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Plasticity of xylem vulnerability to cavitation and its structural determinants in *Populus tremula x alba*

Cédric Lemaire¹, Yann Quilichini², Jérémie Santini², Nicole Brunel-Michac¹, Julien Cartailier¹, Romain Souchal¹, Pierre Conchon¹, Stephane Herbette^{1*}

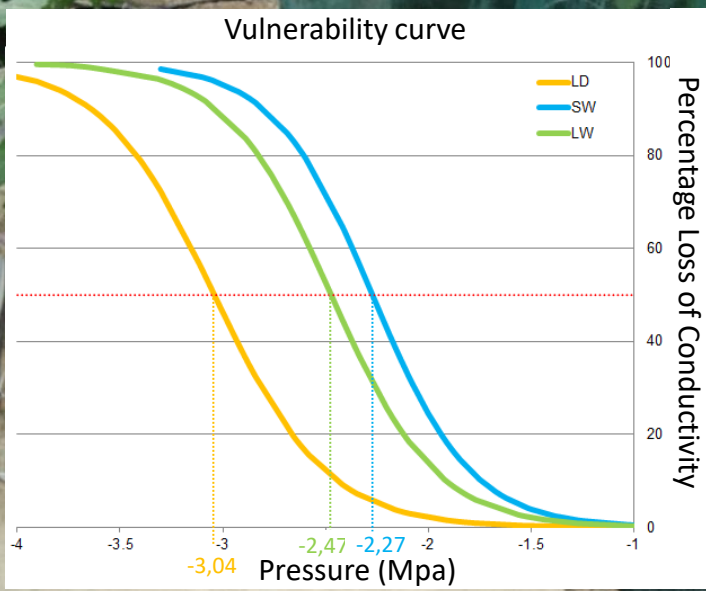
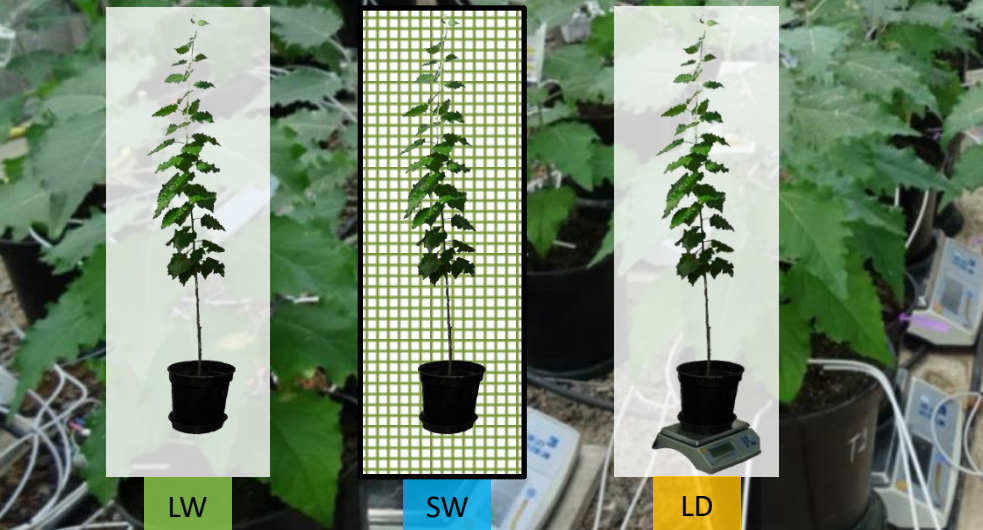
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Scientific background:

Xylem vulnerability to cavitation is a major trait to assess plant drought resistance. An environmental plasticity for this trait could permit an acclimation to climate conditions. Knowledge on plasticity of vulnerability to cavitation remains weak, especially on genetic and structural basis. The objective of this setup is to investigate these latter.

Experimental setup:

Young poplar trees grown under contrasted conditions: **LW: Light + Watered**; **SW: Shaded + Watered**; **LD: Light + Droughted**. **Light**= full Sun Light. **Shade**= plants covered by shade-house intercept 30% of incident light. **Watered**= Watered at full field capacity (FC). **Drought**=a water regime at 25-30% FC was applied thanks to a device coupling a weight survey and a watering control by selenoid valve. We managed water stress in order to constrain the hydraulic properties the most but without stopping growth (radial growth survey).

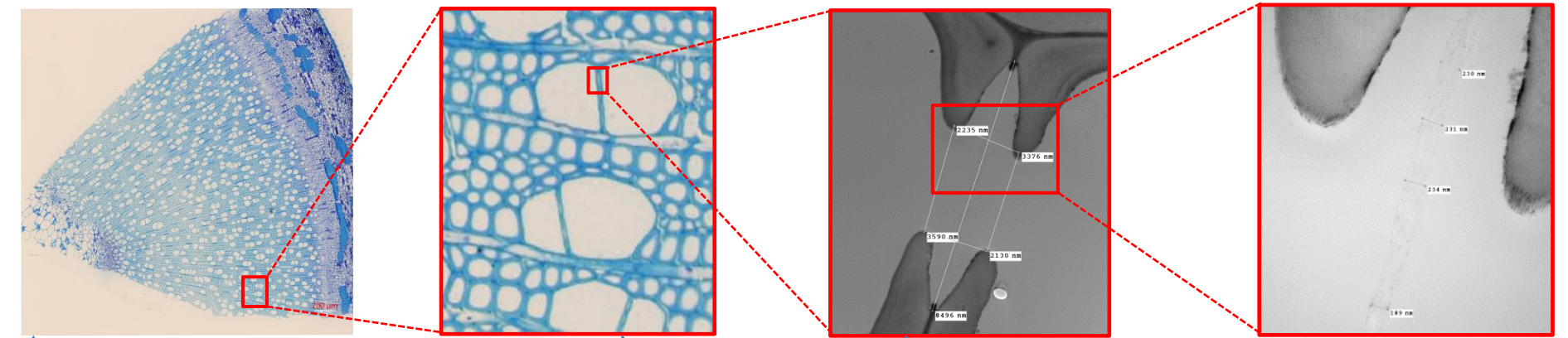


Water potential (MPa)	LW	SW	LD
Predawn	-0.14	-0.11	-0.55 *
Minimum	-0.98	-0.98	-1.44 *

The contrasted irrigation and light conditions induced **plasticity of cavitation resistance**.

Structural basis?

Several imaging and microscopy methods are used to investigate the structural determinants underlying this changes in cavitation resistance.



- Xylem scale**
Optical Microscopy
- Xylem organisation
- Vessel grouping index
- Vessel scale**
Optical Microscopy
- Vessel diameters
- Wall length connecting other vessels
- Pit scale**
Transmission Electron Microscopy
- Pit geometry
- Membrane thickness
- Scanning Electron Microscopy**
- Vessel area covered by pits

