



MIXED AND PURE FORESTS IN A CHANGING WORLD*

Session 1
MIXED STANDS

Session 2
CARBON AND BIOMASS MODELLING

Session 3
SUSTAINABILITY OF FOREST STANDS

Session 4
FORESTS AND CHANGES



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BOOK OF ABSTRACTS

MIXED AND PURE FORESTS IN A CHANGING WORLD*

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BOOK OF ABSTRACTS

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CO₂ FLUXES IN SHORT ROTATION COPPICES FOR ENERGY PRODUCTION

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Short rotation coppices (SRC), which usually consist of densely planted and high-yielding willow and poplar clones, can provide a sustainable source of energy. Furthermore, the potential of these systems as carbon sinks, recognized in the international debate on the global carbon balance and climate change impacts, may also make them a good option for many countries to receive 'carbon credits' to offset the effects of greenhouse gases emissions.

With the purpose of evaluating and optimizing the contribution of this type of intensively managed crops in carbon sequestration, CO₂ vertical fluxes have been measured in a SRC stand installed in Bragança, Portugal. Chamber based-techniques were designed to measure both CO₂ soil effluxes and exchange rates between the crops canopy and the atmospheric boundary layer. Soil fluxes are measured at various locations by means of an open top dynamic chamber. Biosphere/atmosphere CO₂ exchange rates are evaluated by using a large ventilated open top chamber. CO₂ analyses are performed by using an ADC 2250 differential infrared gas analyzer coupled to an automatic gas sampling and data acquisition system. Measurements are taken every 10 seconds and averaged over half hour intervals. These measurements will be continued throughout several seasons, with the purpose of investigating daily and seasonal patterns of net ecosystem CO₂ exchange rate. To support our analysis, other relevant environmental variables as meteorological, soil temperature and soil humidity have also been monitored.

The results obtained so far are still scarce, but very encouraging since they show the ability of the system to perform reliable and continuous measurements of CO₂ fluxes. This presentation will focus on the description of the developed experimental facility, on the methodologies adopted and on the evaluation of the studied SRC system as carbon pools.

EFFECT OF INITIAL STAND DENSITY ON ALLOMETRY OF EUCALYPTUS GLOBULUS IN PORTUGUESE CONDITIONS

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The 3-PG process-based model has been widely used in both research and management context to predict the productivity of tree plantations in relation to climate and soil conditions. Calibration of 3-PG for *Eucalyptus globulus* Labill. in Portuguese conditions performed by Fontes, *et al.* (2006) showed that the parameter values for the NPP partitioning parameters were quite different from those of Sands and Landsberg (2002). They also noted that some parameters had to be adapted for high stocking stands. At high stocking, the parameters a_0 of the allometric equation, γFx of the litterfall rate equation and pRx of NPP allocation to roots equation had to be changed. However, their work only proposes changes on parameter values for the 1x2 m spacing (5000 trees ha⁻¹). In order to express those parameters as a function of initial stand density (Npl) and improve the predictive ability of 3PG in *Eucalyptus* stands of different spacings, a first evaluation of the variation of the parameter a_0 of the allometric equation with initial spacing was made. Data from destructive measurement of 513 trees from several sites representative of the *Eucalyptus* expansion area in Portugal were used. This data include seminal and clonal experiments and cover a large range of site qualities, stocking and stand ages.

The nonlinear regression $w = a_0 d^{-n}$ with a_0 and n as parameters was fitted to the data and the parameter a_0 was estimated using the SAS procedure PROC NLIN (SAS Institute, 2004). It was found that a_0 was significantly affected by initial stand density as well as by clone and an equation for expressing a_0 as a function of Npl and clone was obtained. Analysis of the influence of Npl on the parameters γFx and pRx is under development.