

# MANAGED FORESTS IN FUTURE LANDSCAPES

IMPLICATIONS FOR WATER AND CARBON CYCLES

Santiago de Compostela, Spain - May 8-11, 2011

## BOOK OF ABSTRACTS



**INTERNATIONAL YEAR  
OF FORESTS • 2011**



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POSTER PRESENTATIONS: MONDAY, 9 MAY: 11:30-12:30. POSTER AREA 3

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# LOCAL-SCALE FLUXES OF CARBON DIOXIDE IN A POPLAR SHORT ROTATION COPPICE

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## ABSTRACT

Short rotation crops can provide biomass fuel for a wide range of users in co-firing plants and to replace other conventional energy resources used for heating and/or power generation. These biomass systems have also a considerable potential for carbon sequestration, which may constitute a good option to offset greenhouse gas emissions.

With the purpose of evaluating the contribution of these intensively managed crop systems to carbon sequestration, we measured daily and seasonal patterns of net exchange rates of CO<sub>2</sub> and soil effluxes in a poplar short rotation plot installed in the vicinity of the city of Bragança, Portugal. Open top chamber based-techniques were designed to measure both CO<sub>2</sub> soil effluxes and exchange rates between the crop canopy and the atmosphere. Chambers inflow and outflow CO<sub>2</sub> concentrations were measured by means of an ADC 2250 differential infrared gas analyzer coupled to an automatic sampling and acquisition system. This study started in the summer of 2010 and the data collected so far covers only part of the annual growth cycle of the poplar coppice. Poplar trees were already in an advanced stage of their growth cycle and from then on they have been subjected to stress environmental conditions, especially heat and high soil moisture deficit, which were observed until the end of September.

The main results showed a significant variation of CO<sub>2</sub> fluxes over the evaluation period. Day/night variation pattern was a common characteristic, but with shapes and magnitudes clearly influenced by the physiological activity of the poplar trees. The pronounced diurnal cycle with CO<sub>2</sub> uptake during daytime and an upward flux at night registered in late September gave gradually rise to a CO<sub>2</sub> emission pattern in the second half of November, slightly before the falling of the leaves. These preliminary results showed the potential of this energy crops to absorb large amounts of carbon dioxide during the growing season, but in the senescent period and/or under very stressful environmental conditions these biomass systems become predominantly a source of CO<sub>2</sub>.

**KEYWORDS:** Net CO<sub>2</sub> fluxes, Carbon sequestration, Soil CO<sub>2</sub> effluxes, Chamber methods, Energy crops