



DOES THE STRUCTURE OF WOOD CONTRIBUTE TO UNDERSTANDING THE OAKS DECLINE PHENOMENON?

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Vascular cambium is a meristematic tissue which produces wood centripetally and phloem centripetally. In the structure of wood and phloem, data concerning developmental processes taking place in the cambium is recorded. The history of the cambium is encoded in the dimensions, numbers and arrangements of the wood and phloem cells. For investigations, the wood is usually preferred because it is durable and such data could remain unchanged for centuries, whereas in the phloem due to distorted processes, it deranges after a few years.

In broadleaves, the wood is composed of vessels, tracheids, fibers and parenchyma cells. The process of the wood formation consists of the cambial cell derivatives expansion, lignification of its walls and programmed cell death.

Since the seventies of the nineteenth century, the process of declining oaks taking place in Europe on a regular basis has been observed. Oak decline is a complex process that involves interactions of both biotic and abiotic factors leading to increased trees mortality.

The main goal of the studies is the examination of the structure of wood in declining oaks (*Quercus robur* L.) in respect to physiological (conductive) role of this tissue. It is known that on the level of the wood structure, water transport efficiency depends on the diameter of vessels - the main elements of the hydraulic conductivity system. Any reduction of the vessels lumen causes the reduction of the

water transport to the organs of the trees body and, therefore, influences organisms survival rate.

Anatomical analyses were carried out on wood samples (comprising all annual rings formed during the 30-40 years life of the analyzed trees) collected at breast height from the main stem of healthy, weakened and dead oaks. The anatomical traits of the wood like as the width of the annual increments, the diameter and density of early wood vessels were measured.

The results which are described in the paper by TULIK (2014) revealed that anatomical traits of the wood changed both with the age of trees and in response to unfavorable factors. The largest early wood vessels were observed in healthy trees, which implied that they had the highest hydraulic conductivity, whereas trees considered being in decline produce smaller vessels and hence had reduced conductivity.

Therefore, it seems that the size of vessel elements responsible for water transport in whole tree, is a crucial feature that should be taken into consideration in dendro-ecophysiological studies designed to unravel the issue of oak-tree decline.

References

- TULIK M. 2014. The anatomical traits of trunk wood and their relevance to oak (*Quercus robur* L.) vitality. *Eur. J. Forest Res.* In print. DOI: 10.1007/s10342-014-0801-y.