

3. Measurement considerations

Chaired by Mike Proe and Graeme Buchan

The objective of this workshop was to recommend a measurement protocol.

Graeme Buchan proposed the hypothesis that: a forest plantation can improve and then maintain the physical fertility of a soil (apart from episodic periods of planting and harvesting). Graeme was less sure about the effects of trees on chemical fertility and relegated the issue to an objective: to investigate the extent to which long-term plantation forestry can *maintain* chemical fertility. Graeme cautioned that in planning a long-term trial we should 'avoid overloading analytical facilities, expect the unforeseen and allow for climate change'.

The conclusion from an extensive discussion of measurement requirements was that the experimental site must be fully characterised before establishing the trial. A history of the site should be compiled that is as complete as possible and includes historical climate data. Great emphasis was given to defining site variability, both through systematic sampling and by taking aerial photographs during the onset of periods of water-stress.

Soil properties proposed for the pre-trial variability study included:

- basic soil chemistry (phosphate retention, pH, CEC, Δ mineral N);
- soil phosphate fractions;
- soil depth, profile description and bulk density;
- soil texture;
- soil mineralogy;

- available moisture capacity;
- biological characterisation; and
- vegetation, including species, biomass and mineral composition.

Pre-plant soil samples should be archived for future analysis.

After establishment, every conceivable soil, plant and climatic parameter was recommended for monitoring. In practice, the most likely option is a system of core samplings with routine analysis for estimates of chemical fertility and less frequent full profile description and analysis. Samples should be archived to allow more detailed analysis in future.

Routine plant measurements should be limited to height, diameter, and some estimate of leaf area index, possibly based on aerial photography.

It was suggested that reference points be established in study profiles so changes can be accurately described.

Climate measurements should be recorded continuously with less frequent detailed microclimate studies.

The general conclusions from this workshop supported:

- full site characterisation before planting;
- regular but limited soil and plant measurements after establishment, to describe tree growth soil pools and nutrient removals;
- archiving samples for future use; and
- an 'opportunistic' approach to more detailed sampling and process studies at intervals throughout the trial.