



Stand scale palynology helps to reveal the role of forest exploitation and climate change in the current distribution of *Fagus sylvatica* in the NE Pannonian Basin (Hungary)

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Black Lake (Mátra Mts.,) and Lake Egerbakta (Bükk Mts.,) were used to study the former distribution of beech at different altitudes. We used sites qualifying for stand-scale studies for pollen and plant macrofossil analyses to detect the local presence of beech. Lake Egerbakta is in an oak-dominated (*Quercus cerris* – *Q. petraea*) forest today. We expected that before the medieval forest management, beech was likely more widespread at lower altitudes and might have lived in the surrounding forest. At the Black Lake, we focused on whether beech has been cleared earlier in this region and particularly, when it first appeared >700m a.s.l. during the Holocene. High-resolution pollen and plant macrofossil analyses were combined with ²¹⁰Pb, ¹³⁷Cs, AMS ¹⁴C dating, LOI, and chemical element analyses (MP-AES). We found high amounts of *Quercus* (40–75%) and very low *Fagus* (1–6%) count in the pollen record spanning the last ~2000 years. We detected forest clearances at AD 1525, 1660 and 1750, and concluded that the Migration Age and Medieval land use did not decrease beech representation at this altitude since it was a turkey oak – pedunculated oak forest zone. Hemp-retting was also detected from ~AD 900. At the Black Lake, beech expanded and dominated rapidly at ~4500 cal BP and was already substantially cleared around ~2850 cal BP, likely for charcoal-burning and iron-smelting in the region. After its selective removal, our data shows beech being the dominant canopy component around the lake even during medieval times without any considerable clear-cut. Overall, we can conclude that beech forests of the eastern-slopes were not heavily exploited during the medieval forest management period; their old-growthness can be confirmed. Also, the elevation zone where beech forests were replaced by oak due to preference by medieval forest management can be located >300m a.s.l. in the Bükk Mts.