



Species effect on the water use efficiency of a mixed forest of beech (*Fagus sylvatica* L.), Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco) and silver fir (*Abies alba* Mill.) in Belgium Ardennes.

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Induced by climate change, intensity and frequency of droughts should be more important for the next century. How does water availability affect the physiology of woody plants at the species and stand scale? Carbon and water vapour fluxes measurements of a mixed forest (deciduous and coniferous) were performed for over ten years by the eddy covariance method in Belgian Ardennes (Aubinet et al, 2001) as a part of the CarboEurope project. Whereas carbon fluxes have been analyzed in detailed and good estimations of the Net Ecosystem Exchange (NEE) and Gross Primary Production (GPP) were obtained, a thorough analysis of water vapour fluxes remains to be done. Improving analysis of water vapour fluxes and monitoring species transpiration will contribute to the estimation of the water use efficiency, WUE, at both the species and stand scale. The WUE well characterizes the vegetation productivity and ecosystem response to environmental factors. It also allows evaluating the sensitivity of temperate woody species to drought. The species concerned are beech (*Fagus sylvatica* L.), Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco) and silver fir (*Abies alba* Mill.). Since summer 2009 we monitor and analyze each species water use by measuring sap flow with the thermal dissipation method (Granier, 1987). Results at the species level will then be upscaled and compared to stand water vapour fluxes measurements obtained by the eddy covariance methodology. Transpiration of each species will be analyzed in relation with their own phenological and ecophysiological attributes, ecosystem soil and atmospheric conditions, to clarify among others their behaviour in case of water deficit. Data are actually analysed, the presented results will concern the 2009, and a part of 2010 growing season.