ANALYSIS OF DENDROMETRIC PARAMETERS OF BEECH STANDS WITH DIFFERENT MANAGEMENT TYPES AT THE TRAINING FOREST ENTERPRISE MASARYK FOREST KŘTINY

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PROJECT GOAL

The main objective of this project is to analyse and evaluate the beech resistance and sensitivity in different type of managements. We analyse forest structure parameters, competition and 20 biggest trees in each of 6 types of forest stand management.

INTRODUCTION

Remeš et al. (2015) investigated increment in beech stands aged 37-48 years, where at a density of 150-160 target individuals/ha the increment was 0,39-0,52 cm/year. Brang et al. (2014) summarizes the possibilities of close-to-nature silviculture and concludes that management systems need to be revised. He concludes that the focus should be on increasing not only tree species diversity but also to individual trees. This contribution is focused on comparison of DBH (diameter at breast height) and volume of 6 beech forest stands with different management at oak-beech vegetation zone. Trees with a lower increment of less than 0,95 cm2/cm/year for 20 years have an increased risk of mortality than faster growing trees (Diaconu, Kahle and Spiecker, 2015; Gillnera et al. (2013).

MATERIAL AND METHODS

1. **Increment thinning** - strong release crown thinning, which aims to completely free the crown area and maximize thickness growth.
2. **Borgreve** – Voropanov thinning – heavy crown thinning and cut off physiological old trees, which also aims to maximise growth.
3. **Shelterwood** – Forest regeneration with reduced density (below 70 %).
4. **Dauerwald** - forest in conversion to permanently creative, with elements of group selection and permanent forest production.
5. **Nature reserve** - an area that is free from human influence. For this purpose, an area without human intervention for 60 years has been used (the Březinka Nature Reserve).
6. **Uneven-aged forest** - conversion of forest to Uneven-aged forest - for beech may have elements of group and individual selection.

We also conducted hemispheric imaging (Fig. 1), natural regeneration assessment and dendrochronological sampling for analysis of beech resistance except measuring dendrometric parameteres on all trees in stand.

Fig.1 – Hemispherical photos for canopy closure analysis (Photos: Petr Sýkora)

RESULTS

We evaluated the 20 largest trees (by diameter) per management type which represented production potential of each stand. Mean diameter and volume of all stands were comparable, only the "Nature reserve" showed higher values of these parameters. However, this is due to the age of this forest stand in comparison to the other management types. In contrast Borgreve – Voropanov and Increment thinning managements were considerably younger than the others but described parameters of the largest trees were similar as the others (except Nature reserve management).

Borgreve - Voropanov thinning and Increment thinning have not a differentiated structure with higher representation of lower thickness classes due to their age (Fig. 2). The structure of 2 (Uneven-aged, Dauerwald) of the 6 evaluated managements is close to the structure of an uneven-aged forest (Fig. 3).

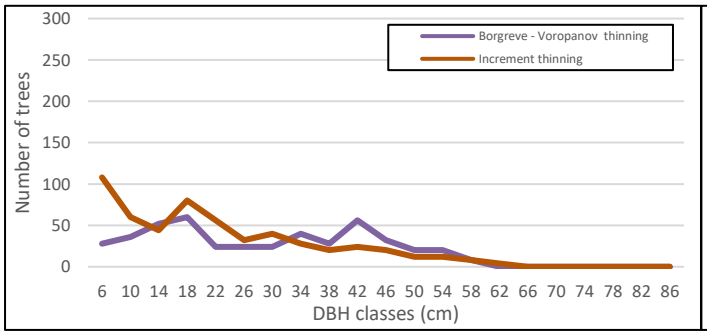

Fig. 2 – Diameter structure of Borgreve-Voropanov and increment thinning

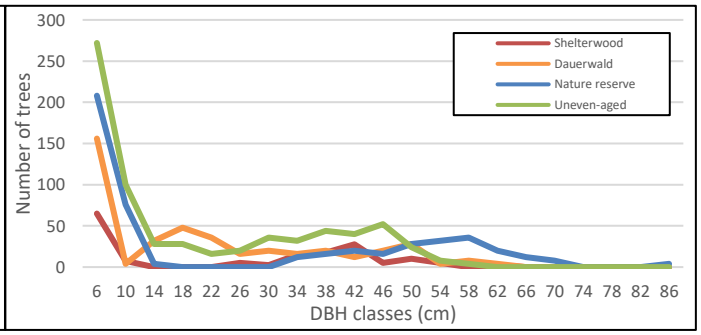

Fig. 3 – Diameter structure of Shelterwood, Dauerwald, Nature reserve and Uneven-aged forest stand

CONCLUSION

The structure of the forest in the conversion to Dauerwald and Uneven-aged forest do not differ much. In Borgreve – Voropanov thinning and Increment thinning is not to much different forest structure, but trees in these type of management have faster wood growth. We will know the answer to the sustainability of the different management models in the future thanks to the annual ring analyses. After the annual ring analyses, we will know for sure how stand structure affects beech resistance under different types of management.

REFERENCES

BRANG, P., et al. Suitability of close-to-nature silviculture for adapting temperate European forests to climate change. Forestry: An International Journal of Forest Research, 2014, 87.4: 492-503.

DIACONU D., KAHLE H. P., & SPIECKER H. (2015): Tree-and stand-level thinning effects on growth of European beech (Fagus sylvatica L.) on a northeast-and a southwest-facing slope in southwest Germany. Forests, 6(9), 3256-3277.

GILLNER, S. et al. (2013): Low relative growth rates predict future mortality of common beech (Fagus sylvatica L.). For. Ecol. Manag. 2013, 302, 372–378.

REMEŠ, J., et al. Diameter increment of beech in relation to social position of trees, climate characteristics and thinning intensity. Journal of Forest Science, 2015, 61.10: 456-464.

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