

RESILIENCE AND SYNERGY EFFECT IN SPRUCE-BEECH-LARCH MIXED FORESTS

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INTRODUCTION

Under the pressure of Global climate change, we need to adapt our forests and forestry management by modifying the species composition. The mixed stands benefit significantly in their higher resistance and resilience to abiotic and biotic factors, which increases their ecological stability. We focused on European larch (*Larix decidua* Mill.) as a suitable admixture, because of its higher ability to transmit a significant amount of light and precipitation through the crown.

MAIN AIM

- ✓ How sensitive European larch reacts to extreme conditions (2018).
- ✓ Whether the admixture of larch can positively influence the growth of other commercial tree species - spruce (*Picea abies* (L.) Karst.) and beech (*Fagus sylvatica* L.) in the mixed stand.

HYPOTHESIS

- ✓ We have hypothesized that the radial increment of larch is less sensitive to extreme conditions compared to spruce or beech.

METHODS

- 3 research plots with similar exposure, slope, and age (30 – 70 years) in ŠLP ML Křtiny.
- 2 types of plots: **mixed stand** of **(A)** beech-spruce including larch as admixture (45-30-25%) and **control stands** of **(B)** beech-spruce (65-35%) and **(C)** pure larch (100%).
- Position, DBH, and species were recorded with Field-Map technology.
- 10 wood cores have been collected on each site from each tree species (total 60 pc).
- Standard dendrochronological analysis and cross-dating were performed.
- Competition indices (CI5 – 5 competitors; CI10 – 10 competitors) were calculated on the base of Hegyi (1974).
- Resistance and resilience were calculated via the method described by Lloret (2011).
- The competition indices and DBH were correlated with resistance and resilience.

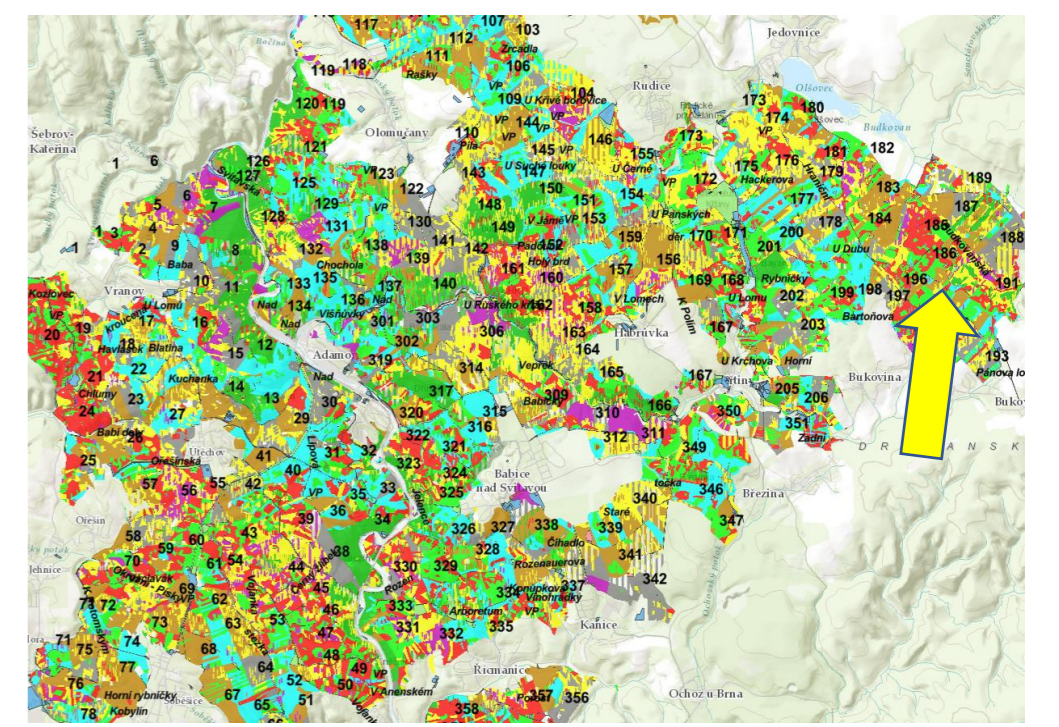


Fig. 1: Map of ŠLP ML KŘTINY. An arrow marked the location of research plots.

RESULTS

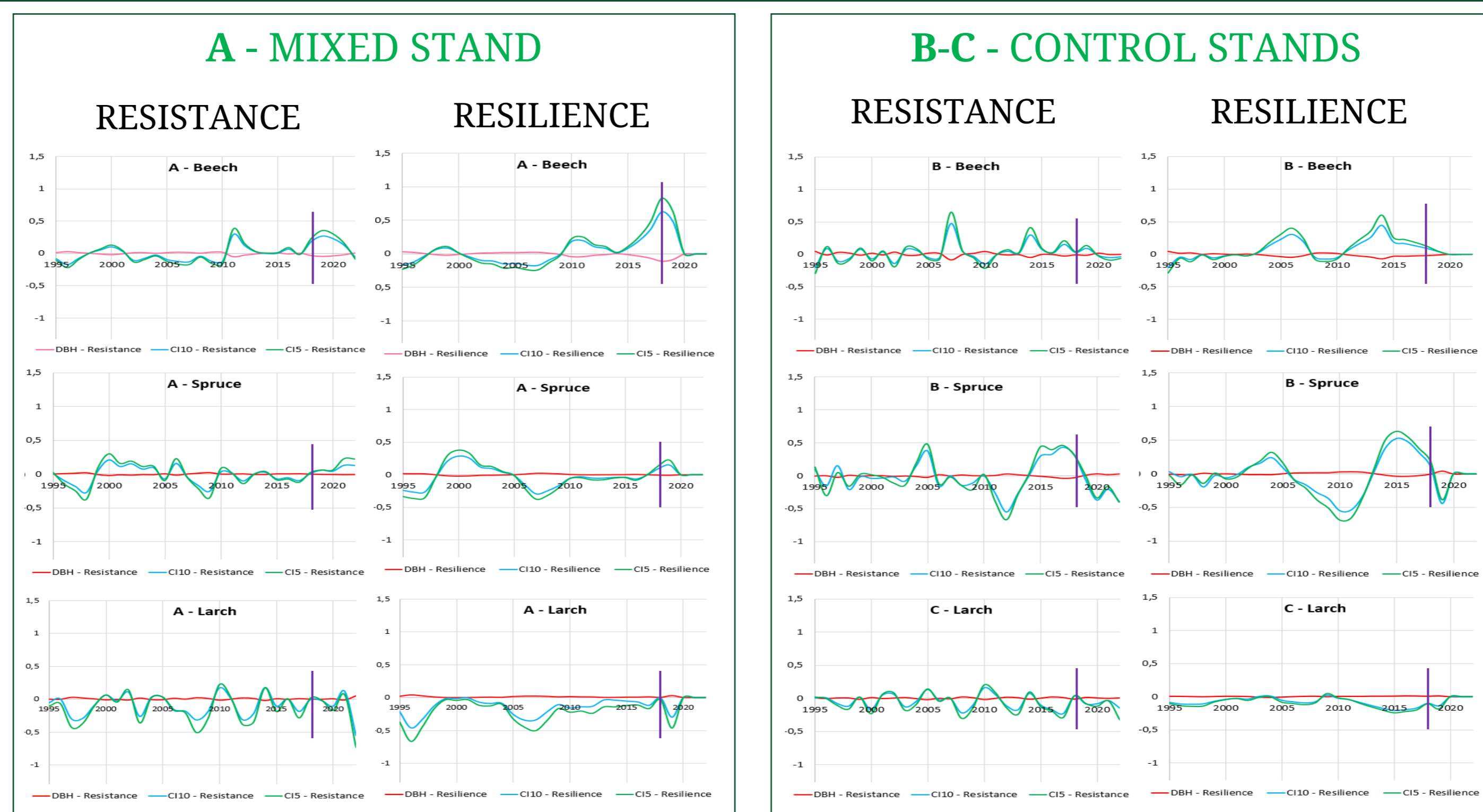


Fig. 2: Linear regression of DBH (red), CI10 (blue) and CI5 (green) to resistance and resilience for A) beech-spruce-larch mixed stand, B) beech-spruce control stand and C) pure larch control stand. The purple line shows the observing year 2018.

CONCLUSION

The results confirmed the existence of a positive effect of the presence of European larch in the beech-spruce-larch mixed stand, the highest positive effect was observed on beech. Larch performed a higher growth response and less sensitivity to extreme conditions than spruce in the control stand. The correlation between DBH and resistance or resilience had an opposite character in all cases than the correlation between competition indices and resistance or resilience. This performed, that competition analysis gives us a better understanding of trees reaction to extreme conditions compare to DBH values.