Verhandlungen der **Gesellschaft für Ökologie** - Band 42

GfÖ 2012

ISSN 0171-1113

From Basic Ecology to the
Challenges of Modern Society

LEUPHANA
UNIVERSITÄT LÜNEBURG

stress treatment was irrigated with water amounts between 0.75 to 2.0 liters per day subject to the respective climatic conditions. The well-watered plants were watered each day with not less than 4 liters. The H_2O and CO_2-gas exchange of leaves was measured with a minicuvette system and chlorophyll fluorescence was monitored with a pulse-modulated fluorometer Walz-PAM-2100. Stem circumferences above ground level of the pots and in breast height were determined at the beginning and at the end of the drought experiment. Net photosynthesis and transpiration was reduced by drought due to stomatal closure. To minimize transpiration on plant level leaf area was reduce by drastic leaf fall. Increasing temperature and vpd increased transpiration significantly from 0.68 to 3.6 mmol m^{-2} s^{-1} only in the well-watered plants, while in drought stressed plants it is 0.39 to 0.48 mmol m^{-2} s^{-1}. Mean electron transport rates ranged from 71-105 µmol m^{-2} s^{-1} in drought stressed plants to 113–136 µmol m^{-2} s^{-1} in the well-watered plants. The diameter growth of the drought stressed trees was reduced by 42%.

P3 – Influence of nitrogen fertilization on photosynthesis and leaf nitrogen content of leaves of poplar and willow plants in short rotation plantations

Maik Veste[2], Antje Balasus[1], Jürgen Kern[1], Werner B. Herppich[1]

[1]Leibniz-Institut für Agrartechnik Potsdam-Bornim, Potsdam, DE
[2]Centre for Energy Technology Brandenburg e.V., Cottbus, DE

The demand for bioenergy plants and renewable raw material will increase in the next decades. The sustainability of their production depends on conservation and appropriate use of natural water and nutrient resources in the respective ecosystems. The efficient use of nitrogen is important for maintaining or increasing biomass yields and reducing environmental impacts in short-rotation plantations. In our experiment, we identified the effect of nitrogen fertilization on chlorophyll content, leaf nitrogen content and photosynthetic performance of poplars (*Populus maximovizcii* × *P. nigra* clone max 4) and willows (*Salix viminalis* clone Inger) growing at different nitrogen levels (0, 25, 50 and 75 kg N/ha year) in a field trial at the Institute for Agricultural Engineering in Potsdam-Bornim (Germany). Photosynthetic performance of single leaves was determined with a pulse-modulated fluorometer. Furthermore, three leaves were selected for photosynthetic light dependency measurement. Chlorophyll content of individual leaves were measured with a Yara-N-tester and related to the measured electron transport rate. A mixed sample of leaves were dried and analysed with an element analyser for their carbon and nitrogen contents. Mean electron transport rate (ETR) of poplar leaves showed a high variation ranging between 69.7 +/- 22.4 and 125.6 +/- 30.5 µmol $m^{-2}s^{-1}$, whereas, in willows, ETR was between 145.6 +/- 38.1 µmol $m^{-2}s^{-1}$ and 186.2 +/- 20.8 µmol $m^{-2}s^{-1}$. In poplars electron transport rates linearly related to the chlorophyll content as measured with the Yara-N-Tester. However, no significant influence of the nitrogen treatment on photosynthesis, and chlorophyll and nitrogen content could be observed for both tree species.