Comparison of vessel features in tension wood and opposite wood of young shoots of Poplar (*Populus euramericana* cv 'Ghoy') submitted to a gravitational stimulus

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Tension wood is a tissue which normally develops on the upper face of branches and bent stems of most hardwood species. It is generally admitted that such a formation is induced by a gravitational stimulus due to the displacement of an axis with regard to its equilibrium position. For Poplar, very sensitive to such a stimulus, the formation of tension wood represents an effective mechanism of adaptation to environmental conditions. For the user, however, it means a major defect in logs. This abnormal tissue is different by anatomical and chemical features which induce a specific behaviour. The fibres have their structure mainly modified inside the wall; however, the vascular elements, the topic of this poster, also present some modifications.

Vessel features, i.e. number, proportion, basic surface, radial - tangential - maximum - minimum diameter, isolation index are measured by an image analysis system 'Kontron' on coloured microscopic transverse sections. These latter were cut at the bottom of 20 shoots of the ongoing growth season produced in greenhouse under controlled conditions and previously tilted to an axis of 30 degrees between July 10th and the end of the vegetative period. In the sectors of tension and of opposite wood, so previously shaped, 4 connected and radially aligned windows were analysed.

Taking into account the whole vessels, a decrease was observed of their number per surface unit when going up from opposite wood (212 vessels/ mm^2) to tension wood (142 vessels/ mm^2), a reduction of area proportion of vessels lumina from 20.2% in the opposite wood to 14.4% in tension wood and a decrease of the proportion of isolated vessels from 36.7% in the opposite wood to 34,2% in tension wood.

The decrease of observed porosity in tension wood is only due to the reduction of the number of vessels per surface unit and despite the fact that lumina surface of the linked vessels increases (opposite wood: 1074 μ^2, tension wood 1134 μ^2). The lumina of isolated vessels (opposite wood: 1331 μ^2, tension wood 1337 μ^2) remains the same.

For windows 1 to 4 (from centre to outside), an evolution was noted in terms of the number of vessels per surface unit (from 129 vessels/ mm^2 to 275 vessels/

mm^2), in terms of the proportion of the surface occupied by vessels lumina (from 15% to 19%) and in terms of the proportion of isolated vessels (from 27.9% to 46.9%). This increase is particularly important in the fourth window.

As shown in figures 1 and 2, the number of vessels and their surface proportion present a similar evolution when considering both types of wood separately within the four windows. In terms of the amount of isolated vessels, the same trend was observed within the three first windows.

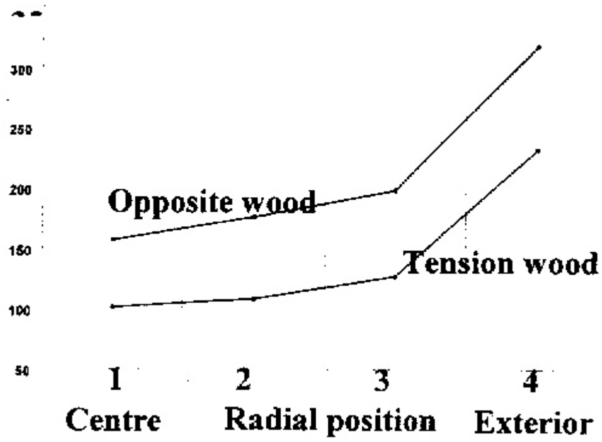

Figure 1. Evolution of number of vessels per mm^2 as a function of radial position

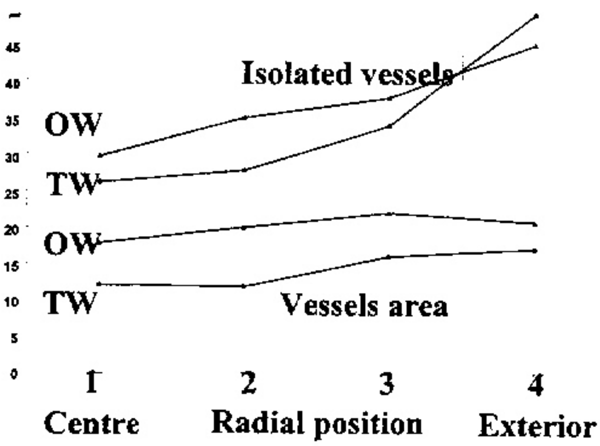

Figure 2. Evolution of the proportion of vessel lumina area and the isolated vessel as a function of the radial position, (OW = Opposite wood, TW = Tension wood)

The type of wood (opposite or tension), the radial position (window 1 to 4) and the kind of vessel (isolated or linked) were distinguished on statistical bases when taking into account the individual features of lumina vessels, i.e. radial and maximum diameter, perimeter and surface.

Finally, in tension wood, an increase of 12% in the radial elongation of vessels was observed.