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Intra-annual wood anatomical variability in European beech in response to elevation, management and climate in the Central Apennines, Italy

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European beech (*Fagus sylvatica*) is a widespread and economically important temperate tree species in Europe. Expected future warmer temperatures and severe drought events, especially in Mediterranean areas, could affect vitality and productivity of beech stands that historically were under intensive management in those areas. In this study, we aim to address the lack of knowledge on intra-annual wood anatomical responses of beech to environmental variability and silvicultural practices by investigating three beech stands along an elevational gradient (1200 to 1950 m a.s.l.) in the Apennines (Italy). Several wood cell anatomical features were quantified on increment cores collected from five trees per stand. Results showed that high-elevation trees are hydraulically limited, and mid-elevation trees meet their hydraulic requirements with a different anatomical setup/configuration compared to low and high sites. Maximum xylem vessel size and theoretical hydraulic conductivity were associated with the temperatures of previous summer, previous winter and current summer as well as precipitation at the onset of radial growth and at time of maximum growth rates. Cessation of coppicing did not trigger main intra-annual differences in wood anatomical traits. Similarly, years with extreme climate (e.g. mean temperature and/or precipitation values above or below one standard deviation) did not have strong effects on intra-annual wood anatomical traits, maybe due to buffering through the several active sapwood rings present in beech. In conclusion, elevation had a higher impact on intra-annual wood anatomical traits in the studied trees than either cessation of silvicultural practices or years with extreme climate.