



Universität
Basel

Research Project

STReESS - Studying Tree Responses to extreme Events: a SynthesiS (Tree tissue formation under low temperature stress)

Third-party funded project

Project title STReESS - Studying Tree Responses to extreme Events: a SynthesiS (Tree tissue formation under low temperature stress)

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Organisation / Research unit

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Department

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Status Completed

Low temperature stress constrains tree growth, but the underlying mechanisms are unresolved. Since it became obvious that cold stress does not invoke carbon limitation, but exerts direct impacts on meristems, stress research refocused toward understanding the physiological impact of low temperature on tissue formation. Similar cold-limits for growth were previously shown across temperate tree species, but the cold temperature impact on cellular processes are largely unknown. We aim to decipher these processes by experimental studies and surveys across natural climatic transects. All meristematic and cambial activity should be controlled by similar basic mechanisms, but for practical reasons we will focus on root growth as a proxy, and use anatomical and biochemical methods to identify the main driver behind the low temperature growth cessation. We will address this topic within three separate work packages: 1) an assessment of morphology, cell anatomy and cell-wall composition of roots from different tree species experimentally produced at their cold-temperature limit, 2) a sequential root-cooling and -warming experiment to identify key-processes of low temperature stress, 3) a survey of morphology and cell-wall composition of tree roots across sharp, natural soil temperature gradients. This project will offer a mechanistic explanation of low temperature stress on tree tissue growth and largely contribute to the general understanding of tree growth under cold stress.

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