EGU22-2144, updated on 09 Aug 2022
https://doi.org/10.5194/egusphere-egu22-2144
EGU General Assembly 2022

Tree-ring stable carbon isotope ratio ($\delta^{13}C$) and growth chronologies of more xeric Turkey oak (*Quercus cerris* L.) is reliable climate proxy than hydric pedunculate oak (*Q. robur* L.) species.

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Climate anomalies significantly shape forests around the World. Intensive climate changes (global warming and drought) that have occurred since 20th century have caused more extreme climate events and boosted forest mortality. Different drought resistance in the *Quercus sp.* was observed among species and tree populations up to the genotype level. Species-specific responses to drought further complicate the understanding of the drought-induced changes in forests. We selected 20 radial growth and six stable carbon isotope ratio ($\delta^{13}C$) chronologies of *Quercus cerris* and *Q. robur* from Serbia. Since both $\delta^{13}C$ and radial growth chronologies are influenced by surrounding stressors, including nonlinear climate trends, a more flexible approach to their modeling was required, and we, therefore, chose a generalized additive mixed model (GAMM) for data processing. A total of 20 climate and environmental variables were included in models to better understand their relationship and climate predictions/reconstruction.

In the GAMM, a better fit was obtained for $\delta^{13}C$ and more xeric *Q. cerris* (adj. R^2 0.646) than for radial growth and *Q. robur* GAMMs performances. The potential for predicting radial growth and $\delta^{13}C$ based on 20 different climate and environmental variables was tested with GAMM. Chronologies were split into two subsets for GAMM calibration and validation. GAMM predictions were calibrated using the first 25 years (1961-1985), while the second subset (1986-2010) was used for model validation. Both oak species showed higher similarity between measured and predicted $\delta^{13}C$, opposite of radial growth. A xeric oak species (*Q. cerris*) showed higher sensitivity to climatic and environmental factors, reflected in better GAMM prediction potential.

Species-specific differences in radial growth and $\delta^{13}C$ were observed. The results presented in this study suggest that xeric oak species such as *Q. cerris* are more sensitive to environmental factors in both $\delta^{13}C$ and radial growth. According to the GAMM results, the more climate-sensitive *Q. cerris* showed better relationships with the analyzed factors than *Q. robur*. It was concluded that $\delta^{13}C$ responds more strongly and quickly to climatic anomalies than TRW and that the analyzed climatic and environmental factors can be a reliable indicator of cambial productivity and stress periods of both oak species.

Keywords: Dendrochronology, Dendrochemistry, Stable carbon isotope, Tree ring, *Quercus*, Drought, GAMM.

Acknowledgments: This research was supported by the Science Fund of the Republic of Serbia, PROMIS, #6066697, TreeVita. TL acknowledge the financial support from the Slovenian Research Agency - research core funding No. P4-0107 Program research group "Forest Biology, Ecology and Technology" and research grant J4-8216 "Mortality of lowland oak forests - consequence of lowering underground water or climate change?"

Note: This contribution is a summary of a study by Kostić S, Levanič T, Orlović S, Matović B, Stojanović DB. Xeric Turkey oak (*Quercus cerris* L.) is a more reliable climate indicator than hydric pedunculate oak (*Q. robur* L.) in the same stand conditions: Stable carbon isotope ratio ($\delta^{13}C$) and radial growth approaches (*In press*)