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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

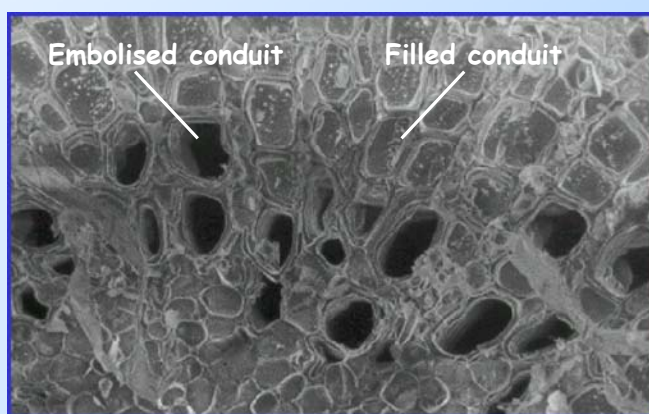
2. Stem and primary root embolism was estimated as the **percentage loss of conductivity** (PLC, Sperry *et al.*, 1988)

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

$K_i$  : initial conductivity

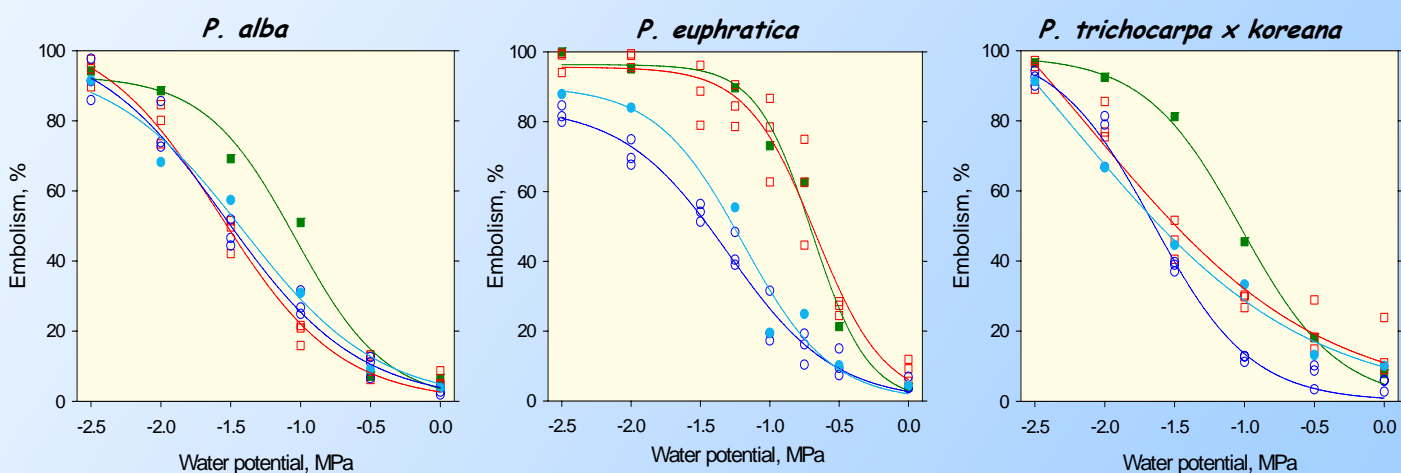
$K_s$  : saturated conductivity

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

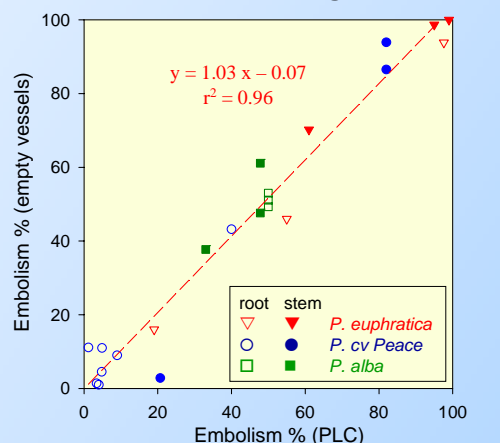


Cryo-SEM image of *P. alba* leaf mid-rib vein

## 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