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Sampling and Submitting Greenhouse Substrate, Irrigation Water and Tissue for Analysis

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Routine sampling of your greenhouse crops growing substrate, irrigation water, fertilizer solution, and tissue can be useful in diagnosing plant nutritional problems or to monitor your fertility program. Whether performed in house (basic substrate, soil, irrigation, and fertilizer solution testing) or sent to a commercial laboratory or testing facility, the following sampling procedures should be carefully followed to ensure consistent and accurate results.

Substrate Sampling Procedure

The substrate sample should be representative of the crop or nutritional problem you wish to analyze.

1. The same individual should collect samples each time.

2. The following information should be recorded: date, crop and substrate type, fertilizer, crop age, watering regime, or any other factor that may influence fertility.

3. Samples should be collected at the same point in the watering/ fertilizing cycle for a crop. Sampling an hour after the last water/fertilizer application represents nutrition of the soil solution well. Be consistent.

4. Problem crops or benches should be sampled individually. Include samples from good and bad plants where visual symptoms are evident to compare nutrition differences.

5. For routine analysis, subsamples should be collected from 5 to 10 containers, depending on container size, and combined into a single sample. The subsample should be collected by either:

a) removing a wedged- shaped piece from the top to the bottom of the pot, excluding the top and bottom one- half inch of the substrate or

b) pinch a handful of substrate from the center one-third of the pot. Include the entire soil volume when sampling from plug flats excluding the top one-eighth of the medium.

6. Thoroughly mix the subsamples to make a single homogeneous sample. The sample to be tested should be at least one pint of media. Remove any large roots or debris and avoid including any slow-release fertilizer in the sample.

7. Air dry the samples and send to the lab as soon as possible. If samples cannot be mailed immediately, they can be refrigerated.

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8. Samples should be placed in a new plastic bag labeled with your name, address, the crop, and location of sample. Avoid containers that have been washed using phosphate detergent, metal containers, or containers with metal lids. These may contaminate the sample. Many labs provide special containers for potting medium samples.

9. Follow the same procedure every time you sample so you can compare results and detect trends over time.

10. One to two pints of substrate are required for conducting analysis; smaller volumes can be submitted, but the results may not be as accurate.

11. New substrates should be wetted to container capacity by placing the substrate in a growing container, watering it until drainage occurs, and allowing it to stand for a few days. The sample can then be collected and mailed. With mail delivery time, this allows about a week for the lime to react and correct pH readings to be obtained.

Irrigation Water Testing and Fertilizer Solution Testing

Testing irrigation water and fertilizer solution is recommended for each water source that you use in your greenhouse or nursery (especially wells) and should be done one to four times a year. Standard irrigation water analysis includes pH, EC, and alkalinity. Fertilizer solution testing is recommended for checking the accuracy of your injectors or mixing procedures. Additionally, growers should conduct weekly in-house EC testing of their injector's accuracy. A standard lab analysis usually includes pH, EC, NO3-N, NH4-N, P, K, Ca, and Mg.

Sampling Procedure

1. Allow your irrigation water to run for 5 minutes to clear the line.

2. Request a test kit from your commercial testing lab or use a new plastic 16-oz. container and rinse it 2 to 3 times with the water to be tested.

3. Fill the container with your irrigation water completely and cap tightly. Avoid prolonged exposure to air.

4. Label the container with your name, address, and type of analysis requested or following the testing lab protocol.

5. Mail the sample within 24 hours. If samples cannot be mailed immediately, they can be refrigerated before shipping.

Plant Tissue Testing

Plant tissue analysis can be conducted to determine the nutrient status of the crop or for detecting nutrient deficiencies or toxicities. Plant tissue analysis is especially useful when one needs to determine micronutrient levels in the plant. Generally, plant tissue analysis is done at the same time and the same frequency as potting media testing. A standard analysis usually includes macroelements (N, P, K, Ca, and Mg) and micronutrients (B, Cu, Fe, Mn, Mo, and Zn).

Sampling Procedure

The leaf tissue samples should be representative of the crop or problem you wish to analyze.

1. For routine analysis, collect leaves from 20 to 30 plants (more leaves are required for plants with small leaves) and combine into a single sample (about 2 cups of lightly packed leaves). Generally, the most recently matured, fully expanded leaves are collected from the upper part of the plant. Collect the sample in the morning (before noon) when plants are not under moisture stress. Try to collect the sample at the beginning of the week so delivery will not be delayed over the weekend, or use overnight or next day delivery.

2. Problem crops or benches should be sampled individually.

3. If the leaves have dirt, dust, fertilizer, or pesticide spray residue on them, gently wash the leaves in distilled or deionized water to remove surface contaminants. This may be accomplished by immersing the sample in water in a new plastic bottle and gently agitating the sample for about 10 seconds. Longer agitation times or vigorous agitation may damage the tissues and alter the test results. Air dry or blot dry the surface water with a clean towel before packing.

4. Samples should be sent in paper or perforated plastic bags, never in sealed plastic bags. Label the bag(s) with your name, address, the crop, and location of the sample.

5. Mail the sample within 24 hours. If this is not possible, refrigerate the samples before shipping. Do not freeze samples.

References

Kessler, J. and B. Whipker. 2004. Submitting Greenhouse Samples for Laboratory Analysis. Alabama Cooperative Extension. ANR-1190.

Whipker, B. 1998. Submission Procedures for Root Substrate, Water, Fertilizer Solution, and Plant Tissue Samples. North Carolina Cooperative Extension Service Horticulture Information Leaflet 560.

The names and addresses of several commercial laboratories that perform substrate, soil, irrigation, fertilizer solution and tissue tests are provided below. Most laboratories charge a nominal fee or waive the fee for their customers.

A&L Great Lakes Lab, Inc. (Tissue and Substrates)
3505 Conestoga Drive 209
Fort Wayne, IN 46808
Phone (260) 483-4759
Fax (260) 483-5274
Email: lab@algreatlakes.com
Web: http://www.algreatlakes.com/

AgSource Laboratories (Soil, Tissue, and Water)
106 North Cecil Street
Bonduel, WI 54107
Phone: (715) 758-2178
Fax: (715) 758-2620
Email: bonduel@agsource.com
Web: http://agsource.crinet.com/page298/Agronomy

Brookside Laboratories (Water, Fertilizer, Tissue, and Soils, Substrates)
308 S. Main St.
New Knoxville, OH 45877
Phone: (419) 753-2448
Fax: (419) 753-2949
Web: http://www.blinc.com/greenhouse.htm

Everris Testing Lab (Water, Fertilizer, Tissue, Soil, and Substrates)
300 Speedway Circle
Suite #2
Lincoln, NE 68502
Phone: (402) 476-0300 or 1-800-270-3714
Email: fred.hulme@everris.us.com or keith.santner@everris.us.com
Web: http://protestinglab.everris.us.com/

Fafard Horticultural Services (Water, Fertilizer, Tissue and Substrates)
Phone: 1-800-722-7645
Web: http://www.fafard.com/AnalyticalRequests.aspx

Cal Mar Soil Testing Lab (Soil)
130 S. State St.
Westerville, OH 43081
Phone: (614) 523-1005; 1-800-80-SOILS
Fax: (614) 523-1004
Email: ohiolab@calmarlabs.com
Web: http://www.calmarlabs.com/

JR Peters Laboratory (Water, Fertilizer, Tissue, and Substrates)
6656 Grant Way
Allentown, PA 18106
Phone: (610) 395-7104 or (866) 522-5752
Email: info@jrpeterlab.com
Web:http://www.jrpeters.com/Lab-Services/Testing-Services.html

Litchfield Analytical Services (Water, Fertilizer, Tissue, Soils, and Substrates)
P.O. Box 457
535 Marshall Street
Litchfield, MI 49252
Phone: (517) 542-2915
Fax: (517) 542-2014
Email: litchlab@qcnet.net
Web: www.litchlab.com

Midwest Laboratories (Water, Tissue and Soils)
13611 B. St.
Omaha, NE 68144
Phone: (402) 334-7770
Fax: (402) 334-9121
Web:https://www.midwestlabs.com/index3.html

Premier Horticulture Lab (Water, Fertilizer, Tissue, Substrates and Pathology)
183 Paradise Blvd., Suite 108
Athens, GA 30607
Phone: 1 800 424-2554
Email:services@pthorticulture.com
Web:http://www.pthorticulture.com/en/support-service-growers/

Spectrum Analytic Inc. (Water, Fertilizer, Tissue and Soil)
1087 Jamison Rd NW
Washington Court House, OH 43160
Phone: (740) 335-1562; 1-800-321-1562
Fax: (740) 335-1104
Web:http://www.spectrumanalytic.com/

SGS North America Inc. (Water, Tissue and Soil)
236 32nd Avenue
Brookings, SD 57006
Phone: (605) 692-7611
Fax: (605) 692-7617
http://www.sgs.com/en/Agriculture-Food/Seed-and-Crop/Soil-Leaf-and-Water-Services.aspx

United Soils, Inc. (Soil and Tissue Testing)
108 S. Crystal Lane
Fairbury, IL 61739
Phone: (815) 692-2626
Fax: (815) 692-4483
Email:agronomist@unitedsoilsinc.com
Web:http://www.unitedsoilsinc.com/

Waters Agricultural Labs (Water, Fertilizer, Tissue, Soil, Herbicide, Pesticide, and Nematode)
257 Newton Hwy, P.O. Box 382
Camilla, GA 31730
Phone: (229) 336-7216
Email: info@watersag.com
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2101 Calhoun Rd.
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Email: kyinfo@watersag.com
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