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Variability of leaf anatomical properties in pedunculate oak genotype (*Quercus robur* L.) in natural population

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INTRODUCTION

Leaf anatomy depends on genetic information and environmental condition. Furthermore, leaf anatomy has an important impact on leaf gas exchange, especially on photosynthesis. Hence, leaves structures are important from the aspect of biomass production. The objective of this study was to determine the genotypic variability of leaf anatomical properties originating from a natural population.

MATERIAL AND METHODS

Leaves were sampled from ten genotypes from the natural pedunculate oak forest in Morović (Serbia). The leaves were placed in 70% ethyl alcohol from which anatomical sections were made. Then the leaves were cut into smaller pieces and frozen and cut in a cryostat (Cryosat MEV). Prepared cross-section was measured on microscope (Olympus, BX53F). For the purposes of this research, seven parameters were estimated:

abaxial epidermis thickness (1),
main vein diameter (2),
spongy parenchyma thickness (3),
palisade parenchyma thickness (4),
adaxial epidermis thickness (5),
lamina thickness (6) and
sclerenchyma thickness(7).

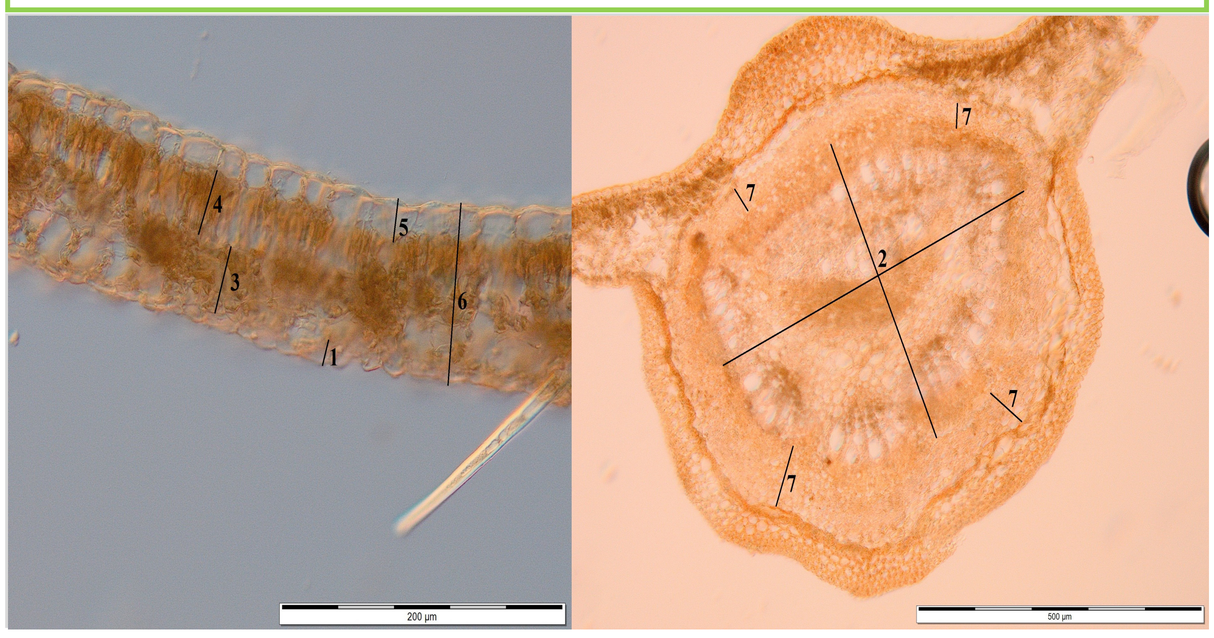

FIGURE 1: Measured cross-sectional parameters of the leaf and the main vein

RESULTS

The highest variability was estimated for the main vein diameter (6.69%), while the lowest variability was observed for the sclerenchyma thickness (2.83%). The contribution of adaxial and abaxial epidermis thickness in leaf lamina ranged from 11.39 to 17.51 %, and 9.92% to 15.30%. The contribution of palisade and spongy parenchyma thickness ranged from 31.56% to 41.70% and 31.06% to 38.92%, respectively. The lowest values for palisade parenchyma thickness (68.96 µm) and spongy parenchyma thickness (63.68 µm) were found in genotype 3, resulting in the thickest leaf lamina (165.36 µm). The highest values for main vein diameter and sclerenchyma thickness were found in genotype 10, while the smallest and thinnest in genotype 4.

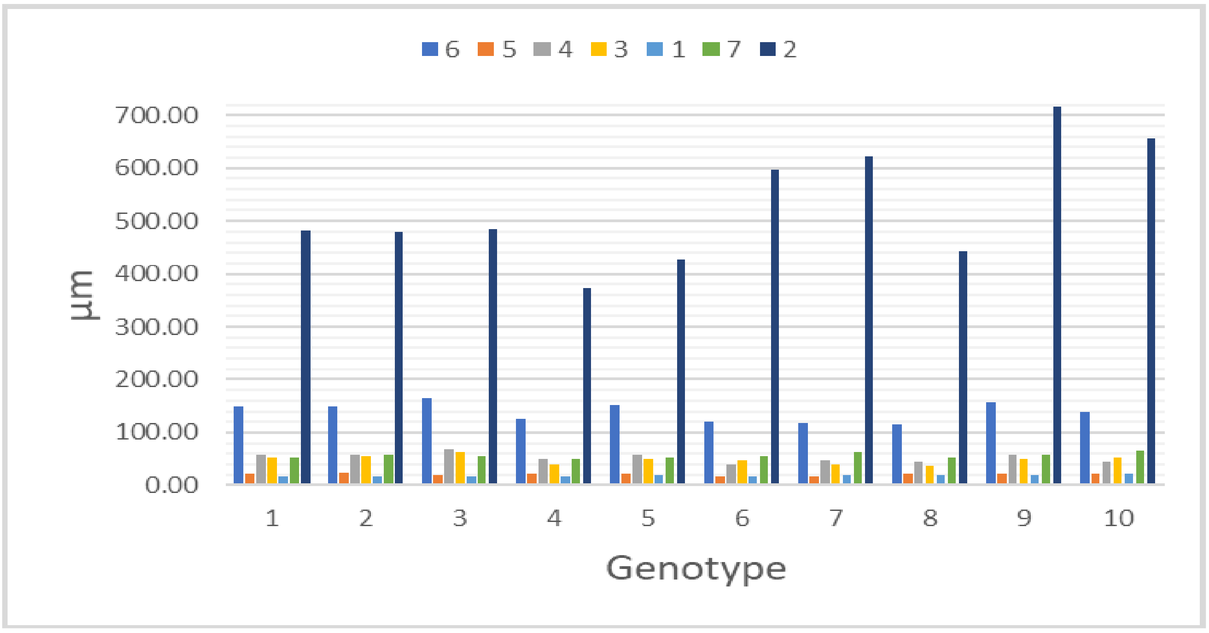

FIGURE 2: Results of descriptive statistics. Legend: abaxial epidermis thickness (1), main vein diameter (2), spongy parenchyma thickness (3), palisade parenchyma thickness (4), adaxial epidermis thickness (5), lamina thickness (6) and sclerenchyma thickness(7).

CONCLUSIONS

This study presented above suggest that *Q. robur* genotypes in natural population did not exhibit large divergence regarding the studied anatomical leaf traits. These quantitative differences, illustrating intraspecies variability of studied parameters, were the consequence of interaction of certain genotype and common environmental conditions for all trees. Within-species variability of anatomical traits might improve plant performance, allowing species to maintain their fitness in a wide range of environmental conditions.

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