INTRA-ANNUAL TREE GROWTH PATTERNS IN LEVEL II ICP FORESTS PLOTS FROM ROMANIA

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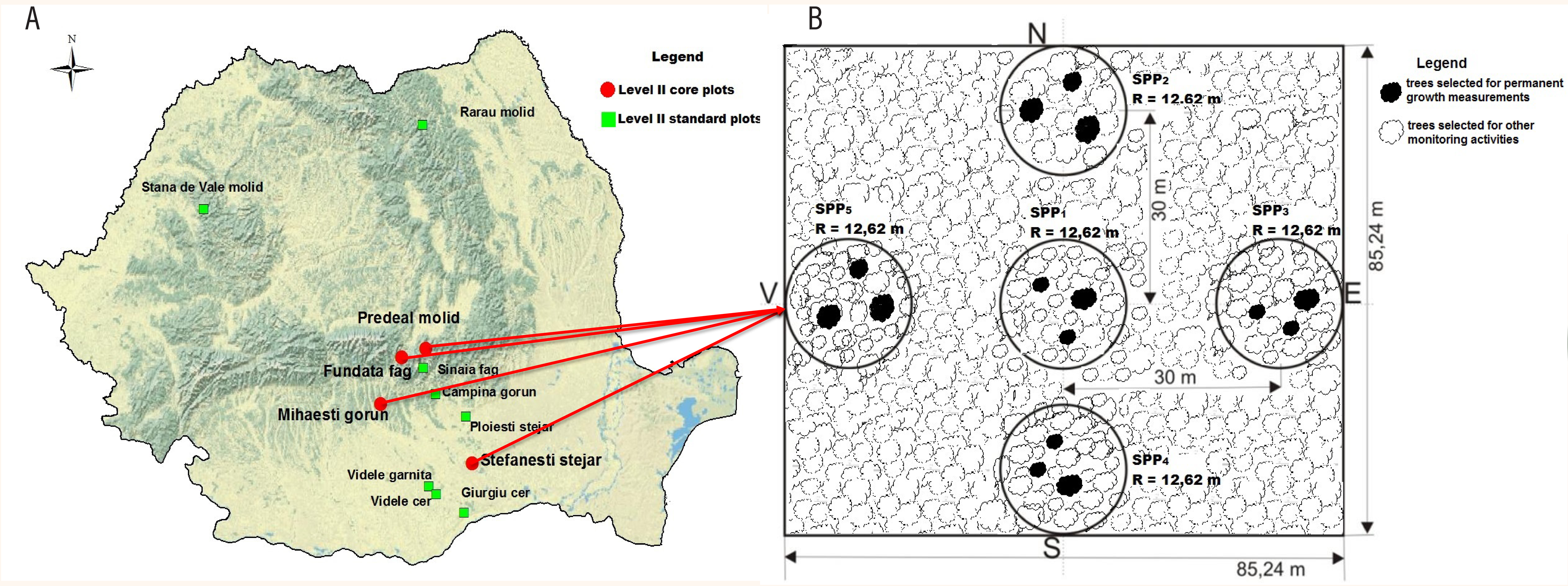
INTRODUCTION

Under the climate change framework, with a continuous warming trend and an increasing frequency and intensity of drought, it is mandatory to understand how forest ecosystems react. Long-term monitoring of tree growth represents a valuable source of information about tree's capacity to react and adapt to environmental changes. In this study, we investigate intra-annual tree growth patterns of the fourth most common tree species (Norway spruce (*Picea abies* [L.] Karst.), European beech (*Fagus sylvatica* L.), pedunculate oak (*Quercus robur* L.), and sessile oak (*Quercus petraea* L.)) at the Romanian level in 4 core plots of ICP Forest Level II network in the period 2010-2023.

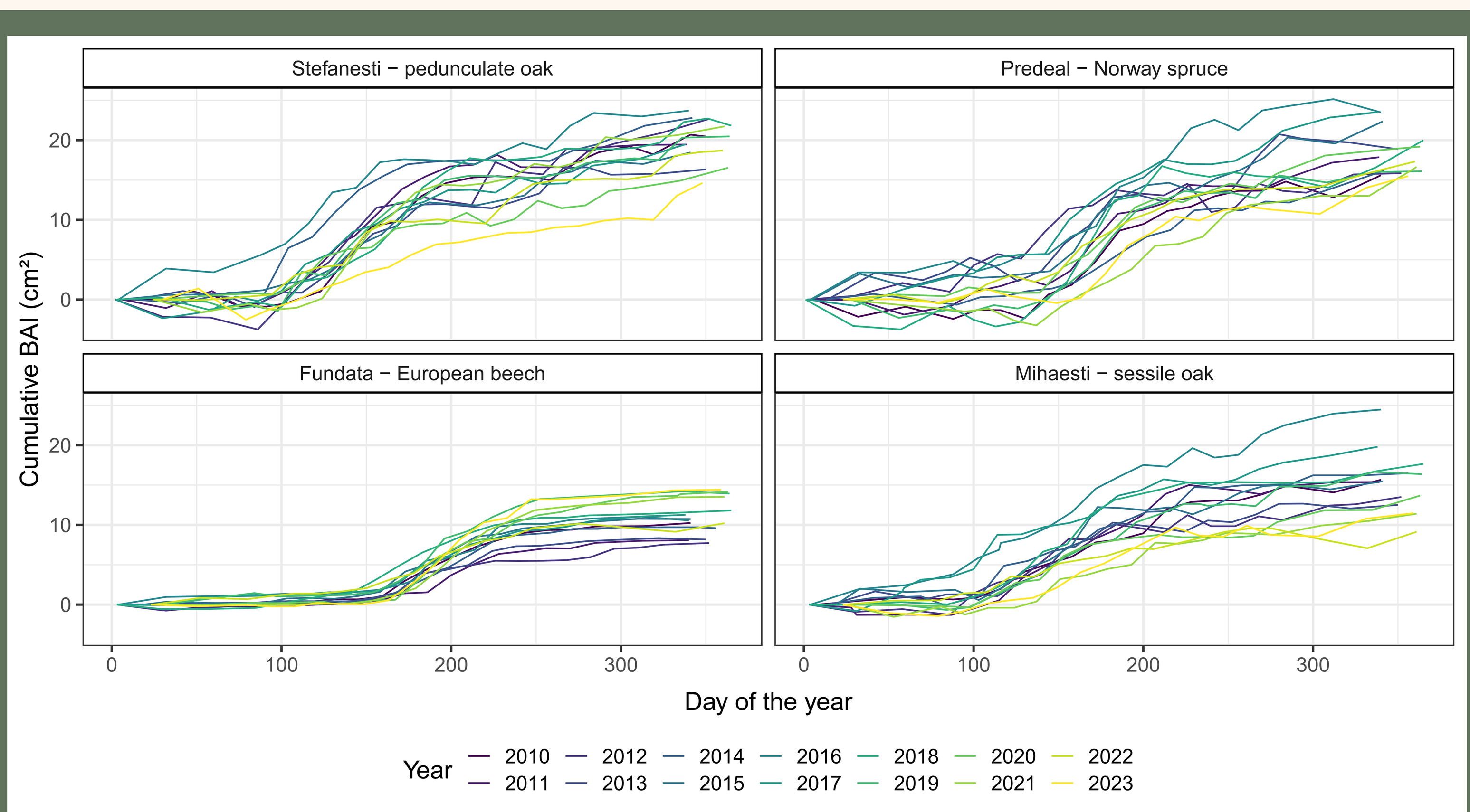
MATERIAL AND METHODS

The tree growth was assessed by band dendrometers with bi-monthly readings during the growing season and monthly readings during the dormancy season. In each core plot, 15 trees were monitored each year. During the monitoring period, some trees died, but new ones were included. Stem diameter variation was transformed into basal area increment (BAI), adopting the circular stem cross-section model. BAI cumulative values were obtained by summing the values of monthly-biweekly BAI. The average growth rate at the plot level were modeled using a logistic function. Based on successive differences in modeled data, the daily growth rates were defined.

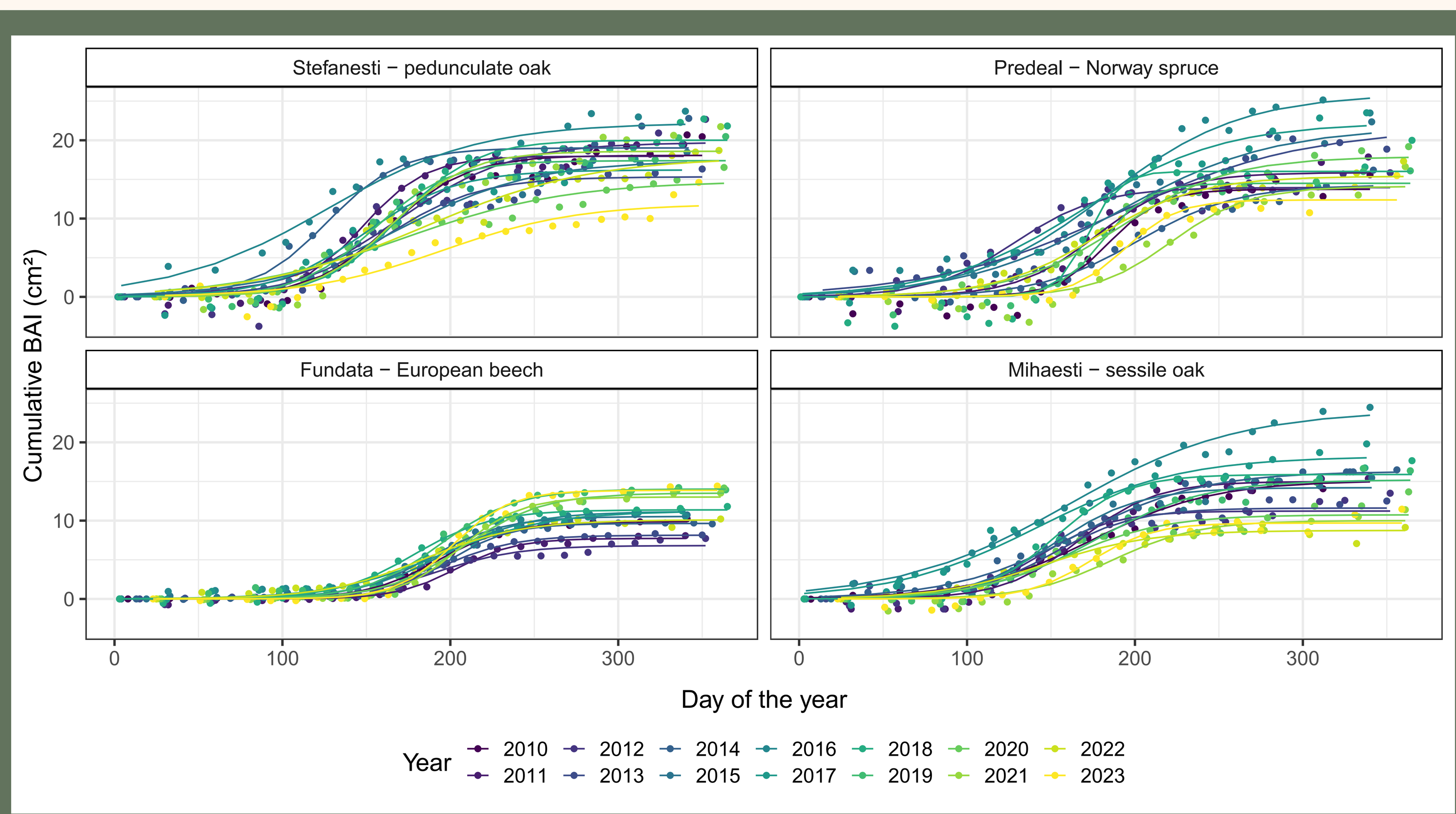


A. Location of ICP Forests Level II network at Romanian level (red dots represent core plots);
B. Design of Level II plot in Romanian ICP Forests network

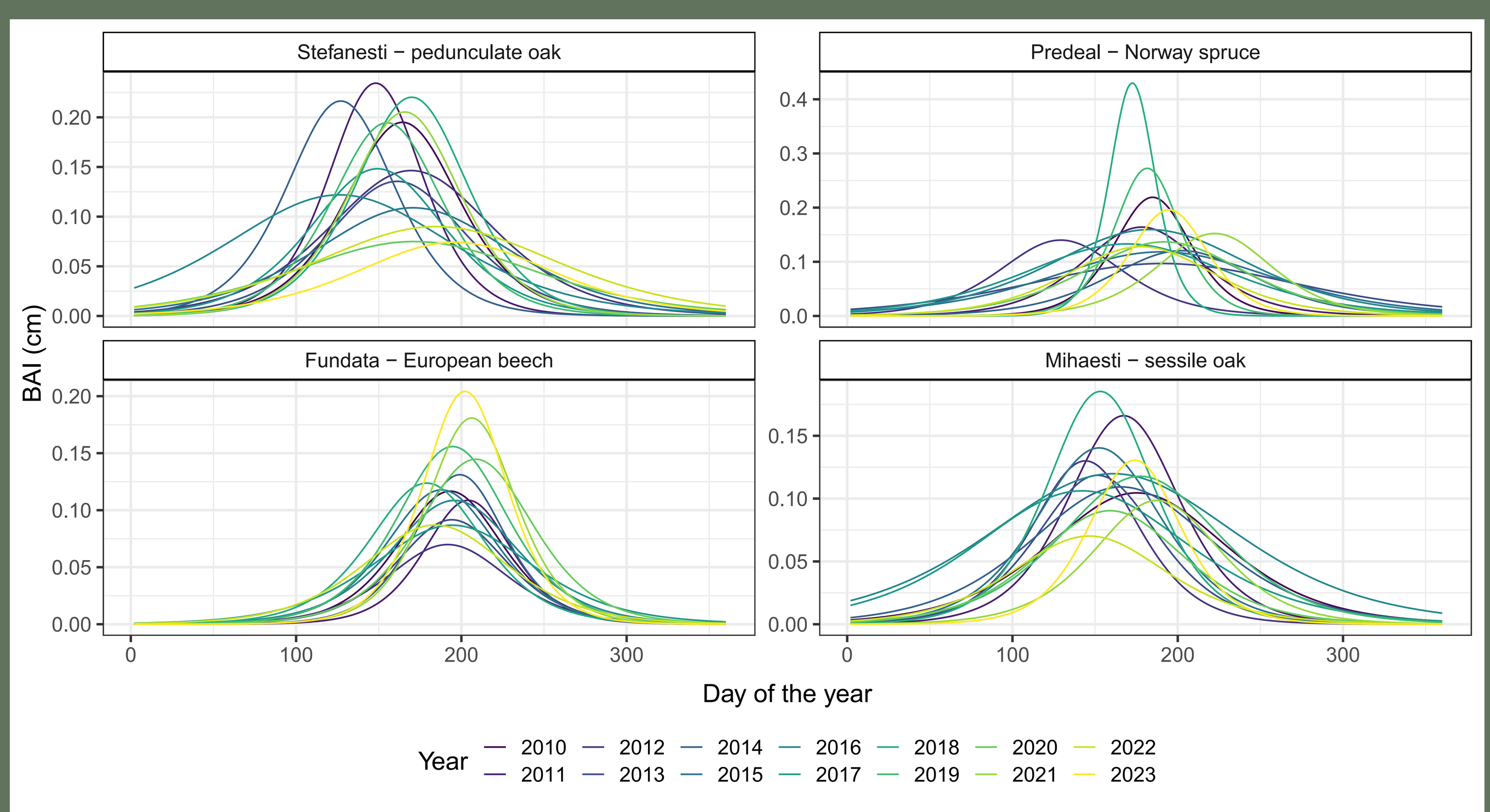
RESULTS



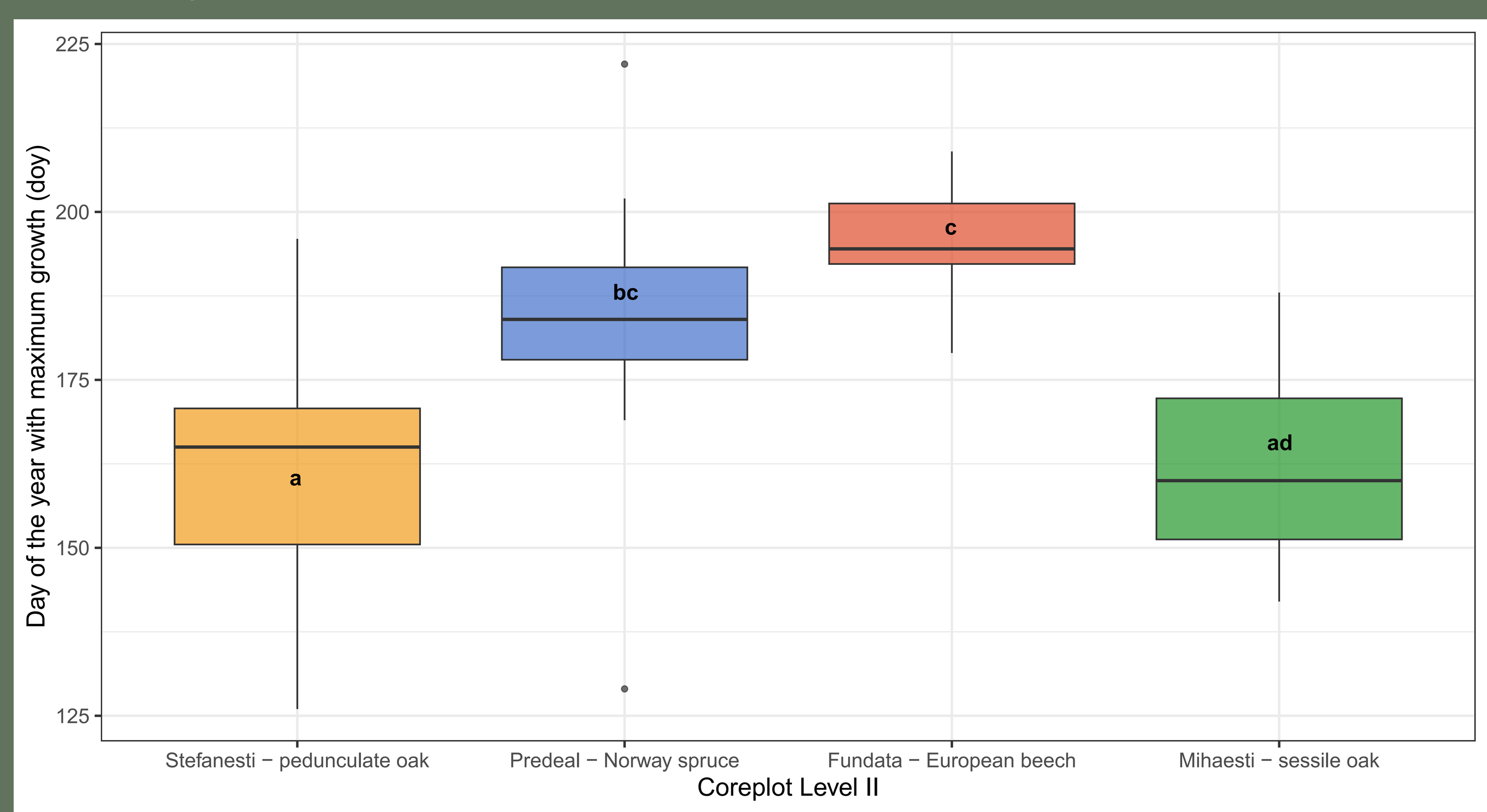
Cumulative BAI at plot level in the period 2010-2023



Daily BAI based on modeled values at plot level in the period 2010-2023



Modeled BAI at plot level in the period 2010-2023 (dots represent measured values in each year)



Differences in the moment of maximum growth rate in the period 2010-2023 between the species (letters represent the result of the Wilcoxon test; $p < 0.05$)

CONCLUSIONS

In all core plots and for all species, the growth pattern is similar in the monitoring period. However, beech showed lower growth rates and less variability. In the sessile oak stand, the highest variability was observed between years. Significant differences in terms of the moment of maximum radial growth were observed between species. In the beech stand, it was observed the latest moment of recording the maximum growth during the season. Further monitoring of these stages would enhance the understanding of how forests are reacting to climate change.

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