PART V

ANALYSIS OF FOREST SOILS

Introduction

Much has been done in recent times by soil chemists to simplify and abbreviate the analytical determinations of various soil constituents. In spite of this, soil analysis still remains a time consuming procedure, too costly to be employed indiscriminately. The obtaining of worthwhile results requires a knowledge of analytical technique, certain laboratory skill, and careful collection of reliable samples.

The skill in laboratory determinations may be acquired, in many instances, without a profound theoretical background; sampling of soils, especially forest soils, calls for a thorough understanding of soil conditions and plant requirements. This is one phase of work in which the "savoir faire", or, to translate freely, the "horse sense" of a forester cannot be replaced by any written instruction.

In the selection of planting sites, the analysis may well be limited to a few of the more important factors such as reaction, texture, and content of organic matter; in case the soil is formed on a uniform geological deposit, for instance, outwash sand, five samples per forty acres may give sufficient information. In the work with nursery soils, it is necessary to make a more complete analysis of the basic fertility factors as well as the available nutrients; in this type of investigation, as many as five samples per acre may be needed to obtain a true picture of the soil fertility.

In dealing with young nursery stock, the analysis may be confined to the surface 7-inch layer of soil. In studies of soil drainage or soil texture, the analysis of the substrata may be of much greater importance than the analysis of the surface layers. In most cases, the investigation of forest soils involves the analysis of the entire soil profile, i.e. three to five separate horizons.

For some determinations, sampling may be accomplished by means of a tube which removes a representative cross-section of the surface layer. In other determinations, samples should be taken from the individual soil layers. Sometimes both methods may be combined.

The mixing of soil from different parts of the field, so commonly used in agricultural analyses, is rarely permissible in forestry practice. Because of uneven distribution of fertilizer within the same nursery block, the amount of available potash may vary as much as 50 to 400 pounds per acre. The composite sample from such a block may give an ideal content of about 200 pounds per acre, whereas actually potash occurs in the soil in either deficient or excessive amounts. The same may be true in regard to all other fertility factors.

Mistakes in soil sampling, which lead to the drawing of erroneous conclusions are often made because of the outmoded assumption that the soil is a static and homogenous surface layer. Actually, the soil is a dynamic and heterogeneous sequence of several horizons.