



Tree and stand water fluxes of hybrid poplar clone (*Populus nigra* x *P. maximowiczii*) in short rotation coppice culture

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This study reports on evapotranspiration and tree water use in short rotation coppice culture of hybrid poplar (*Populus nigra* x *P. maximowiczii*) for biomass energy in the Czech Republic. The high density poplar plantation (10 000 trees per ha) was established in 2003 on arable land in Czech-Moravian Highland (49°32' N, 16°15' E, 530 m a.s.l.) and has been coppiced in rotation period of 7 years.

Firstly, evapotranspiration of the stand has been estimated by applying the Bowen ratio-energy budget method, which is considered as reliable, robust, quite simple and inexpensive technique with comparable results to eddy covariance and lysimeters. The gaps in evapotranspiration diurnal patterns caused by limitation of the bowen ratio method were filled with simple linear regression model based on relation between potential and actual evapotranspiration with regard to soil water availability and leaf area index and thus the daily, monthly and seasonal totals could be calculated. The amount of evapotranspiration during the growing season 2009 (1 March – 31 October) was 593 mm with highest monthly total 116 mm in June. Mean daily water loss over the season reached 2.43 mm per day. During the hot summer day, the maximal value 5.73 mm per day, which presented 89 % of potential evapotranspiration calculated by Penman equation, was recorded with a peak rate 0.94 mm per hour.

Secondly, the transpiration was measured by sap flow tissue heat balance techniques on four individual trees with greatest stem diameters (11 – 12 cm d.b.h.) and height of 12 – 12.5 m. Relatively high transpiration values by the poplars were found during the measured part of growing season (18 June – 31 October), with maximum and mean daily transpiration of 44.41 dm³ and 16.69 dm³ per day, respectively. The seasonal transpiration of the most vigorous from the investigated individuals amounted 2542 dm³. Because in this study we didn't evaluate the transpiration of thinner trees (technical features of sap flow method don't enable to assess trees smaller than 10 cm and bigger than 2 cm d.b.h.), scaling the transpiration to the whole stand through the relation between leaf area index, d.b.h. and the sap flow is under evaluation and results will be presented at the conference. The presentation will also include comparison between actual evapotranspiration over the reference grass surface in the immediate vicinity of the poplar plantation. The differences between the actual evapotranspiration and transpiration of the poplar stand and other special features of this bioenergy production system will be revealed in more detail.

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