long-Term High Tunnel Package (tunnels covered for 3+ years) includes the basic package plus saturated media extract (potting soil test) for water soluble nutrients. \$30.
  - [Example of long-term high tunnel test results](#).

### Potting soil / greenhouse media test (for germination mix, seedlings, pots and trays, etc.)

- The saturated media extract (SME) measures immediately available nutrients by testing liquid extracted from a paste of soil and water.
- [Other test methods](#) are the 1:2 dilution and leachate pour through.
- [UMaine Analytical Lab SME](#). \$20 for pH, soluble salts, nitrate-N plus ammonium-N, Ca, K, Mg, P, Al, B, Cu, Fe, Mn, Mo, Na, S, and Zn.
- [UMass Soil Test Lab SME](#) \$30,
- [Example of SME test results](#).

### Pre-Sidedress Nitrate Test (PSNT) or June Nitrate Test

- Used to assess need for sidedressing N by measuring available nitrate in early summer.
- Best suited to soil amended with manure, compost, or sod plow down; not recommended for sandy soils, do not use after broadcasting N.
- Results 'predict' season long availability; 25-30 ppm nitrate-N or above is considered adequate for most long-season crops; a lot of rain may affect results and interpretation.
- Handling can affect results – soil must be dried or sent in aerated bag to lab within 2 days
- [UVM PSNT test](#) \$10. [UConn PSNT test](#) \$10. [UMass PSNT test](#) \$15.
- [Using the PSNT for vegetables](#).

### Tissue test (also called leaf analysis, or foliar analysis)

- Measures what plants actually take up from the soil; still need a soil test for soil pH.
- Best method for assessing fertility status of perennial fruit crops.
- Sample recently matured leaves, fully expanded (except for grapes use petioles).
- [Dairy One tissue test](#), Ithaca NY. For most fruits, the results come with Cornell recommendations. Optimal ranges for many crops [are listed](#). \$30.
- [Penn State tissue test](#), with recommendations for many crops including greenhouse tomatoes. \$24
- [UMaine Analytical Lab](#). \$30. No recommendations provided.
- [UConn Soil Nutrient Analysis Lab](#). \$30.
- [Example of Dairy One blueberry leaf analysis results](#).
- [Example of UMaine tomato leaf analysis results](#).

### Compost test

- Important for assessing nutrient status, maturity, metal content.
- Use a [plant bioassay](#) as low-cost test for herbicide contamination.
- [UMaine compost tests](#) \$60 or \$70. Bulk density, pH, conductivity, total solids, total volatile solids, NO<sub>3</sub>-N, NH<sub>4</sub>-N, total C, N, P, K, Mg, Ca, B, Cu, Fe, Mn, and Zn.
- [Penn State compost tests](#) \$45, 60 or \$80. Basic test includes percent solids, organic matter, pH, soluble salts, total nitrogen, total carbon, Carbon: Nitrogen ratio.
- [Example of UMaine compost test results](#).

### Irrigation water

- Testing can help prevent or diagnose crop production issues related to water quality.
- Water with high pH / alkalinity may be [treated with acid](#) to optimize nutrient availability.
- [Penn State irrigation water test](#). \$40 or \$60.
- [UMaine irrigation water test](#) \$40. Includes nitrate, ammonium, pH, conductivity, alkalinity, Ca, K, Mg, P, Al, B, Cu, Fe, Mn, Na, S, Zn.
- Example of [Penn State irrigation water test results](#).

### Produce wash water (aka harvest and post-harvest agricultural water)

- Testing water that will contact edible crops is necessary to identify food safety risks.
- Wash water must be free of E. coli bacteria, an indicator of fecal contamination, as required by the [U.S. Food and Drug Administration](#).
- Many state labs perform water tests; states also maintain lists of [accredited testing labs](#).
- [State of Vermont “NU” water test](#). \$15. Coliform and E. Coli bacteria number of colonies.
- Example of [Vermont “NU” water test results](#).
- [Agriculture water](#) (for irrigation and spraying) has assessment and testing requirements related to produce safety mandated by the FDA.

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