Quantifying intra- and interspecific competition effects on water use of different tree stands using sap flow, terrestrial lidar scan and advances in stable water isotopy

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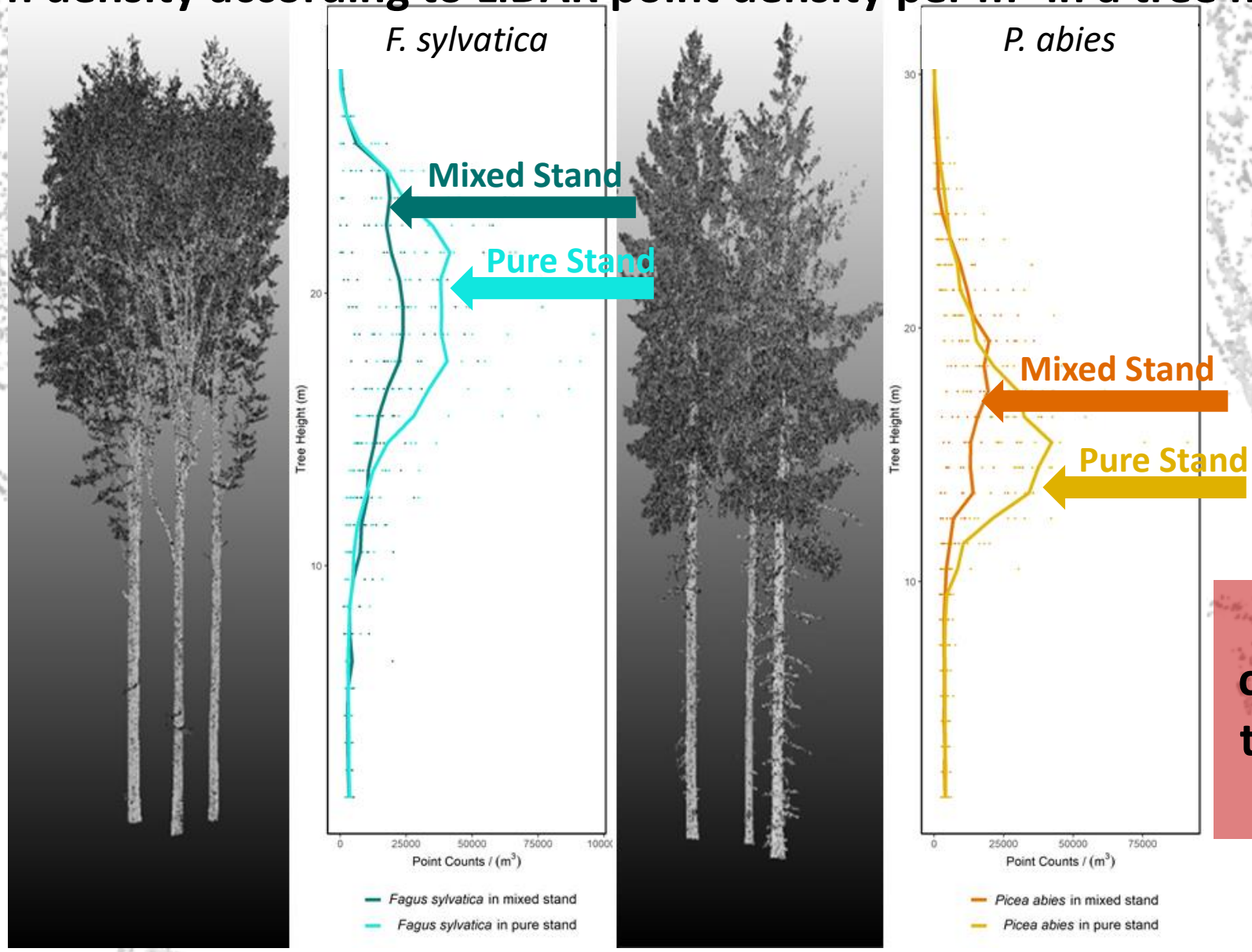
Does **interspecific competition force changes in water use** and **influence the dynamics of water uptake** in *F. sylvatica* and *P. abies*?

interspecific competition force changes in above ground structure

Crown density according to LiDAR point density per m^3 in a tree height profile



Interspecific competition reduces the crown density in both species

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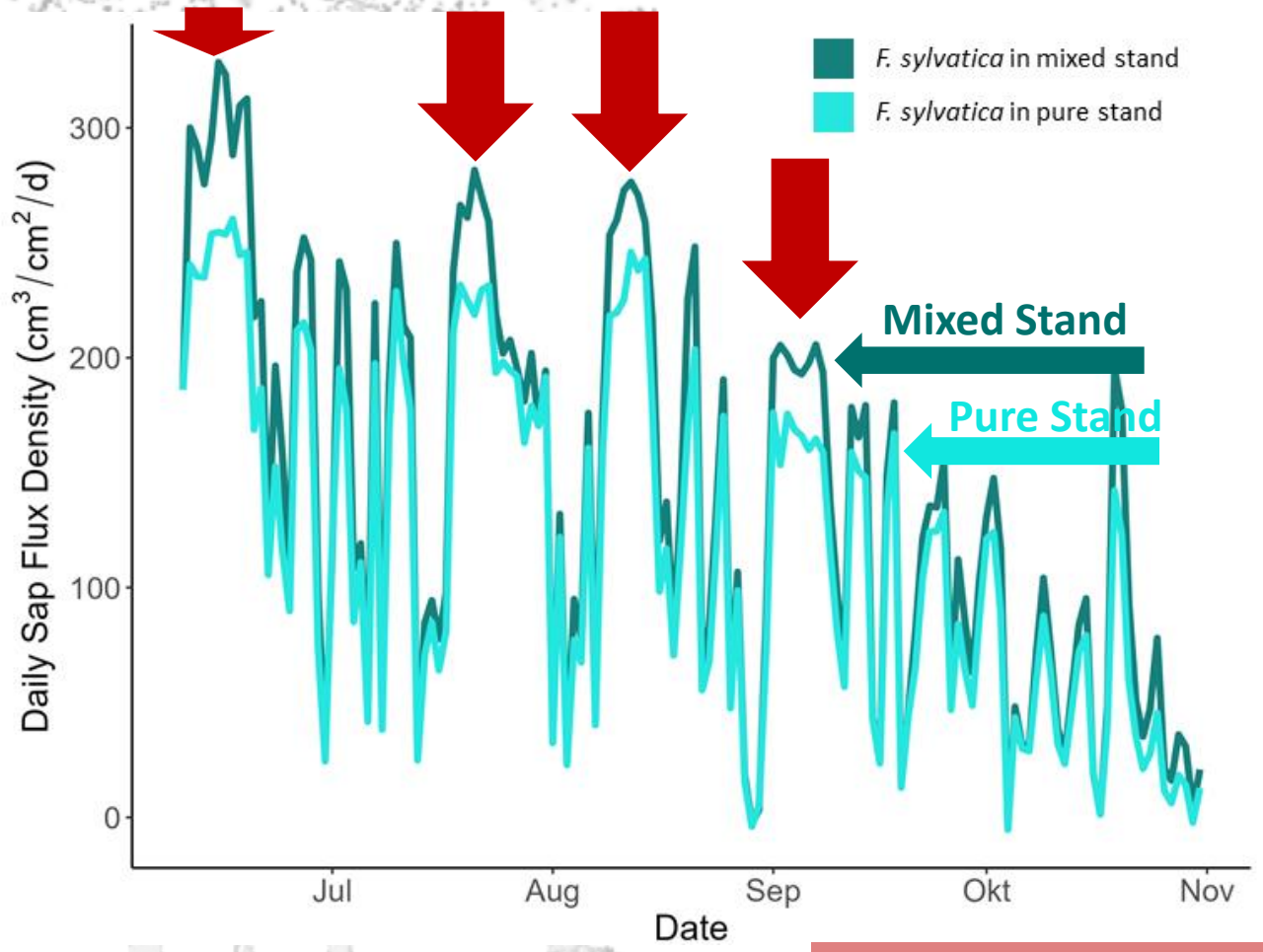
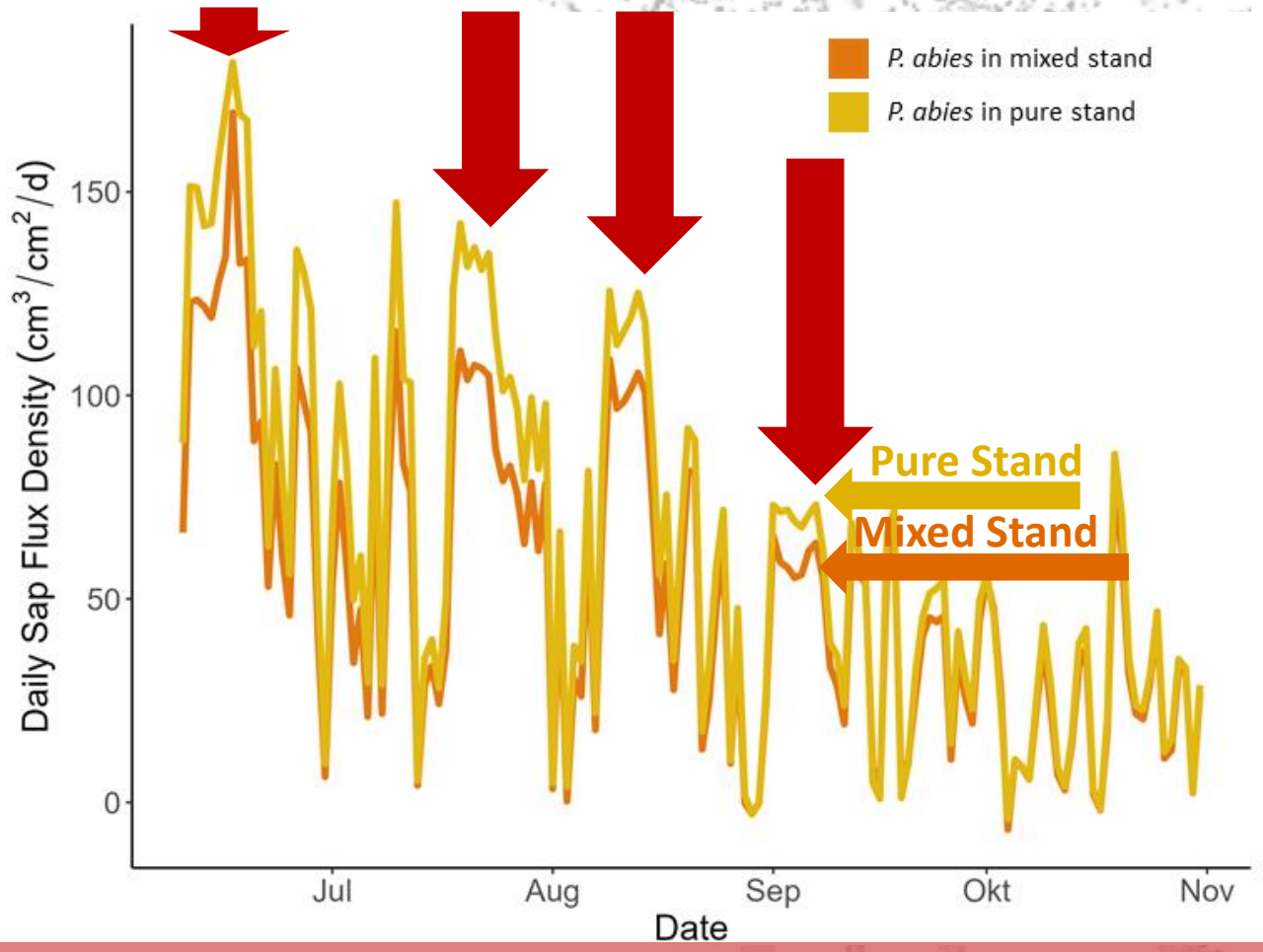
interspecific competition force changes in water use

Daily Sap Flux Density during measurement period for both species and tree stands





Interspecific competition increases the water use of *F. sylvatica* and reduces the water use of *P. abies* during days of higher VPD

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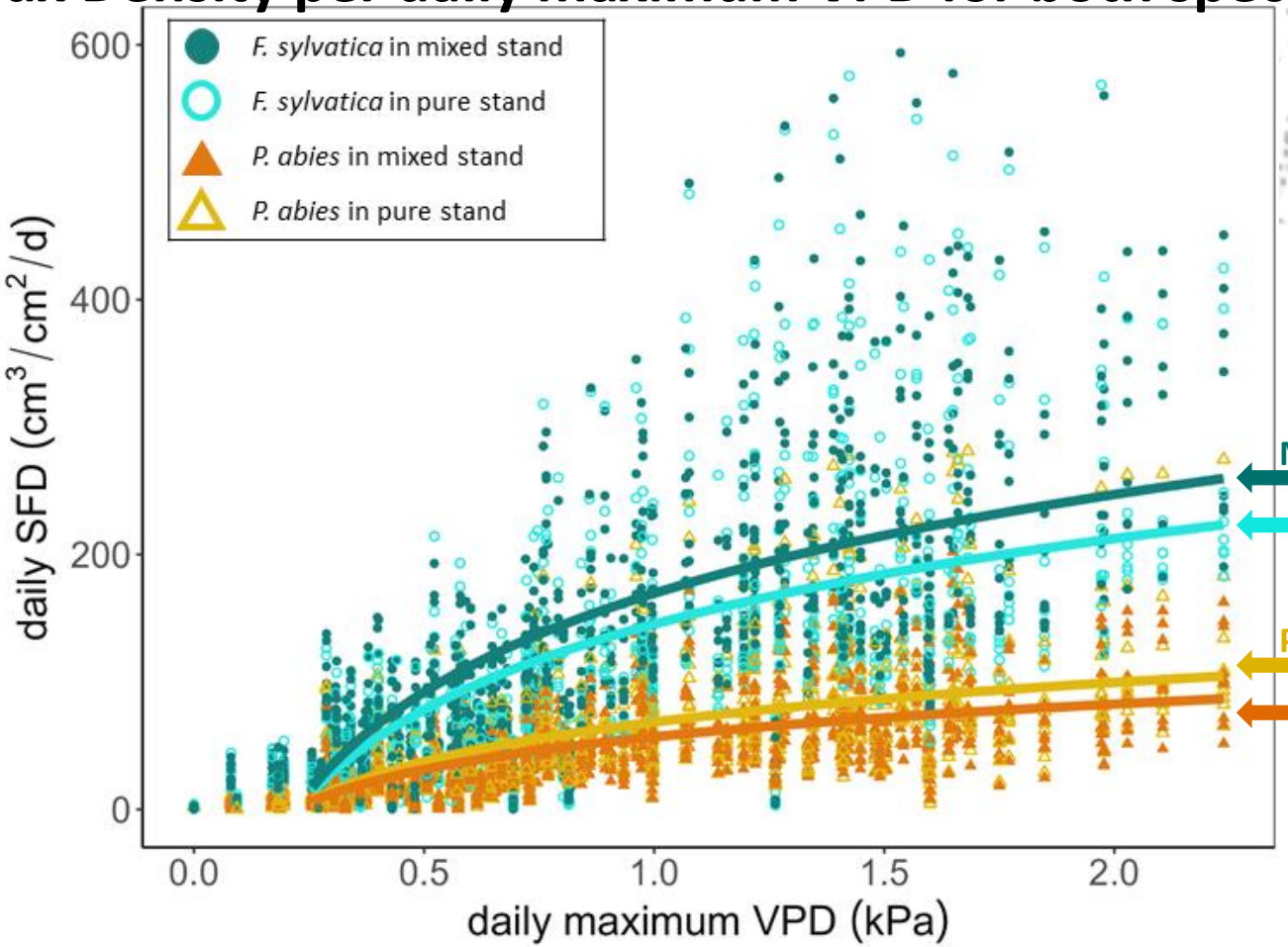
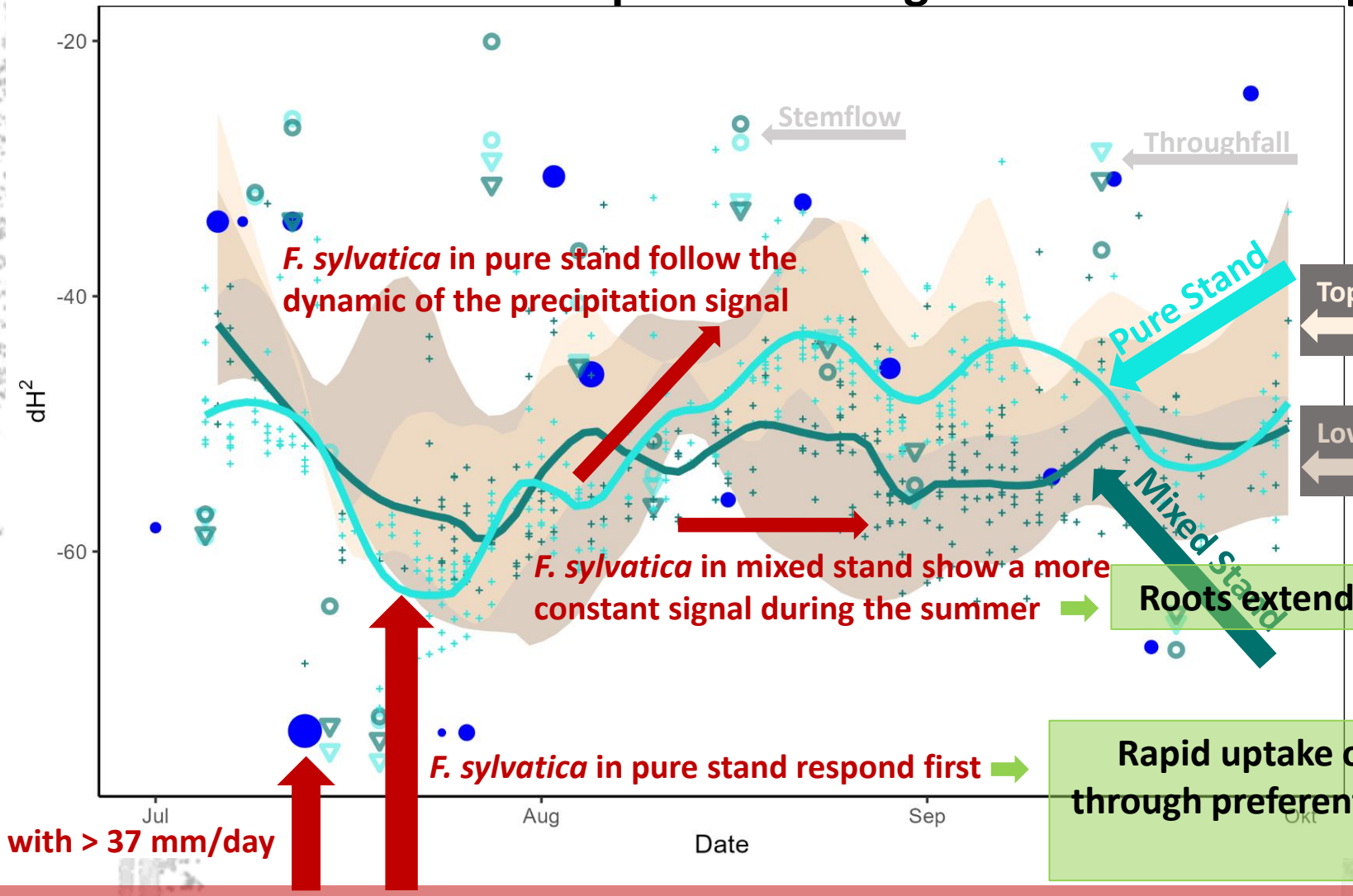
Daily Sap Flux Density per daily maximum VPD for both species and tree stands



Interspecific competition increases the water use of *F. sylvatica* and reduces the water use of *P. abies* during days of higher VPD

interspecific competition influence the dynamics of water uptake

Continuous in-situ water isotope data during the measurement period



F. sylvatica in pure stand follow the dynamic of the precipitation signal

F. sylvatica in mixed stand show a more constant signal during the summer → Roots extended to deeper soil layers

F. sylvatica in pure stand respond first → Rapid uptake of precipitation water through preferential flow along stem and roots?

Strong Rain Event with > 37 mm/day

Without interspecific competition *F. sylvatica* takes up precipitative water rapidly
Interspecific competition forces *F. sylvatica* to rely on water from deeper soil layers

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Interspecific competition increases the water use of *F. sylvatica* and reduces the water use of *P. abies* during days of higher VPD

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