

Greenhouse Potting Mix

1. Application

Potting mixes used in commercial greenhouses contain high proportions of peat and artificial materials such as perlite and vermiculite. Nutrients are supplied as a nutrient solution when watering in most cases. Therefore, little attention is given to nutrient supplying ability of such mixes. Under greenhouse management, plants are using primarily the nutrients in the water of the soil mix. This testing procedure measures the *intensity* factor (nutrients in solution). The procedure has been termed the “saturated extract” method.

2. Summary of Methods

Potting mixes are wetted with 100ml of 0.005M DTPA solution per 400cc of soil. The mixture is then saturated with distilled water to the point where the water content is about twice the field capacity. The greenhouse solution is extracted from the saturated phase by suction. The pH is determined as a subsample without DTPA solution added. The extract is analyzed for soluble salts, NO₃-N, P, K, Ca, and Mg.

NO₃-N is determined by flow injection.

The elements P, K, Ca, and Mg are analyzed by inductively-coupled plasma (ICP) emission spectroscopy.

3. Safety

All chemicals should be considered a potential health hazard. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material handling data sheets should be made available to all personnel involved in the chemical analysis.

4. Interferences

Normal care must be taken to avoid contamination. For interferences with individual analyses, see the procedures for those analyses in soil. Spectral interferences are less severe in the ICP analysis compared to flame emission of atomic absorption spectroscopy.

5. Apparatus and Materials

- 5.1 Plastic beakers (600- ml)
- 5.2 Spatula
- 5.3 Suction manifold
- 5.4 Buchner funnels, 111 mm inside diameter.
- 5.5 Filter paper (Whatman No. 1 or 2 or equivalent)
- 5.6 Suction flasks, 500-ml Erlenmeyer flasks with tubulation
- 5.7 Vacuum pump
- 5.8 Vials, 100-ml, with caps

6. Reagents

DTPA (Diethylenetriaminepentaacetic acid), 40.95g of DTPA per 22 L of deionized water.

See individual procedures for pH, soluble salts (electrical conductivity), and NO_3N .

7. Methods

- 7.1 Place 200 to 400 cc of greenhouse “soil” in a 600-ml plastic beaker.
- 7.2 Add 100 ml DTPA
- 7.3 Add deionized water until the soil is just saturated, mixing with a large spatula. At saturation the soil paste glistens as it reflects the light. The soil mixture will flow slightly when the beaker is tipped. The paste slides freely and cleanly from a spatula. Free water should not collect on the surface.
- 7.4 Determine the pH of the soil using the procedure for Soil pH and Lime requirement.
- 7.5 Filter the paste, using suction and Buchner funnels fitted with 11-cm Whatman No.1, No. 2 or equivalent filter paper, 1 to 4 hours after water is first added to the greenhouse mix. Collect the filtrate in 500-ml suction flasks.
- 7.6 Transfer the filtrate from the suction flasks to 100-ml vials. If the filtered extract is not analyzed the same day, refrigerate the vials.
- 7.7 Measure the electrical conductivity of the saturation extract.
- 7.8 Determine NO_3^- -N in the filtered extract by flow injection.
- 7.9 Analysis of P, K, Ca, and Mg is done by (ICP) inductively-coupled plasma spectroscopy.
- 7.10 Analyze solutions for P, K, Ca, and Mg.

8. Calculations

No calculations are required unless dilutions are required: if so, multiply results by the dilution factor.

9. Quality Control

- 9.1 Laboratory Reagent Blank (LRB) – At least one LRB is analyzed with each batch of samples to assess contamination from laboratory environment. Contamination from the laboratory or reagents is suspected if LRB values exceed the detection limit of the method. Corrective action must be taken before proceeding.
- 9.2 Standard soil – One or more standard soils of known analysis is analyzed with each batch of samples to check instrument calibration and procedural accuracy.

10. Reporting

Results for pH are given without units. The term “pH” means $-\log [H^+]$. Electrical Conductance is reported in $mhos \times 10^{-5}/cm$. Values for NO_3^- -N, P, K, Ca, and Mg are reported as ppm in solution.

11. References

- 11.1 Warncke, D. 1998. Greenhouse root media. Pp.61-64. *In* J.R. Brown (ed.), Recommended Chemical Soil Test Procedures for the North Central Region. NCR Publ. No. 221 (revised). Missouri Agr. Exp. Sta. SB 1001. Columbia, MO.