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Abstract

Seasonal and diurnal variability in sap flow intensity of mature sessile oak (Quercus petraea (Matt.) Liebl.) trees in relation to microclimatic conditions
P. Kanalas, A. Fenyvesi, J. Kis, E. Szőllősi, V. Oláh, I. Ander & I. Mészáros

In this study sap flow dynamics of mature sessile oak trees (Quercus petraea) in a marginal sessile oak-turkey oak forest was investigated in 2009. That year spring was dry without significant rain in April and May and the driest month was August. Due to the extreme weather conditions the volumetric soil water content (SWC) of upper 30 cm was low on experimental days in May (0.13-0.14 cm3 cm-3) but it reached the lowest value in August (0.08 cm3 cm-3). Sap flow was measured in a dominant and a co-dominant tree by heat dissipation method from 26 March till 30 October. In the present paper several three-day long periods of the continuous seasonal recordings were chosen to represent the effects of typical weather conditions and different stages of canopy development on sap flow dynamics. The daily maximum sap flow density values of dominant and co-dominant trees were similar (0.30-0.32 cm3 cm-2 min-1) in moist period (July). Rains and transient increase of SWC after proceeding drought resulted in change of diurnal course of sap flow in experimental days of July. In this period dominant trees also showed considerable sap flow (0.19 cm3 cm-2 min-1) during night hours and short sap flow peaks in early morning (6:00 to 8:00 a.m.) indicating the refilling of desiccated tissues. After the progressive drought in August the daily maximum sap flow density decreased to 0.07 cm3 cm-2 min-1 in dominant tree and to 0.12 cm3 cm-2 min-1 in the co-dominant. Both trees exhibited gradual

stomatal closure from morning hours.

habitat: open/dry oak forests
forest ecology
climate: microclimate, climate of stand
Notes

Drought stress, marginal forest, sap flow, sessile oak, stomatal control

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