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Investigating the molecular basis of drought tolerance in Populus: The WATBIO Populus core experiment

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Introduction

- **Populus core experiment:** Investigation of drought stress responses of selected *Populus* genotypes
- **Unifying research aim of participating groups:** Analysis of development of tissues and organs under drought in order to identify mechanisms important to maintain growth under limited water availability
- **Main hypothesis:** *Populus* genotypes originating from different environments harbour adaptation mechanisms that can be exploited to produce new germplasm for sustained biomass production under stress

Methods

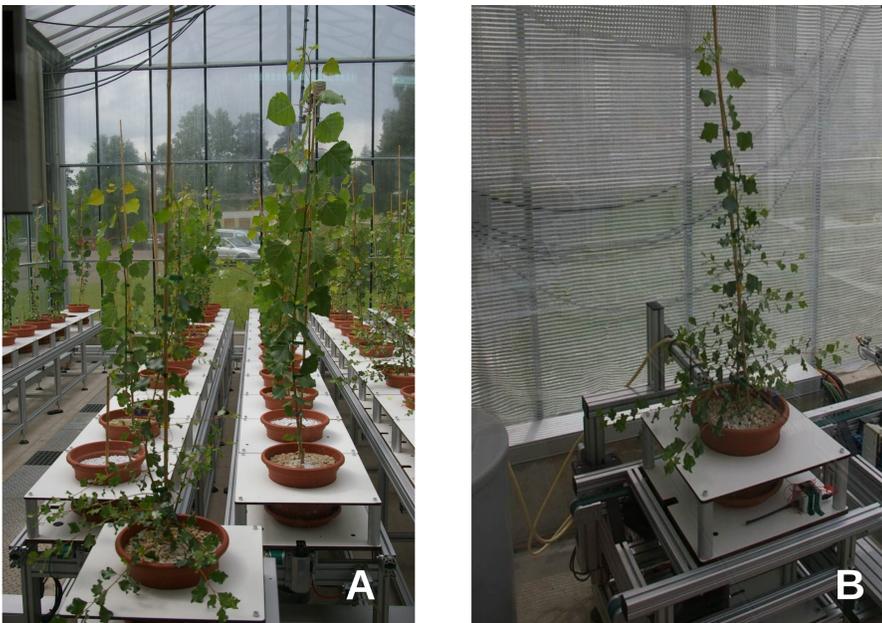


Fig. 1 | Poplar plants in the glasshouse at INRA Nancy (A, B). Trees of three *Populus nigra* genotypes originating from habitats characterised by increasing water limitation were exposed to a control or drought treatment (cf. Fig. 2). B) A plant of genotype „Spain“ on the watering station, a balance adjusting the pot weight to a target weight corresponding to the defined soil water content three times per day.

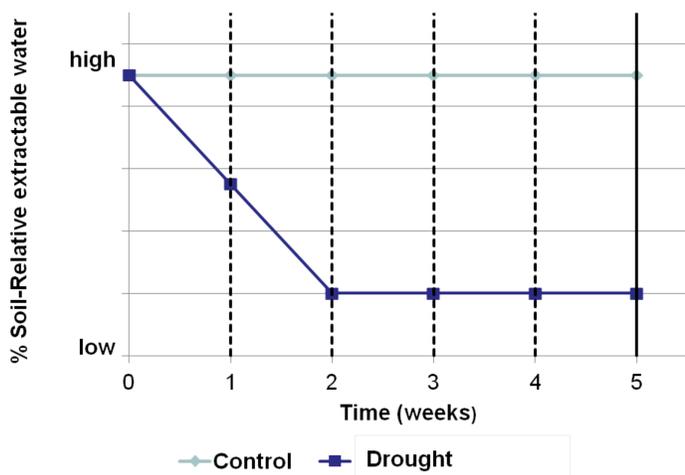
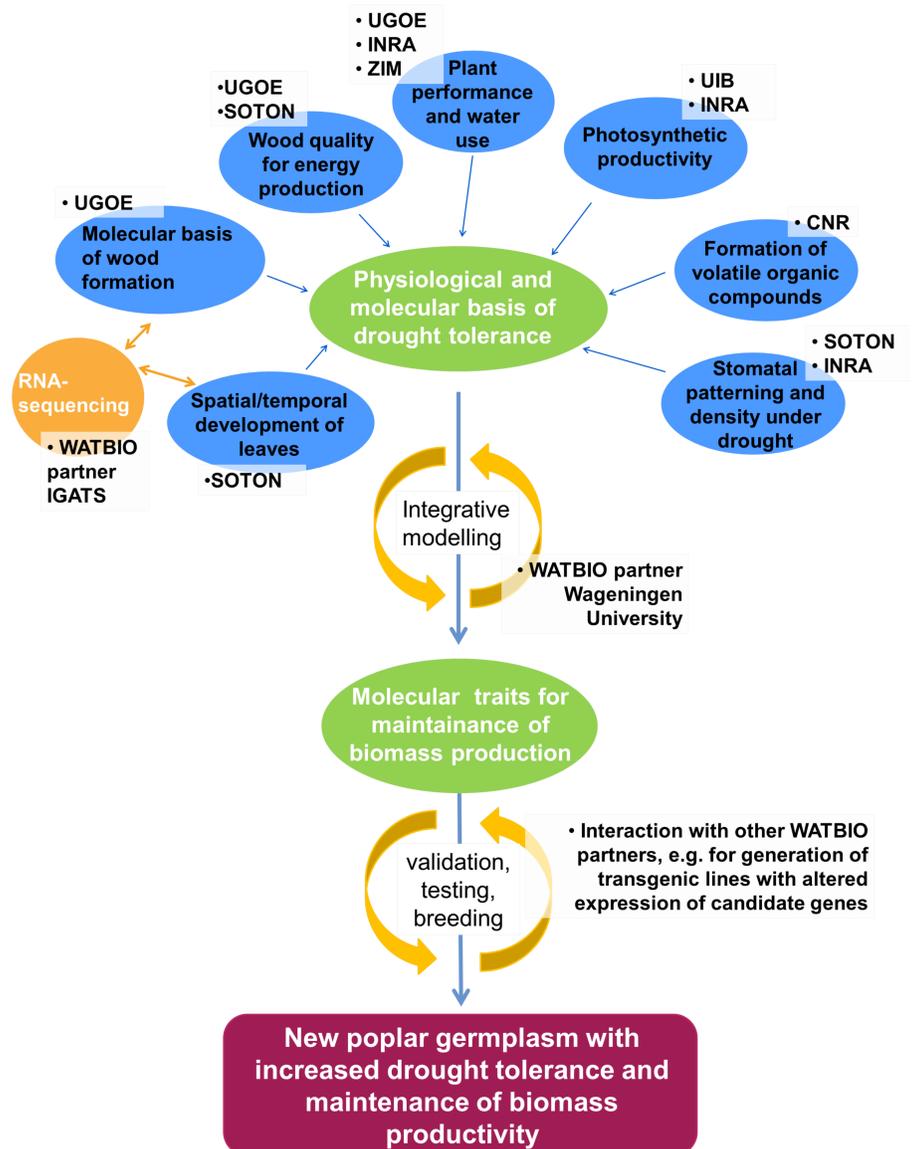


Fig. 2 | Soil water conditions in a drought stress experiment with *Populus nigra*. Trees of three genotypes were exposed to a control treatment with high soil-relative extractable water (soil-REW) or a drought treatment with a low level soil-REW.

Concept

• The involved partners contribute their expertise to achieve the main goal of the WATBIO project



• A core set of measurements is carried out

- Biomass yield
- Soil water status
- Plant water status
- Leaf size, total leaf area
- Branching patterns
- Stomatal conductance
- Wood/lignocellulosic quality, saccharification potential

Outlook

- Data analysis of growth and physiological parameters
- Study wood anatomy and –composition
- Perform transcriptomics (mRNA-Seq) and metabolomics to understand the molecular basis of the observed changes in growth in physiology

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