

NATURAL REGENERATION OF SESSILE OAK (*QUERCUS PETRAEA*) UNDER SHELTERWOOD AND THE INFLUENCE OF COMPETITION FROM OTHER TREE SPECIES

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PROJECT GOAL

The aim of this study was to compare parameters of natural regeneration of sessile oak, european beech and european hornbeam under the shelterwood.

INTRODUCTION

The sessile oak (*Quercus petraea*) ranks among the most valuable commercial tree species in Europe (Kanjevac et al., 2021). This species is considered a key component of future mixed forest stands that are expected to help European forests better adapt to ongoing climate change (Kohler et al., 2020). In modern forestry, natural regeneration of stands is increasingly promoted as an essential element of close-to-nature forest management (Vacek et al., 2010). However, the success of natural oak regeneration depends not only on the chosen regeneration method but also on a wide range of biotic and abiotic factors and their interactions. Due to limited understanding of these influences, considerable uncertainty remains regarding optimal silvicultural practices (Kohler et al., 2020). A crucial factor in the initial phase of regeneration is seedling density, as higher numbers can suppress the development of competing vegetation. Among the most common competitors in European forests are beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*) (Kanjevac et al., 2021). Seedlings of these species tend to overtop oak due to their faster initial height growth and subsequently outcompete it through greater competitive ability (Govedar et al., 2021; Kohler et al., 2020).

METHODS

Within the FTE Křtiny area, three stands were selected for sampling of naturally regenerated seedlings of sessile oak (*Quercus petraea*), European beech (*Fagus sylvatica*), and hornbeam (*Carpinus betulus*). Samples were collected beneath the parent stand. For each variant, 50 individuals were taken, resulting in a total of 150 oak seedlings, 150 beech seedlings, and 126 hornbeam seedlings (at one site, only 26 individuals were collected due to low density). For each sampled individual, total height was measured to the nearest 0.1 cm. Root collar diameter was measured with an accuracy of 0.1 mm. After the measurements, each sample was divided into three main fractions: leaves, stems, and roots, and carefully stored in pre-labeled paper bags. The bags were then placed in a drying oven and dried at 105 °C for 24 hours. After drying, the dry weight of leaves, coarse roots, and stems was determined to the nearest 0.001 g. Based on the obtained data, total dry biomass and the ratio between aboveground and belowground plant parts were calculated.

RESULTS

Fig. 1 shows the total height of seedlings. The greatest heights were recorded for hornbeam (EH) seedlings across all three sites, while the lowest values were observed in sessile oak (SO) seedlings. This may be due to the fact that hornbeam generally exhibits a higher growth potential during the early developmental stages and responds more favorably to suitable soil conditions.

Fig. 2 shows the root collar diameter of seedlings. The largest diameters were recorded in hornbeam (EH) seedlings across all studied sites, while the smallest values were observed in sessile oak (SO) seedlings. These differences may be related to the distinct ecological requirements of the individual species.

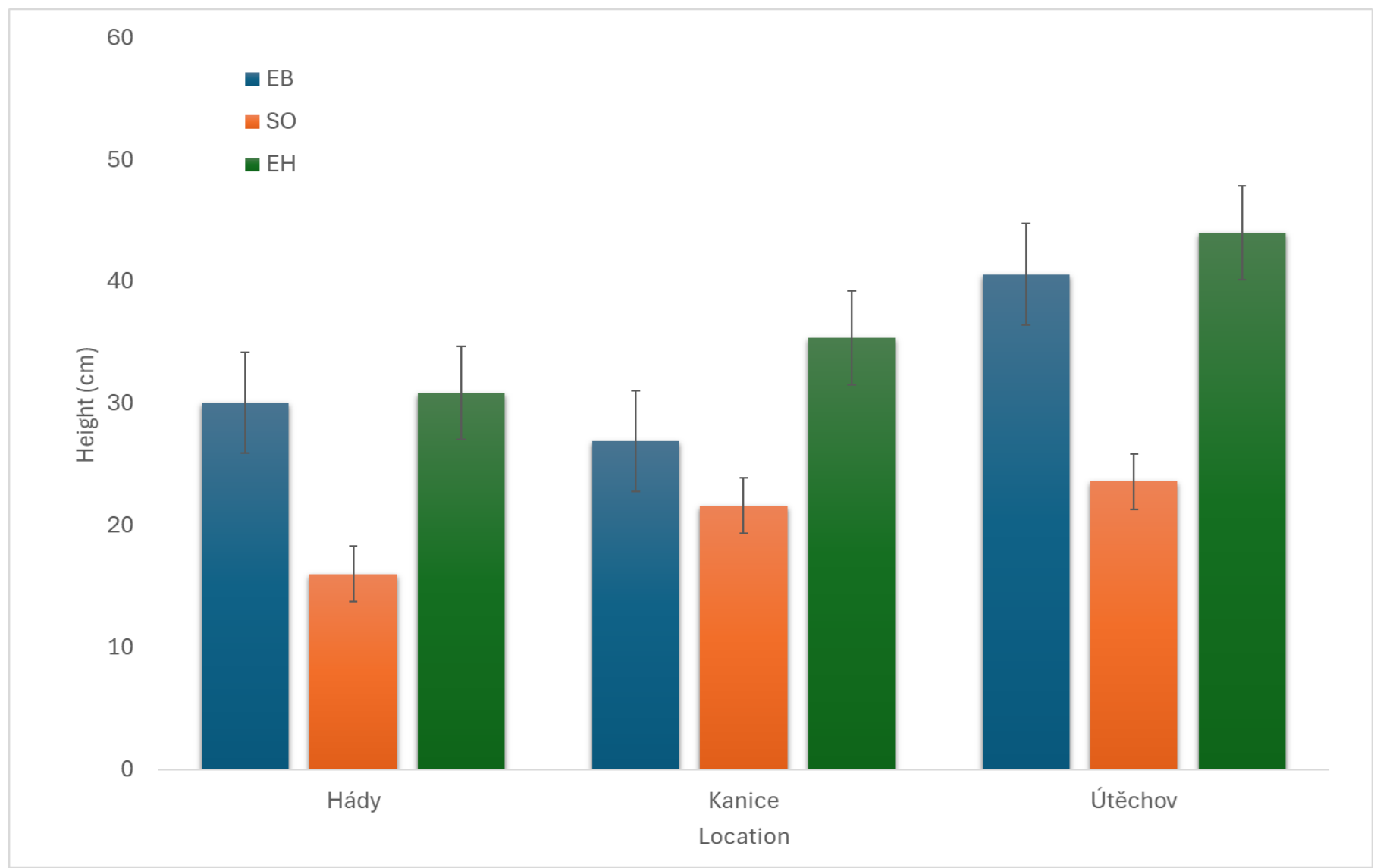


Fig. 1: Total height of natural regeneration in different location

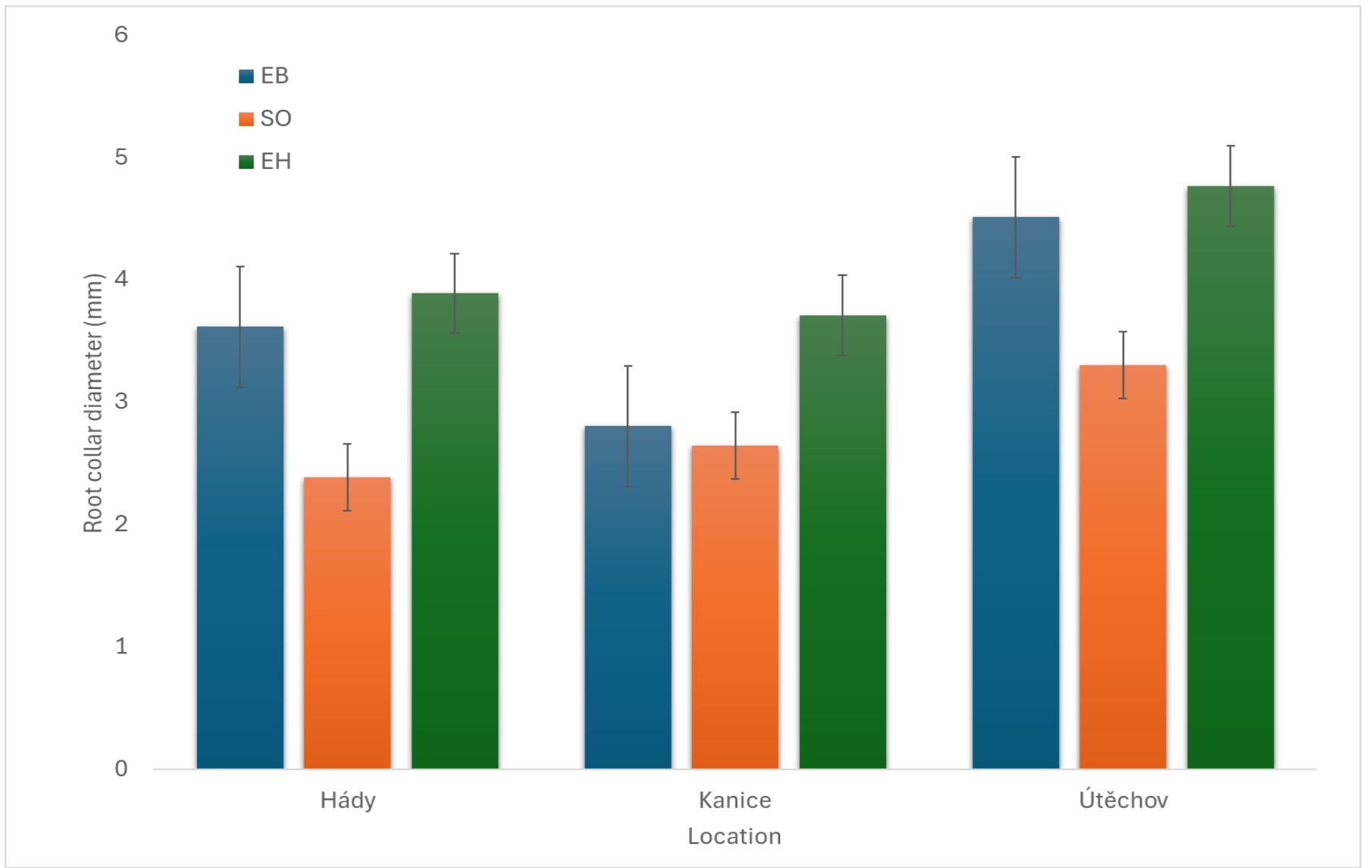


Fig. 2: Root collar diameter in different location

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