



revised  
May 2009

# Agronomic Services for the Nursery Industry

N.C. Dept. of Agriculture & Consumer Services Agronomic Division  
Physical Address: 4300 Reedy Creek Rd, Raleigh, NC 27607-6465  
Mailing Address: 1040 Mail Service Center, Raleigh, NC 27699-1040  
Phone: (919) 733-2655  
Web site: [www.ncagr.gov/agronomi/](http://www.ncagr.gov/agronomi/)

***The NCDA&CS Agronomic Division provides several services to help the nursery industry produce high quality plants free of nutrient-related or nematode problems. These services include analyses of irrigation water, nutrient solutions, soilless media, soil, soil amendments and plant tissue. Although these tests can be used to troubleshoot problems, they are best used as routine monitoring tools to prevent problems. Once symptoms such as reduced growth and/or poor color appear, economic loss has already occurred.***

## **Solution Analysis of Irrigation Water and Nutrient Solutions**

Solution analysis measures nutrient concentrations, electrical conductivity (EC), pH, alkalinity and hardness of water or solutions such as irrigation water, nutrient solutions, hydroponic solutions and pesticide source water. The benefit of this analysis is the ability to correct parameters, such as high alkalinity or high EC, before they cause problems.

Since water quality can change over time, it is a good idea to have irrigation sources routinely analyzed in early spring and late summer. Sampling is also recommended whenever a new well is dug and after any extreme wet or dry period. Samples should be collected from irrigation system nozzles or emitters, not from tanks or retention ponds.



Samples of fertigation solutions should also be collected from nozzles or emitters. They should be analyzed periodically to verify nutrient concentrations, confirm proper mixing of fertilizers and check the efficacy of the drip system and/or the injectors.

## **Analyses of Growth Substrates**

Growth substrates include soilless media and mineral soil. Because chemical properties and nutrient concentrations of potting media fluctuate over time and can fall outside of ideal ranges, it is wise to check pH, EC and nutrient concentrations of all media before potting plants and periodically throughout the production cycle. Choose the correct procedure to fit your situation: media analysis for soilless growth substrates (peat moss, pine bark, perlite); solution analysis of pour-through leachate for container plants; and soil testing for field nursery stock.

**Soiless Media Analysis.** Media samples submitted during production can be used to monitor nutrient concentrations or to verify a suspected, nutrient-related problem. These samples are easy to collect from large, planted containers and from bulk piles of preplant substrates. The saturated media extract (SME) procedure used to analyze these samples provides data on EC, macronutrient concentrations and the relationship of these concentrations with EC. Media pH is measured on a 1:1, volume-per-volume water suspension.

**Solution Analysis (pour-through leachate).** Routine use of the pour-through procedure is recommended to monitor EC, pH and nutrient concentrations. Knowledge of these parameters facilitates efficient irrigation and nutrient management.

**Soil Testing.** Yearly testing of mineral soils is recommended for field-grown stock to obtain lime and fertilizer recommendation rates.

### ***Waste Analysis (for composted or precomposted materials)***

This procedure measures chemical properties and assess the suitability of these materials for use as substrate amendments to soiless media or mineral soil. The report provides information on EC, pH, carbon-to-nitrogen ratio (C:N) and nutrient availability.

### **Plant Tissue Analysis**

Tissue analysis measures the concentrations of 11 essential plant nutrients in leaf tissue. The report includes both the concentrations as well as their index values. The use of index values simplifies interpretation by placing the nutrient concentrations in categories of deficient, low, sufficient, high or excessive. The report also gives recommendations for corrective action when necessary.

The most common use of tissue analysis is to diagnose and correct suspected deficiencies or toxicities. When plants exhibit abnormal growth or color, it is essential to submit samples of plant tissue, growth media (or pour-through leachate), irrigation water and fertigation solution for analysis. Comparison of these test results is the best way to assess and diagnose the situation.

### **Nematode Assay**

Foliar nematodes can be a serious problem in the nursery. Soil-inhabiting nematodes can be a problem if containers come into contact with unsterilized soil. Nematode assays determine not only the type of nematode present but also whether populations have reached a threshold severe enough to warrant corrective action. To diagnose most nematode problems, submit a sample of soil and roots. To diagnose foliar nematodes, submit leaf samples.

Visit [www.ncagr.gov/agronomi/sampleinfo.htm](http://www.ncagr.gov/agronomi/sampleinfo.htm) for sample information forms; a list of sample fees; instructions on how to collect and submit all types of agronomic samples; and contact information for advisory support.

*Thank you for using agronomic services to manage nutrients and safeguard environmental quality.  
— Steve Troxler, Commissioner of Agriculture*