



Riparian forests production related to water supply along southern Hungarian Danube

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1. Introduction

The current climatic conditions of the Hungarian Great Plain is not adequate for the forest cover. Surplus water is essential to maintain good ecological status and growth rate of forests. Moreover, in the drying climate of the Great Plain without excess water the survival of forest vegetation is questionable.

In this study, we try to indicate the positive effect of the excess water on the growth of the trees next to the Danube in Gemenc wetland (close the southern border of Hungary).

2. Location and available data

The logging data were collected from 2000 to 2009. Sampled forest compartments were clustered into two groups based on the stand position to the levee (exposed to inundation of Danube or not). The effects of the Danube are evaluated using local hydrological measurements (e.g. gauge at Mohács).

The forest growth itself is not the best indicator because it is also influenced by several other ecological variables. To control better these variables two forest stands were selected aged about 110 years.

One of them is located behind a summer levee (low crown height levee), which is inundated only by the high floods. Another forest compartment is outside the main levee and never inundated. These stands are sampled to prepare dendrochronological analysis, which gives us higher time-resolution data. We hope these analyses will help us to interpret the relationship between forest growth and water conditions.

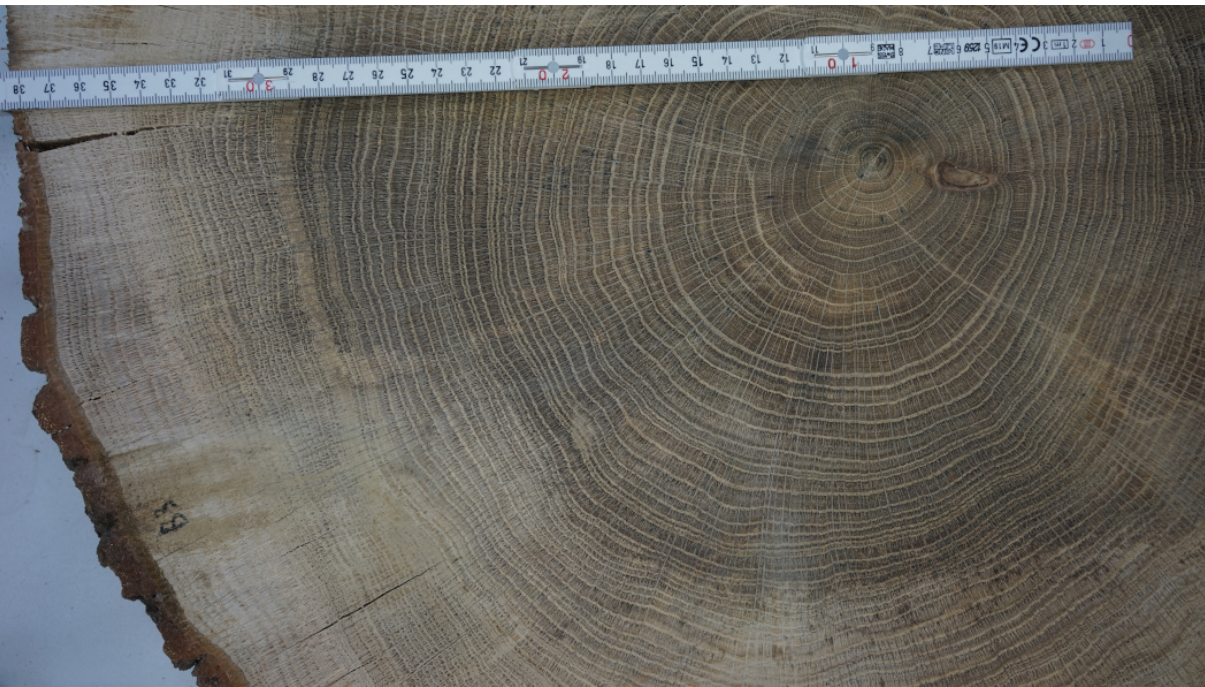


Figure 1: A prepared trunk slice to tree ring analysis

3. Results

The average growth of forest stands were analysed in the selected areas with the help of logging and forest planning data of the last 20 years. In the case of hybrid poplar it showed a statistically significant difference between the floodplain and protected area (Fig. 2).

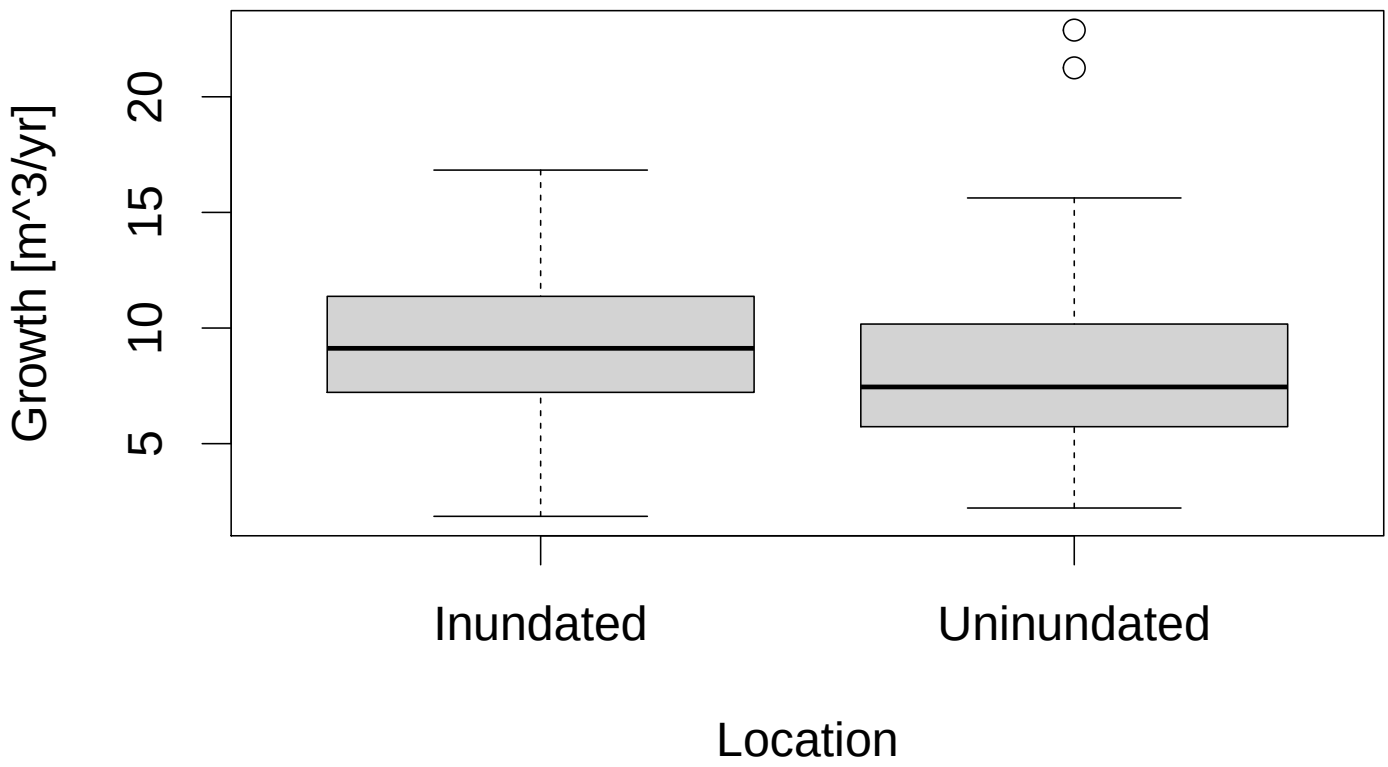


Figure 2: Growth of hybrid poplar classified by inundation

The mean growth (m^3/yr) of inundated and uninundated classes was dissimilar based on t-test (p-value: 0.01683). Because of the non-normality a Mann-Whitney-Wilcoxon test was run and it shows a much stronger denial of similarity (p-value: 0.0007813).

The measurement of the annual ring width was performed on digital photos of polished cross section using a computer program. Due to several “disturbing” years (flood, insect calamity), none of the environmental factors showed a correlation with the complete tree-ring time-series, but significant relationships were detected for shorter periods. The connection with stage of the Danube is surprisingly not validated.

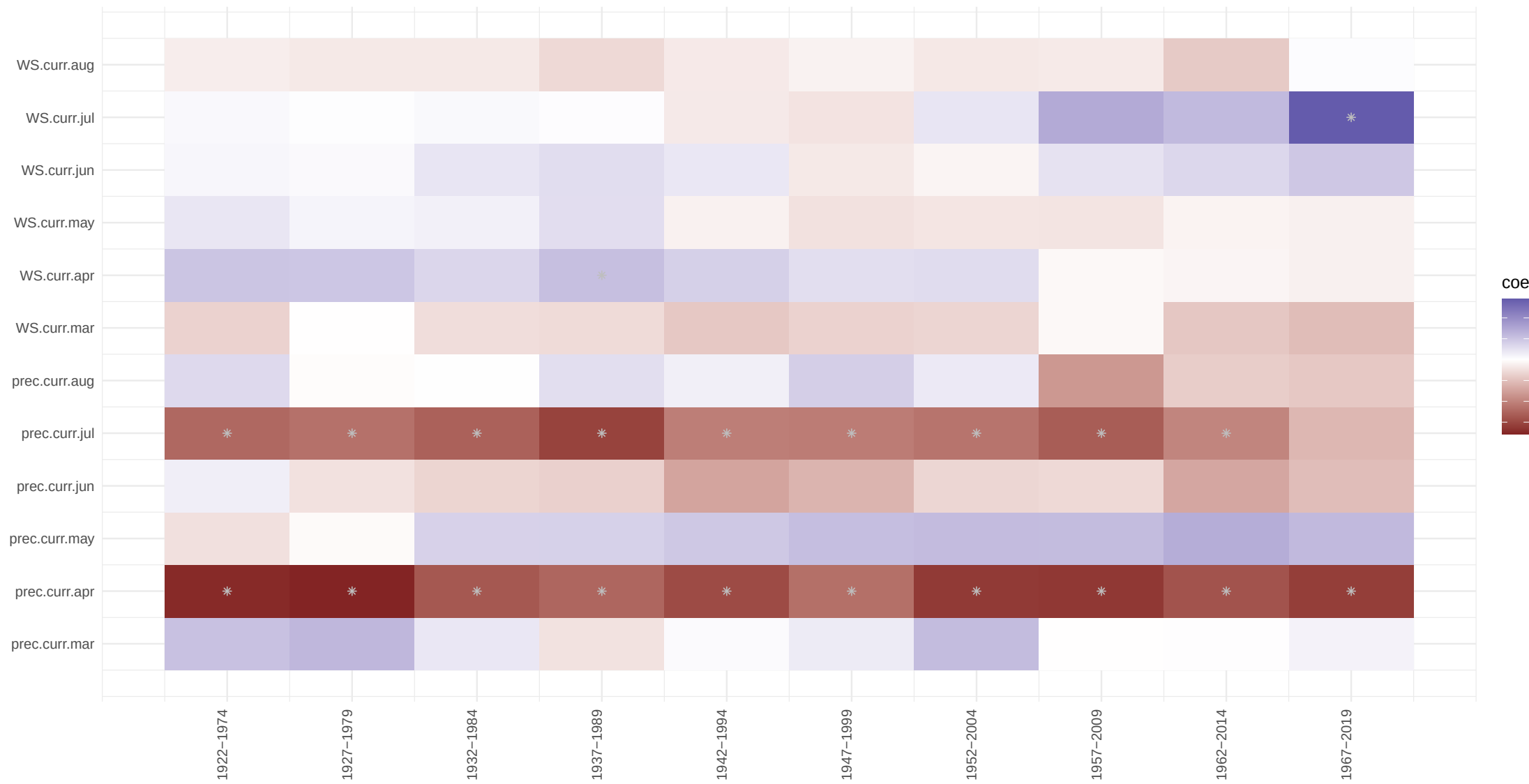


Figure 3: Waterstage and precipitation combined effect on tree-ring growth

Acknowledgments

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