Structure and dynamics of radial growth in a pedunculate oak (*Quercus robur* L.) stand in the Cărpineni Forest District

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The pedunculate oak (*Quercus robur* L.) forests of south-central Moldova developed under warm, arid conditions on the southern and southeastern hilly spurs of the Codri uplands (Forestry Districts of Cărpineni, Mereșeni, Bozieni, Anenii Noi, Zloți, Cantemir, and Baimaclia). The examined forest is a pure, even-aged oak stand, 110 years old according to the forest management plan. It is naturally regenerated and of fundamental type, with an area of 2.0 ha. The site lies on an undulating lower slope with a southern aspect, a gradient up to 6°, and an elevation of 183 m above sea level. The soil is a typical clay-illuviated chernozem. Across the stand, the diameter distribution is polymodal. Tree numbers fluctuate across the 16–48 cm and 68–72 cm diameter at breast height (DBH) classes, with peaks at 24, 28, 32, and 36 cm. This pattern is typical of natural forests and reflects light competition among mid- and lower-canopy trees, together with the absence of harvesting; older trees remain standing and enter decline. The results suggest that regeneration in the smallest diameter classes is influenced less by competition per se than by the presence of overstory trees (a shelter effect). The height structure is two-layered. Heights were grouped into 2-m classes. Tree numbers from the lower to middle classes are relatively high, peaking at 12 m and a smooth transition among adjacent classes. The near-uniform counts in the lower layer likely reflect horizontal canopy closure and a terminal development phase in which regeneration is prominent. Increment cores were used to develop ring-width series for the stand. The series shows the signal typical of open-grown (isolated) trees or low-density stands. Pronounced drought-related growth declines are evident in 1946–1947, followed by post-disturbance recovery. After removing age-related trends (detrending), periods of climatic extremes are more clearly resolved: c. 1929; 1946–1947 (the Great Famine); c. 1995; and 2003. The most severe growth depression occurred in 1946–1947. In this area, pedunculate oak shows only a weak overall response to local climate. This likely reflects the plot-selection criterion prioritising mean stand age over site conditions. Even so, some climatic factors affect growth: precipitation in the prior year helps predict radial growth (ring width). Seasonal analysis indicates that conditions in November of the preceding year positively affect current-year radial growth ($r = 0.287$). This is physiologically plausible, as carbohydrates stored in late autumn provide reserves that fuel the reactivation of cambial division. Regarding precipitation, rainfall during the late-season months at the end of the previous growing season strongly affects oak growth in the study area. A further aim was to describe the dynamics of radial growth captured by the tree-ring chronology; in line with this aim, we identified marked drought-induced growth reductions in 1946–1947 and the subsequent recovery phases.
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