



Sap flow measurements to determine the transpiration of facade greenings

Marie-Therese Hölscher, Thomas Nehls, and Gerd Wessolek

Technische Universität Berlin, Institute für Ökologie, Dept. Soil Conservation, Berlin, Germany

Facade greening is expected to make a major contribution to the mitigation of the urban heat-island effect through transpiration cooling, thermal insulation and shading of vertical built structures. However, no studies are available on water demand and the transpiration of urban vertical green. Such knowledge is needed as the plants must be sufficiently watered, otherwise the posited positive effects of vertical green can turn into disadvantages when compared to a white wall.

Within the framework of the German Research Group DFG FOR 1736 "Urban Climate and Heat Stress" this study aims to test the practicability of the sap flow technique for transpiration measurements of climbing plants and to obtain potential transpiration rates for the most commonly used species.

Using sap flow measurements we determined the transpiration of *Fallopia baldschuanica*, *Parthenocissus tricuspidata* and *Hedera helix* in pot experiments (about 1 m high) during the hot summer period from August 17th to August 30th 2012 under indoor conditions.

Sap flow measurements corresponded well to simultaneous weight measurement on a daily base (factor 1.19). *Fallopia baldschuanica* has the highest daily transpiration rate based on leaf area (1.6 mm d^{-1}) and per base area (5.0 mm d^{-1}). *Parthenocissus tricuspidata* and *Hedera helix* show transpiration rates of 3.5 and 0.4 mm d^{-1} (per base area). Through water shortage, transpiration strongly decreased and leaf temperature measured by infrared thermography increased by 1 K compared to a well watered plant.

We transferred the technique to outdoor conditions and will present first results for facade greenings in the inner-city of Berlin for the hottest period in summer 2013.