



FunDivEUROPE

Functional significance of forest biodiversity in Europe

Project number: 265171

Leaf Area Index sampling and assessment

FunDivEUROPE (FP7) field protocol

V1.0

Last update: 3rd March 2011

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1 Introduction

Leaves are the active interface of energy, carbon and water exchanges between forest canopies and the atmosphere. The leaf component of a canopy may be quantified by its structural attribute Leaf Area Index (LAI), projected leaf area per unit of ground area. This important parameter regulates a number of ecophysiological processes, such as evapotranspiration and photosynthesis; hence, it is related to stand productivity and is a key variable in various stand and regional-scale models. Nevertheless, direct measurements of LAI in forest stands are difficult and time-consuming; therefore, indirect procedures have been developed and are commonly used. Direct estimates based on tree allometry and litterfall are labour-intensive; furthermore, with these methods it is difficult to follow the spatial and temporal dynamics of leaf area development. For this reason, in the last decades, indirect methods based on the measure of light transmission through plant canopies have been developed to estimate LAI of forest stands. In recent years, new instruments have been developed in order to measure rapidly and reliably LAI of plant canopies. One of the more often used is the LAI 2000 Plant Canopy Analyzer (PCA, Li-Cor, Lincoln, NE, USA), a portable instrument that does not require additional data acquisition and processing, but is able to provide immediate LAI estimates.

2 Scope and application

The objective of this part of the manual is to provide harmonized and standard procedures for LAI measurement with indirect methods, linking the results to litterfall analysis (direct method). Other links can be found in the actions regarding the understory vegetation (light reaching the soil) and in the soil processes. In order to get an estimate of the variation of the leaf area and so of the crown structure and light conditions under crown a systematic sampling design is necessary. The present protocol is related to the “field protocol” of LAI assessment of the FutMon project.

3 Objectives

The objective of this task is to have an estimation of the overall photosynthetic surface and net primary production.

4 Location of measurements and sampling

The sampling will be done in the Experimental and Exploratory sites (including the highly instrumented plots) of FunDivEUROPE.

To enhance the comparability with direct methods, the measurements will be done at the same locations of the litter traps (five per plot in all sites apart from the Experimental site of BIOTREE/Kaltenborn, where eight points per plot will be sampled).

4.1 Sampling equipment:

LAI 2000 Plant Canopy Analyzer (PCA, Li-Cor, Lincoln, NE, USA). Follow strictly the advices given in the manual

ftp://ftp.licor.com/perm/env/LAI-2000/Manual/LAI-2000_Manual.pdf

4.2 Frequency of sampling:

The assessment will be done once, at July 2012, in the Exploratory sites and in July 2011 in the Experimental sites. Where possible, winter measurements on deciduous tree species (during time without leaves) are optional.

4.3 Sample collection, transport and storage – quality control in the field and between plots and sites

No sample collection, transport and storage. Data are stored in the instrument and sent to the institute responsible for data treatment, in the formats according to the download programme. Different instruments working simultaneously will be intercalibrated before starting with the assessment campaign.

5 Measurements

Measurements will be done directly in the field. Date and time as well as the weather conditions have to be specified as precise as possible. A form concluding the data on documentation of field situation will be used for this.

6 Data sheet template

PLOT Nr	DATE	START Hour	END Hour	FIRST Record	LAST Record	NOTE

7 References

- Bréda, N.J.J., 2003. Ground-based measurements of leaf area index: a review of methods, instruments and current controversies. *J. Exp. Bot.* 54: 2403-2417.
- Cutini, A., Matteucci, G., Scarascia Mugnozza, G. (1998): Estimation of leaf area index with the Li-Cor LAI 2000 in deciduous forests. *Forest Ecology and Management* 105, 55–65.
- Deblonde, G., Penner, M., Royer, A. (1994): Measuring Leaf Area Index with the Li-Cor LAI-2000 in Pine Stands. *Ecology* 75, 1507-1511.