Research Note

EFFECTS OF ADDING MAGNESIUM NITRATE BEFORE DRY-ASHING ON PHOSPHORUS IN HONDURAS PINE FOLIAGE[1]

Several authors have recommended adding magnesium nitrate or magnesium acetate to dried plant material before ashing.[2,3,4] This pre-ashing treatment reportedly reduces P volatilization from pine foliage, seeds, or other vegetative material that is inherently low in bases. A disadvantage is that Ca and Mg cannot be determined in the same ashed sample because of added salts.

Unpublished data (C. G. Wells, personal communication)[5] suggest that pre-ashing is not needed for foliage of conifers found in the Southern United States. Eliminating any pre-ashing treatment would save considerable laboratory sample preparation and analysis time while allowing determination of bases in the same samples. This study involved examination of the effects of adding magnesium nitrate to P concentrations in Honduras pine (*Pinus caribaea* Mor. var. *hondurensis* Barr. and Golf.) foliage.

Thirteen foliage samples were collected from two different areas in Puerto Rico (table 1). Trees in the private planting were 3 to 4 years old and those at the Institute of Tropical Forestry grounds were almost 13 years old. All samples were oven-dried at 70° C, ground to pass a 1 mm sieve, and stored in screw-tight vials before being shipped to Analytical Services Laboratory (ASL), Soil Science Department, North Carolina State University, in Raleigh, North Carolina. For each sample, duplicate 2.5 g subsamples (A and B) were weighed and placed in porcelain crucibles. The A set was first wet with a 7.5% magnesium nitrate solution that was then evaporated by a steam bath; the B set was nontreated. Subsamples were ashed overnight in a muffle furnace at 500° C. After the furnace was opened, all subsamples were allowed to cool, were wet with distilled water, and 2 ml of concentrated HCl was added; crucible contents were then evaporated slowly to dryness on a hot plate. After dehydration, 2 ml of distilled water followed by 2 ml of concentrated HCl were added, the crucible residues being redissolved slowly over low heat. Contents from the crucibles were then transferred to 50 ml flasks in which the solutions were brought up to volume with distilled water.

[1] Manuscript submitted to Editorial Board July 5, 1982.

[2] Jackson, M. L., 1958. Soil chemical analysis, Prentice-Hall, Inc., Englewood Cliffs, N.J.

[3] Piper, C. S., 1944. Soil and plant analysis, Interscience Publishers, Inc., New York.

[4] Wilde, S. A., R. B. Corey, J. G. Iyer and C. K. Voight, 1979. Soil and plant analysis for tree culture, 5th ed, Oxford and IBH Publishing Co., New Delhi, India.

[5] Principal Soil Scientist, USDA Forestry Sciences Laboratory, Research Triangle Park, N.C.

Phosphorus was determined in phosphomolybdic acid by reading absorbance at 470 nm on a spectrophotometer.

No significant differences ($p \geq 0.10$) appeared between overall means of treated and nontreated samples (table 1). For individual trees growing on different soil types and representing different ages, little differences showed between treated and nontreated samples. Adding magnesium nitrate probably did not affect P concentrations because of the relatively low ashing temperature used in this study.

TABLE 1.—*Foliage P results from dry-ashing* Pinus caribaea *var.* hondurensis *needles with and without 7.5 % magnesium nitrate*

Sample number[1]	Tree height	Topography/soils	Dry-ashing; foliage P Nontreated	Treated
	m		%	
1	4	Slope, subsoil spoil	0.080	0.070
2	7	Slope, non-spoil	0.070	0.070
3	4	Slope, non-spoil	0.095	0.100
4[2]	8	Flat, topsoil removed	0.110	0.120
5	5	Flat, topsoil removed	0.088	0.085
6	8	Fat, topsoil removed	0.085	0.093
7	6	Flat, topsoil removed	0.138	0.134
8	4	Flat, topsoil removed	0.132	0.134
9	15	Flat, heavy clay	0.100	0.100
10	13	Flat, heavy clay	0.119	0.116
11	14	Flat, heavy clay	0.123	o.119
12	15	Flat, heavy clay	0.141	0.140
13	15	Flat, heavy clay	0.086	0.095
		$\bar{x}$	0.105	0.106
		Paired-t Test	NS[3]	

[1] Trees 1 to 8 located on a private farm near Carite State Forest, Puerto Rico; foliage samples taken from upper third of the crown. Trees 9 to 13 located at Institute of Tropical Forestry grounds, Río Piedras, P.R.; foliage samples taken from lower crown branches.

[2] Foxtail individual.

[3] Paired-t test nonsignificant ($P \geq 0.10$).

Low ashing temperatures are routinely used at the ASL in Raleigh as well as at the USDA Forest Service's Forestry Sciences Laboratory at Research Triangle Park, N.C. Ashing temperatures used by authors recommending pre-ashing treatment with magnesium salts were between 600° and 800° C. Other researchers have reported that ashing temperatures above 500° C will affect foliage concentrations for certain elements of citrus.[6] In future foliar analytical work with pine in Puerto Rico, low

[6] Labanauskas, C. K. and M. F. Handy, 1975. Dry-ashing temperature, time, and sample size as variables influencing concentrations in citrus leaf analysis, HortScience 10:386–88.

ashing temperatures should continue to be used and pre-ashing treatment with magnesium salt is not necessary.

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Inadvertently the title of the article in page 446 of Vol. LXVII, No. 4 (October 1983) of the *Journal of Agriculture of the University* of Puerto Rico was edited and changed from the one that appears in the table of contents on the cover. The correct title is "Crop response to soil acidity factors in Ultisols and Oxisols in Puerto Rico. IX. Taniers."