

# XYLEM FORMATION CHANGES OF NORWAY SPRUCE TREES IN SOUTH MORAVIAN REGION DURING 2015-2020 PERIOD

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## Introduction

As high variability in xylem formation among years is influenced by weather conditions, studies on intra-annual dynamics at the cellular level is a useful tool to study weather impact on the tree-ring secondary growth.

## Objectives of the study

The objectives of this study were: (i) monitoring of cambial activity and seasonal intra – annual dynamics of xylem formation, and (ii) to investigate the relationship of xylem cells production and timings with the local weather conditions, during the 2015 – 2020 period.

## Wood formation dynamics

The **critical dates of xylem phenological phases** are the onset (CA) and cessation (CCA) of cambial activity; the onset (OPC) and cessation of cell enlargement (CPC); the onset (SW) and cessation of cell wall thickening (CSW); as well as the onset of maturation (MT). **Duration of xylogenesis**: days between period CSW – OPC.

## Methodology

**Study site:** Research plot Rajec-Němčice, fir-beech forest vegetation zone at an altitude of 600-660 m a.s.l.

**Tree sampling:** Six, healthy mature Norway spruce trees. Tree microcores, were extracted weekly from middle of March till beginning of November.



Fig. 1: Rajec-Němčice research plot

## Weather Data

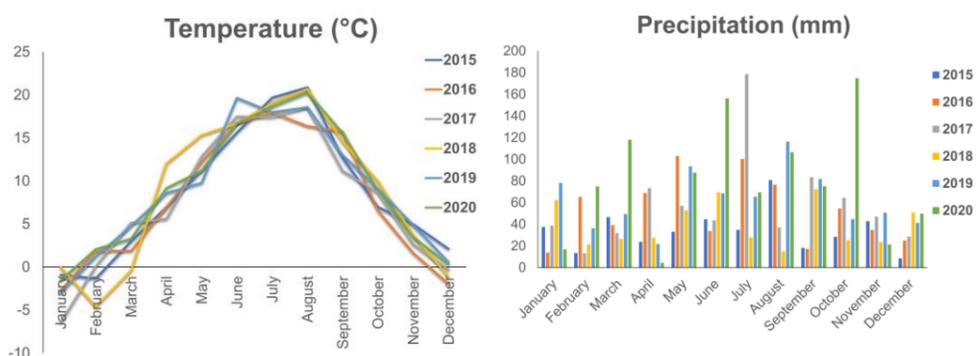


Fig. 2: Distribution of the monthly mean temperature and monthly sum precipitation in the study site during the 2015-2020 period

## Acknowledgements

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## Results

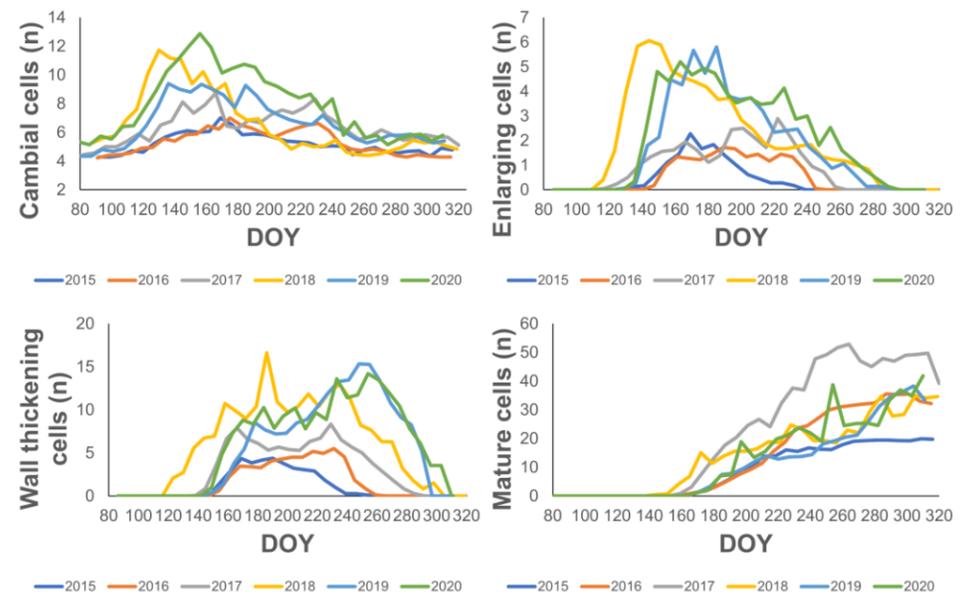


Fig. 3: Number of cells (n) in the cambial zone, in radial enlargement, in secondary wall thickening and mature xylem cells during the 2015-2020 period

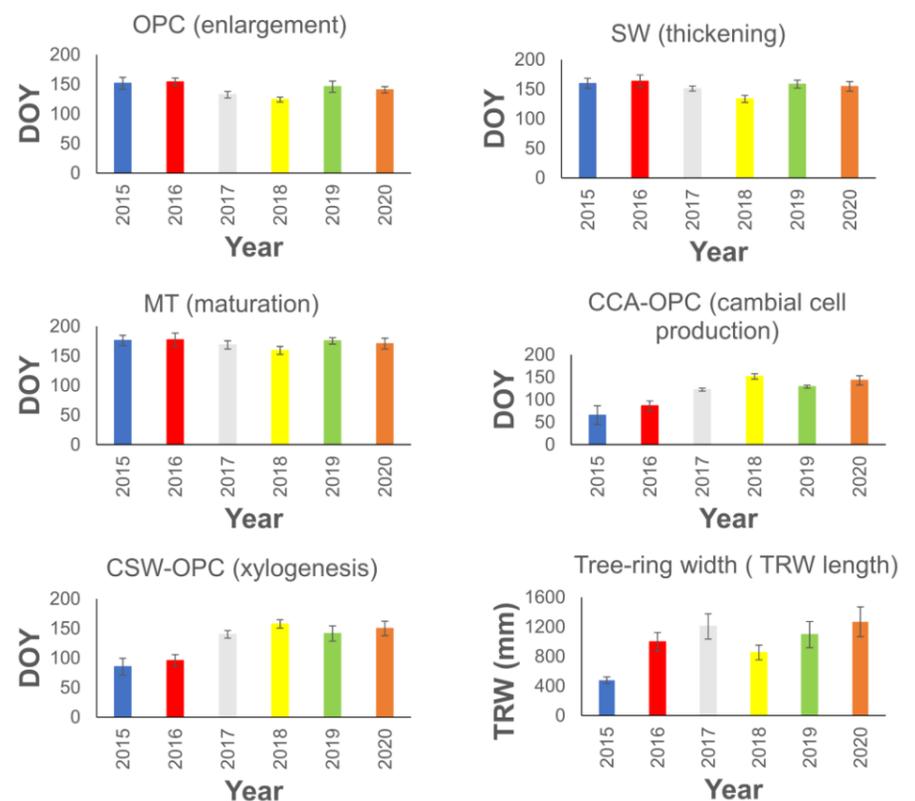


Fig. 4: Tree-ring width (TRW) length, timings and duration of xylem phenological phases (error bar: 95% confidence interval)

## Conclusions

The results suggest that the onset of cambial activity and xylem formation are controlled by minimum spring temperature, while precipitation availability and distribution seem to be the limiting factors for the number, as well as the duration of xylem cells production.