Lesson 7

Foliar Analysis

40 minutes

Objectives

- ▲ Describe the reasons and conditions for using pre- and postfertilization foliar analysis
- ▲ Describe the time line and guidelines for collecting field samples and preparing them for shipment to a laboratory
- ▲ Examine the use of the critical level approach for the interpretation of the laboratory analysis

Equipment Needs

- Overhead projector
- ▲ Lesson 7 transparencies

Method

Lecturette with overheads, exercise and class discussion

Instructions

The subject matter for this lesson is found in Appendix 2 of the *Forest Fertilization Guidebook*. The purpose is to provide sufficient information for participants to collect foliar samples for analysis and interpret the laboratory results for use in stand selection. The commonly accepted critical level and interpretation tables will be explained and used in optional exercises located in the lesson with additional exercises in the appendix.

Key points to this lesson are:

- ▲ Foliar analysis should only be undertaken after a candidate stand meets strategic/wood supply, biological and operational criteria. Adequate time must be scheduled for the laboratory analysis.
- ▲ Distinguish between the differing purposes of pre-fertilization and post-fertilization foliar analysis.
- ▲ Review the methods of collecting foliage samples.
- ▲ Present drying methods of foliar samples prior to shipping to the laboratory.
- ▲ (Optional) Use the interpretation tables contained in the appendix to diagnose several examples of foliar analysis from a lab.

Foliar analysis is the chemical analysis, conducted by a laboratory, of the twelve nutrient elements important for tree growth. The results can be used to infer the nutrient status of a stand but not necessarily the reasons for a nutritional problem. Care must be taken when using foliar analysis for the purpose of prescribing fertilization. Foliar analysis is most useful for the identification of the severely deficient nutrients. Interpretative criteria are not available for all of British Columbia's tree species or for some elements; therefore, it is necessary to check the diagnostic criteria before sampling.

It is assumed that the stand selected for fertilization will utilize the applied nutrients quickly and produce improved tree growth. However, as part of program monitoring procedures, one should consider the use of pre- and post-fertilization foliar analysis. Foliar analysis can be used to measure nutrient status both before and after the fertilization treatment of the stand to quantify the increases in foliar nutrient levels and to identify any induced deficiencies. Therefore, on occasion, where a prefertilization foliar analysis is conducted to assist in the prescription for fertilization, and especially where mixed nutrient fertilizers are used, consider the use of post-fertilization foliar analysis.

There are seven foliar sampling guidelines to follow; these are listed in Appendix 2 of the *Forest Fertilization Guidebook* and below. The important points are to sample at the correct time of year, from dominant and co-dominant trees, away from foliage contamination sources, and to handle samples in the recommended manner. The samples of foliage can be collected using any of four techniques, often depending on the height of sample trees.

Computer-based programs are available to assist in the interpretation of the results from foliar analysis or the simple approach of comparing the laboratory results with the diagnostic critical level where it is available for that tree species. This latter approach is used with this course, in which a scenario is explained and the foliar analysis results provided. Biological Assessment of Site Productivity

Inventory classification (LPMG)

Growth Intercept

OGSI

Tools to
Determine
Fertilization
Potential

Screening Trials

Foliar Analysis

Other (PSPs)

Overhead: Biological Assessment

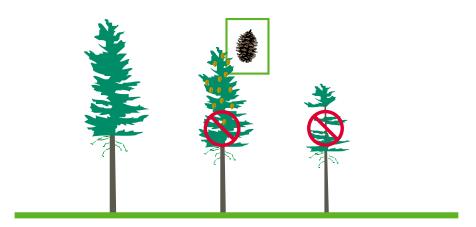
Key Points

- ▲ Use site index to determine if site is low/poor/medium/good
- ▲ The three tools shown (screening trials, foliar analysis and "other" such as permanent sample plots) expand on SI
- ▲ The tools are used to compare pre- and post-fertilization results to determine the effects of fertilization and the response

Foliar Sampling Guidelines

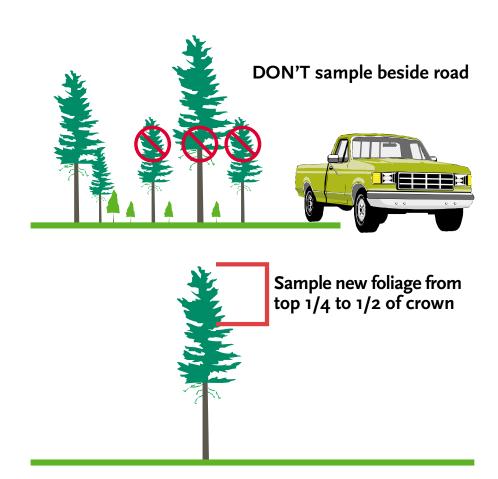
- ▲ Sample in the fall
- ▲ Sample only dominants and co-dominants





Forest Fertilization Workshop

Foliar Sampling Guidelines (con't)



Overhead: Foliar Sampling Guidelines

Key Points

- ▲ Sampling must represent the average conditions in the stand without any bias from the growing season, dust or other variables
- ▲ The Forest Fertilization Guidebook covers drying methods well
- ▲ Sampling must be carefully conducted and the samples properly dried and shipped promptly to the lab
- ▲ The lab should be notified before the samples are shipped so that the analysis can be scheduled

Foliar Analysis

Pre-fertilization

- ▲ Composite samples from representative locations
- ▲ Stratify samples if necessary
- ▲ Complete laboratory analysis

Post-fertilization

- ▲ Needle weights
- ▲ Representative locations across flight lines
- ▲ Complete laboratory analysis
- * Contact regional Stand Tending Forester or Rob Brockley, Kalamalka Research Station

Overhead: Foliar Analysis

Key Points

- ▲ Emphasize importance of screening trials if no other response information is available (e.g., for the species, area fertilized, etc.). Participants do not have to learn how to establish screening trials from this course. Instead, they should consult Appendix 3 of the *Forest Fertilization Guidebook* and contact the regional specialist (stand tending forester) for guidance on establishing them.
- ▲ Establish screening trials to compare pre- and post-fertilization foliar analysis. Use representative stands for the forest estate to use trial and operational \$\$ most effectively.
- ▲ District and licensee staff involved in fertilization operations can contact regional Stand Tending Forester or Rob Brockley at the Kalamalka Research Station for technical assistance.