



**LIFE+ 2007**

**FUTMON**

**Further Development and Implementation of an EU-level Forest Monitoring System**

**Combined Field Course on Phenology and LAI**

**Actions: D1, D2, D3, C1-Tree-30(NWD), C1-Phen-10(FI), C1-Met-29(BY)**

**Minutes**

Tuesday, May 5

The workshop was opened by Egbert Beuker.

Dr. Mirko Medved, director of the Slovenian Forest Institute welcomed the participants to Slovenia and Lipica, and wished all a success full workshop. Mr. Zivan Veselic presented an introduction to Slovenian forestry. Slovenia is one of the most densely forested countries in Europe.

The workshop started with the phenology assessments. All participants were provided with a memory stick that contained all the background material on phenology.

First a short introduction to the draft manual was given, focusing on the major points that differ from the current ICP Forests manual Chapter 9: "Phenological Observations". On request from the database the coding for the stage of the events was changed so that code 0 will no longer be used.

Subsequently a short introduction to the use of digital cameras was given. The advantages of the use of cameras were presented, but also points of consideration were given. These will also be included into the field protocol. Cameras should be used when it is difficult or impossible to make the observations manually. It was decided that a minimum requirement for the quality of the pictures (minimum number of pixels) shall be included into the field protocol. Technical requirements for the cameras will not be given.

Life pictures from an on-line camera in Punkaharju, Finland were shown.

Pictures of autumn colouring and leaf fall in birch where shown and the analyses of the pictures was discussed. Subsequently participants of the course made themselves analyses of a series of pictures about autumn phenology in birch. It was experienced that it is not easy to assess pictures when one is not familiar with the species and with the history of the stand during the growing period. Analyzing pictures requires about the same training as making phenology observations in the field.

Concerning the assessment of damages it was decided that damage will be assessed, but submitted with the phenology data only on a no or yes basis. In case damage occurs further assessment of the damage should be made and submitted using the Damage forms following the guidelines of the ICP Forests manual chapter 2 "Visual Assessment of the Crown Condition", Annex 2 "Assessment of damage causes".

The second item of the day was the leaf area index (LAI) measurements within the FutMon actions D1, D2 and D3. First the objectives of this part of the workshop were defined. The requirements of the several D actions on LAI measurements should be clarified. A second aim was to give an overview about existing methods for LAI measurement and a third point was to compare different methods and making first experiences during a field course.

The requirements on LAI measurements were presented by Inge Dammann for D1, by John Derome for D2 and Stephan Raspe for D3. The following table gives a summary of their talks.

Action	D1	D2	D3
Definition	total one-sided foliage area per unit ground surface area (Chen and Black 1991)		
Objectives	Develop a new tree vitality parameter comparable with defoliation	Only a supplementary role in estimating leaf biomass for nutrient cycles	<ul style="list-style-type: none"> <li>• Parameterisation of water budget models (interception, transpiration, soil evaporation)</li> <li>• Improvement of transfer functions</li> </ul>
Resolution	<ul style="list-style-type: none"> <li>• relation to crown condition sites</li> <li>• 40 scores /site</li> <li>• annual values</li> <li>• vegetation &amp; non vegetation period</li> </ul>	A general value for the plot; no annual variation needed	<ul style="list-style-type: none"> <li>• representative for plot(&amp;species)</li> <li>• min &amp; max of the year</li> <li>• annual values?</li> </ul>

After this introductions into the different methods are given by experts:

Matjaz Cater: Light environment measurements and basic evaluation of images.

it was a good introduction to indirect methods for light measurements in forests and their different results. He explained the general functioning of canopy analyzers like

Li-Cor LAI2000 and of canopy analysis systems based on hemispherical image analysis (WinScanopy). Both systems produce a set of outcomes from which the LAI is probably the most difficult one. Therefore, he suggested to use better the “transparency” or “gap fraction” as an index for tree vitality than the LAI.

Michael Leuchner: Methods for the indirect determination of the Leaf Area Index (LAI) in forest canopies - LI-COR LAI-2000 Plant Canopy Analyzer.

The introduction was clear and broad with a summary of advantages and disadvantages of the LI-COR LAI-2000 system. Advantages are:

- fast measurements
- easy to handle (measurements and data handling)
- good repeatability
- good for determining relative changes in LAI (seasonal / interannual)

Disadvantages are:

- stand has to be characterized well for good absolute values (clumping, woody area etc.)
- meteorological limitations (never perfect conditions)
- necessity of a clearing in proximity of the measurements
- several corrections add to total uncertainty

Christian Hertel: Methods for the indirect determination of the Leaf Area Index (LAI) in forest canopies - Hemispherical Images for LAI analysis (WinScanopy).

The introduction was clear and broad with a summary of advantages and disadvantages of the WinScanopy system. Advantages are:

- Visually useable dataset
- More than LAI-data (openness, PPF, gap fraction, suntrack, clumping etc.)
- Useable on clear sky and overcast sky-conditions

Disadvantages are:

- intensive postprocessing needed (no instantaneous read-out possible)
- photographic expertise necessary
- meteorological limitations
- with use of manual mode: subjective

John Derome: Planar mosaic photos.

Similar to hemispherical photography this techniques use a mosaic of “normal” digital photos. The evaluation is done by a specific black and white analysis soft ware. In Finland this method was used for all Biosoil plots.

Marius Teodosiu: The Trac-System.

The Trac-System is a method which is again a light intensity measurement system. The big advantage of this system is simultaneous measurement of a correction factor needed for e.g. LI-COR LAI2000 method.

Wednesday, May 6

During the second day of the workshop an excursion was organized to look at and practice spring phenology observations and different methods for LAI measurements. Due to the warm weather during spring unfortunately most of the spring phenology of forest trees in the region was already more or less completed. However, at a Black pine stand near Sezana there was a good discussion about the defining of flushing in pine. According to the manual flushing occurs when the separate green needles become visible. However, in black pine the needles are not yet clearly green when they become visible.

Also flowering of black pine was demonstrated. At a second stand of black pine the occurrence of damage was demonstrated.

After lunch Stephan Raspe demonstrated the use of a Speed Dome camera for phenology observations. The camera was located at the ground and looks with an optical zoom (36 fold) into the crown of the trees, similar to manual observations with binoculars.

At about 1100 m asl. an European beech stand was found with all the different stages of flushing still occurring. In this stand 15 trees were selected and the participants were asked to make the observations on flushing. After this the whole group discussed the flushing stage of each of the 15 trees. Again it became obvious how important proper training for the field staff is. A major outcome of the discussion was that the scoring classes for phenology will be revised in such way that 0% and 100% will be replaced by "less than 1%" and "more than 99%", respectively.

During the field course LAI measurements with different methods were demonstrated at two different sites (one in a pine stand and another in a beech stand). LI-COR LAI 2000 was demonstrated by Michael Leuchner. The handling of this system could be tested by all participants. Problems with adequate weather conditions and suitable open field conditions for reference measurements were shown and discussed. The TRAC system was shown by Marius Teodosiu and some measurements were done. Hemispherical photography was demonstrated by Matjaz Cater and Christian Hertel (WinScanopy) and Martin Greve (simple fish eye photography and free ware evaluation). Differences between the methods were discussed and some photos were taken.

The day was closed with a social diner at a nice vineyard near Vipava.

Thursday, May 7

First the results of the field exercise with the flushing of beech (attached) were presented and discussed. In cooperation with Volker Mues (the FutMon data centre) the final draft of the Field protocol was prepared including the submission forms according to the results of the discussions of the former days. It was also decided that pictures from automatic cameras will have to be send to

the FutMon data centre. Guidelines will be presented soon. It was also decided that the intensity of flowering can be assessed as an optional parameter. The forms will be adjusted accordingly.

Concerning QA the need for sufficient training of the field staff was stressed once again. Control of the observations made manually by field staff is almost impossible.

In the second part of the day LAI evaluation and field protocol for LAI measurements were discussed. First the evaluation of data taken during the field course on Wednesday was demonstrated by the experts. Here the differences between the methods became obvious and the following requirements on data submission were discussed. This results in a first draft of a field protocol for LAI measurements, which was prepared during the night before by a small group (Volker Mues, Matjaz Cater, Inge Dammann, John Derome, Martin Greve, Michael Leuchner, Christian Hertel, Stephan Raspe). Volker Mues will finish this draft before the St. Peterburg meeting with some assistance of the experts.

The workshop was closed by Stephan Raspe with special thanks to the external experts Matjaz Cater, Martin Greve, Michael Leuchner and Christian Hertel).