MEASUREMENT OF PLANTS AND ANALYSIS OF PLANTS AND SOILS

R.J. Fessenden [1/]

Routine measurement of seedlings and chemical analysis of seedling and soil samples in connection with the Ontario Ministry of Natural Resources' Forest Nursery Program have been performed at the Glendon Hall Forest Soils Laboratory since 1962. The Glendon Hall Forest Soils Laboratory of the University of Toronto's Faculty of Forestry and Landscape Architecture is located on the Glendon Campus of York University approximately 7 miles north-east of the main University of Toronto campus. This facility also serves as a centre for graduate and undergraduate research in soils and silviculture.

The seedling characteristics routinely measured include height, diameter, top and root dry weights, and root surface area index. During the last several years, the lab has been handling about 27,000 individual seedlings per year and all of these measurements have been made manually. Recently, the Ontario Ministry of Natural Resources and the Canada Department of Agriculture co-operated to build a device which measures height, diameter, and root surface area index simultaneously, and prints out these measurements on a teletype terminal. We have tested this machine and plan to use it routinely this fall.

We also perform chemical analyses of seedling and soil samples. Our lab handles very few numbers of samples relative to some of the large soil and plant test labs. For example, we may do about 400 soil samples in a year whereas the soil test lab at the University of Guelph last year handled 54,000 samples. For this reason, our procedures are less automated than those of the larger laboratories, although we have the same capability in terms of the range of analyses which we can do.

Figures 1 and 2 present the flow charts for the way in which we process plant and soil samples, respectively. Seedlings are first washed, and then measured while they are still in a fresh condition. Those which will be subjected to chemical analysis are then dried and ground. Nitrogen concentration is measured on the dry tissue by the semi-micro Kjeldahl procedure. After dry-ashing in a muffle furnace we measure phosphorus concentration by a colourimetric procedure, potassium and sodium concentration by flame emission spectrophotometry and all other elements by atomic absor-

---

[1/] Assistant Professor, Faculty of Forestry and Landscape Architecture, University of Toronto, M5S1A1

F i.gure 1

GLENDON HALL FOREST SOILS LABORATORY

FACULTY OF FORESTRY AND LANDSCAPE ARCHITECTURE

UNIVERSITY OF TORONTO

FLOW CHART FOR SOIL ANALYSIS

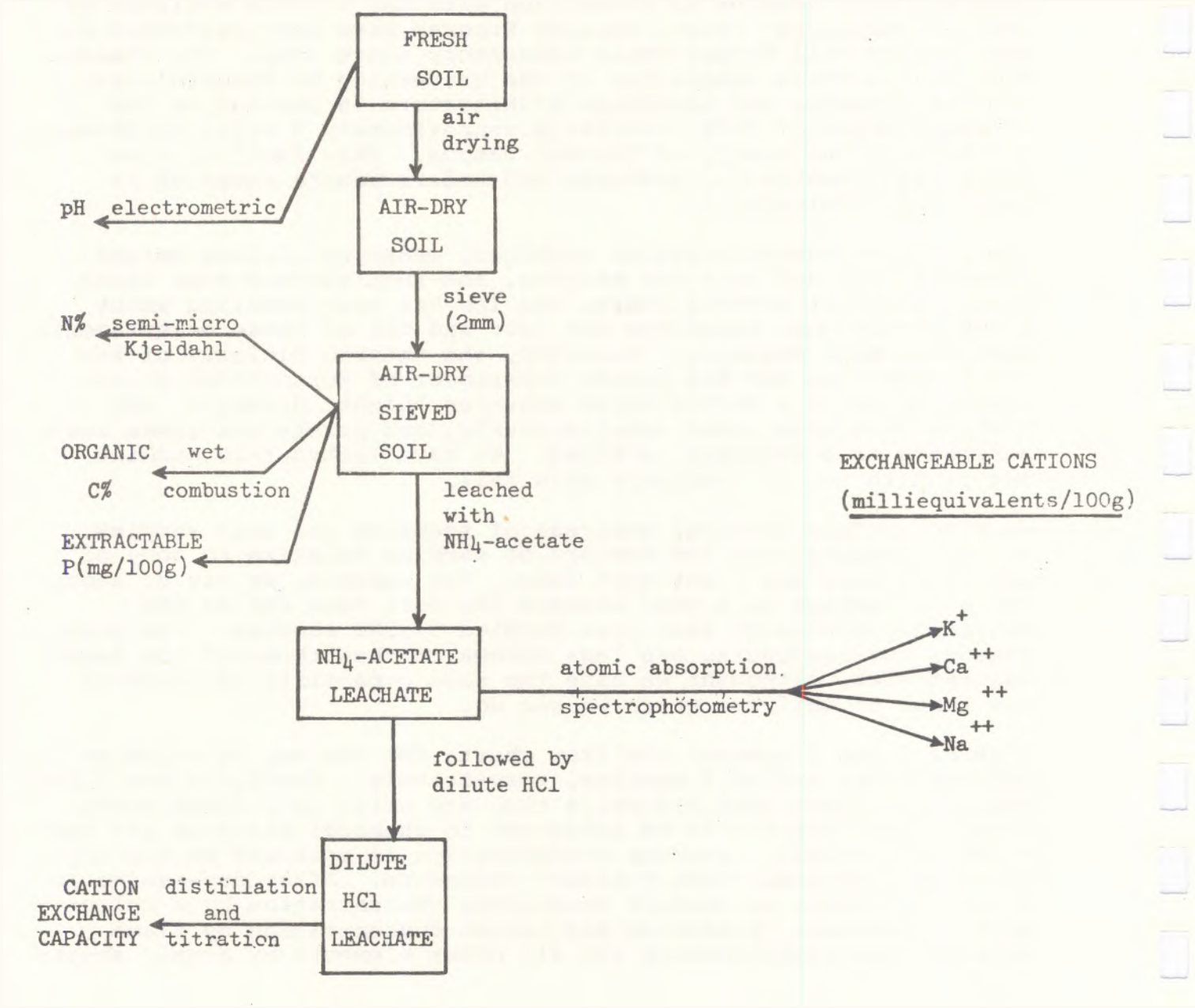


Figure 2

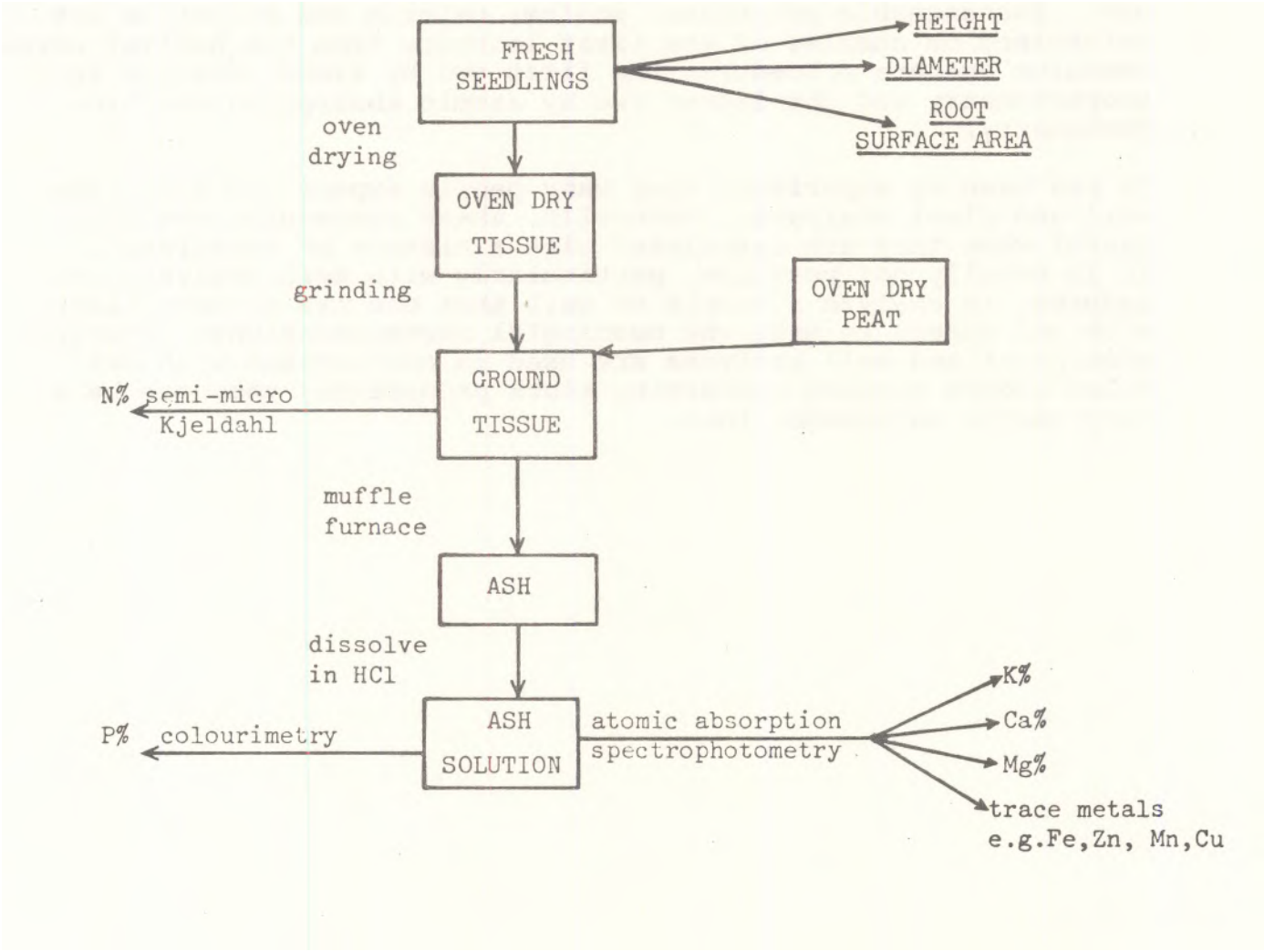
GLENDON HALL FOREST SOILS LABORATORY

FACULTY OF FORESTRY AND LANDSCAPE ARCHITECTURE

UNIVERSITY OF TORONTO

FLOW CHART FOR SEEDLING MEASUREMENT

AND ANALYSIS



ption spectrophotometry.

Soil samples are first read for pH in the fresh condition. Soils are then dried and sieved. Phosphorus, organic carbon and nitrogen are determined on samples of this material. Cation exchange capacity is determined by the neutral normal ammonium acetate procedure. Exchangeable potassium, sodium, calcium and magnesium are determined on samples of the first leachate from the neutral normal ammonium acetate procedure, the first two by flame emission spectrophotometry and the latter two by atomic absorption spectrophotometry.

It has been my experience that many people expect too much from soil and plant analysis. Generally, these procedures are only useful when they are associated with a history of experience. It is usually not possible, particularly with soil analysis procedures, to analyze a sample of soil that one has no experience with and expect to make any meaningful recommendations. However, when plant and soil analyses are used in conjunction with detailed record keeping concerning stock production, they can be a very useful management tool.