- **Sustainable Land Management Project (SLMP)**

Project Development Objective
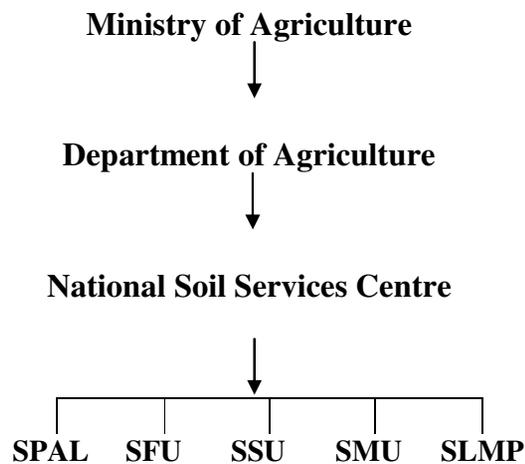- To strengthen institutional and community capacity for anticipating and managing land degradation in Bhutan

Global Environment Objective
- To protect trans-boundary watersheds in a manner that preserves the integrity of ecosystems in Bhutan

Guiding principles
- Bottom-up planning approach- community priorities and community decisions
- Phased implementation- initially in 3 pilot geogs, extending to other geogs as SLM capacity is built
- Support to decentralisation
- Ensuring an appropriate knowledge and information base to guide SLM decision making on practices, planning and policies
- Integrated multi-sectoral approach- a strategy for improving the management of natural resources
- Stakeholder consultation-throughout the project.

Ministry of Agriculture
↓
Department of Agriculture
↓
National Soil Services Centre
↓

SPAL   SFU   SSU   SMU   SLMP

Different units under NSSC

- **Soil and Plant Analytical Laboratory (SPAL)**
  Conducts analytical tests on:
  - Soil
  - Plant
  - Animal feed
  - Manure
  - Water
  - Pesticide residue analysis
  For research, extension and any other land and environmental related issues.

- **Soil Fertility Unit (SFU)**
- Work directly with farmers & extension on:
  - Farmer Extension Fertilizer Use Trials (FEFUT)
  - Farmer-extension training
- To refine/develop fertilizer recommendations for major crops (cereals and fruits/vegetables)
- To study the soil fertility trend of the major traditional farming systems.

- **Soil Survey Unit (SSU)**
  - Carry out soil survey of prioritized areas which is mostly client driven
  - Produce soil reports and digitized soil maps
  - Do land evaluation/suitability evaluation for specific crop and produce suitability maps where ever feasible
  - Participate in land swapping activities in collaboration with LUSS
  - Collecting soil monoliths and determining AHC
  - Compiling base maps for soil surveys

- **Soil Microbiology Unit (SMU)**
  Responsible for
  - Inoculum production
  - EM solution production
  - Study soil biodiversity under different land use.

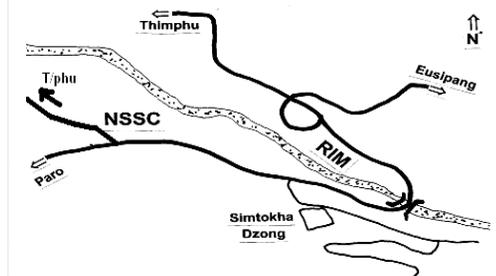**RNR Extension Material 2008**

LEAF SAMPLING FOR HORTI-CULTURAL TREE CROPS

Leaflet No. 4

NSSC Complex at Semtokha

Location

Guide to leaf sampling for horticultural tree crops

Leaf sampling and analysis - Leaf analysis is important in monitoring/evaluating the nutritional status of trees and provides guidelines for determining immediate correction of nutrient deficiency and the fertilizer needs.

MAIN OBJECTIVES FOR PLANT ANALYSIS

- ⳧ To aid in determining the nutrient supplying power of the soil
- ⳧ To aid in determining the effect of treatment on the nutrient supply in the plant
- ⳧ To study relationships between the nutrient status of the plant and crop performance as an aid in predicting fertilizer requirements
- ⳧ To help lay the foundation for approaching new problems or for surveying unknown regions to determine where critical plant nutritional experimentation should be conducted
- ⳧ For diagnosis of suspected nutrient elemental deficiencies

Method of leaf sample collection (Dos and Don'ts)

- ⳧ Leaves should be collected from the current seasons terminal shoots (from non fruiting, fully expanded 5-7 month old spring flush leaves) since these leaves reflect the plant's current nutrient element status and are easy to identify and collect.
- ⳧ Trees may be selected at random or by following a predetermined pattern.
- ⳧ Sampling should be grouped according to variety, tree age and soil type
- ⳧ No more than 2 leaves should be taken from an individual terminal shoot and at least 30 leaves should be collected.
- ⳧ Samples of 100 leaves should be collected

from at least 20 trees representative of the general orchard condition in no more than 20 ha units.

- ⳧ On larger trees, leaves should be collected from about 4 to 7 feet above ground.
- ⳧ If more than one variety, do not mix leaves from different varieties because the leaves of different varieties may differ greatly in their nutrient content.
- ⳧ Samples should be taken from about same height on all trees
- ⳧ Do not mix leaves from young and old trees.
- ⳧ Record observation of any incidences of diseases or insect damage, visual crop symptom, crop load etc.
- ⳧ Plants that have been under a long period of stress, or disease infested or damage by insects, and/or are mechanically injured should not be selected for sampling.

TIME OF LEAF SAMPLE COLLECTION
- ⳧ The time of sampling is very important.
- ⳧ The levels of most elements vary with the age of the leaf.
- ⳧ Leaves collected earlier in the season tend to have higher concentration of N, K and lower

Ca and vice versa if collected later.
- ⳧ Therefore, mid-season (for apples, when the fruits are of marble size) is the best sampling period.
- ⳧ During this period, the accumulation or the concentration of an element is at its peak or in a steady state.

Handling samples
- ⳧ Detach leaves and remove petioles.
- ⳧ Place the leaves in a dry paper bag or perforated plastic bag and immediately label the bag so that you will know from where it came from.

Sending leaf samples to SPAL for analysis.
- ⳧ Leaf samples to be sent to the laboratory should be accompanied or preceded by a "Request for Analysis" form or any explanatory letter giving relevant field data and clearly specifying the type of analysis required.
- ⳧ Every individual sample (i.e. from one plant) should have a sample number or proper identification. A label should be attached to the sample bag and a duplicate label inside.
- ⳧ Check the total number of sample bags with the number of samples mentioned on the request form. The identification on the bags should also correspond with the sample information given on the request form.
- ⳧ **The importance of careful sampling**:- The reliability of the results and the recommendations from analysis depends, ultimately, on the accuracy of the very first step – **Sampling!**
- ⳧ Sampling can be considered in terms of three simple stages:
  - ❖ Taking a representative sample of leaves or fruits
  - ❖ Supplying all necessary field and background information (particularly for problem areas).
  - ❖ Correct packing and immediate dispatch to the laboratory.