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Cavitation vulnerability in 3 poplars : inter-specific differences and organ diversity

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Introduction

Cavitation of xylem conduits induced by low water potential limits water movement and has a major influence on plant production and survival. Vulnerability to cavitation can therefore be an indicator of drought tolerance. In this study, cavitation vulnerability is assessed in different organs of *Populus alba*, *P. euphratica* and *P. trichocarpa* x *koreana* cv Peace.

Methods

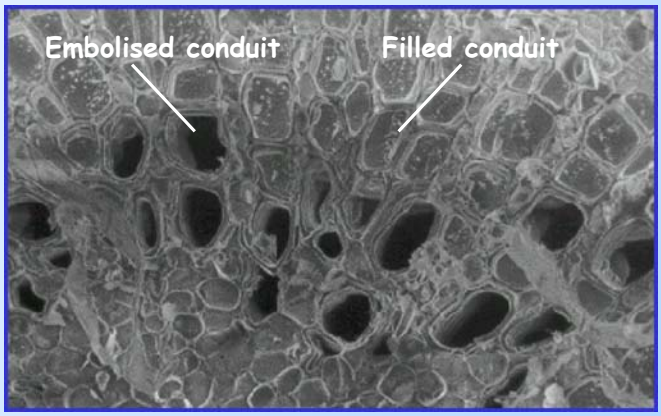
1. **Cavitation** was induced by pressurisation
2. **Stem and primary root** embolism was estimated as the **percentage loss of conductivity** (PLC, Sperry *et al.*, 1988)

   $PLC = (K_s - K_i)/K_s \times 100$

   K_i : initial conductivity

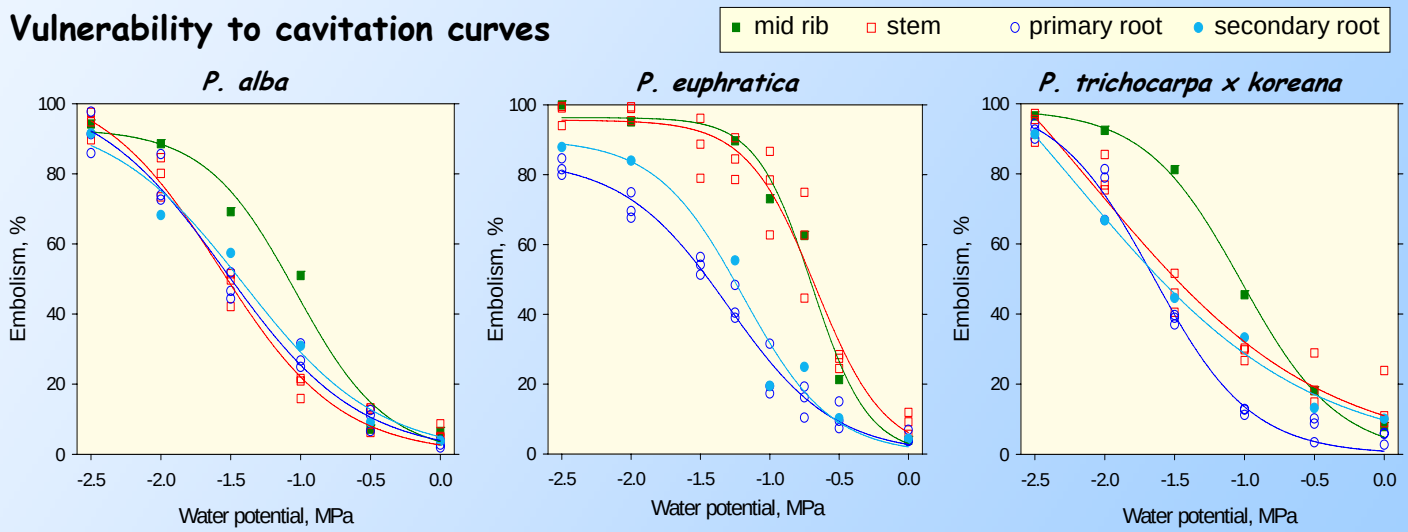
   K_s : saturated conductivity

3. **Leaf mid-rib and secondary root** embolism was investigated by visual examination using **Cryo-SEM imaging** (Cochard *et al.* 2001).

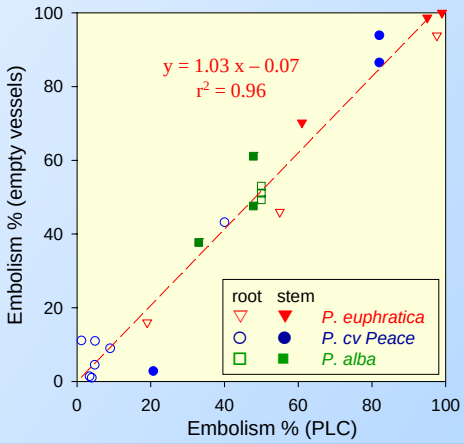


Cryo-SEM image of *P. alba* leaf mid-rib vein

Vulnerability to cavitation curves



Comparison of cryo-SEM and PLC methods of determining embolism



Results and conclusions

- tight correlation between measured PLC and percentage of empty vessels: validation of the cryo-SEM method
- all 3 poplars are very vulnerable. *P. euphratica*, originating from arid areas, is the most vulnerable species
- no apparent difference in vulnerability between primary and secondary roots
- leaf mid-ribs veins are the most vulnerable tissue (with stem for *P. euphratica*)
- roots of *P. euphratica* are less vulnerable to cavitation than stem and mid rib veins : protected by the lost of shoot hydraulic pathway

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References:
Cochard H, Bodet C, Améglio T, Cruziat P. *Plant Physiol.* **124**:1191-1202
Sperry JS, Donnelly JR, Tyree MT. *Plant Cell Environ.* **11**:35-40