SUPPLEMENTARY DATA
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Table S1. p-value of the analysis of covariance (ANCOVA) to assess statistical differences in the relationships between hydraulic variables, by assessing each subplot two by two (p-value < 0.001*; p-value < 0.01**; p-value < 0.05*).**

Relationship	CBa x CBb	CBa x DWa	CBa x DWb	CBb x DWa	CBb x DWb	DWa x DWb
$T_{act}/T_{pot}(\Psi_{soil})$	< 0.001***	< 0.001***	< 0.001***	0.08	0.21	0.16
$T_{act}/T_{pot}(\Psi_{x\_trunk})$	< 0.001***	< 0.001***	< 0.001***	0.07	0.16	0.13
$K_{below}(\Psi_{soil})$	< 0.001***	< 0.001***	< 0.001***	0.24	0.09	0.07
$K_{below}(\Psi_{x\_trunk})$	0.011*	0.018*	< 0.01**	0.08	0.10	0.06
$K_{trunk}(\Psi_{soil})$	< 0.001***	< 0.001***	< 0.001***	< 0.001***	0.042*	< 0.001***
$K_{trunk}(\Psi_{x\_trunk})$	< 0.001***	< 0.001***	< 0.001***	< 0.001***	0.028*	< 0.001***
$K_{below}(T_{act}/T_{pot})$	< 0.001***	< 0.001***	< 0.001***	0.17	0.23	0.15

Table S2. Value, uncertainty and p-value on the coefficients of the linear regression between Ψ_{x_canopy} and Ψ_{x_trunk}, between K_{trunk} and Ψ_{soil}, and between K_{trunk} and Ψ_{x_trunk} (p-value < 0.001*; p-value < 0.01**; p-value < 0.05*).**

		Linear regression coefficient (y=a*x+b)					
		a			b		
Relationship	**Subplot**	*Value*	*Uncertainty*	*p-value*	*Value*	*Uncertainty*	*p-value*
$\Psi_{x\_canopy}(\Psi_{x\_trunk})$	CBa	0.95	0.06	0.33	-0.05	0.06	0.49
	CBb	1	0.14	0.11	0.10	0.13	0.47
	DWa	0.93	0.07	0.06	-0.04	0.05	0.44
	DWb	0.96	0.06	0.12	-0.01	0.05	0.80
$K_{trunk}(\Psi_{soil})$	CBb	0.08	0.35	0.82	2.26	0.07	<0.001***
	DWa	-0.001	0.76	0.99	1.19	0.15	<0.001***
	DWb	-0.21	0.78	0.79	2.24	0.18	<0.001***
$K_{trunk}(\Psi_{x\_trunk})$	CBb	-0.03	0.16	0.85	2.21	0.14	<0.001***
	DWa	0.28	0.31	0.90	1.37	0.22	<0.001***
	DWb	0.06	0.43	0.13	2.34	0.35	<0.001***

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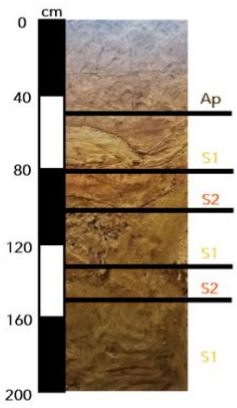
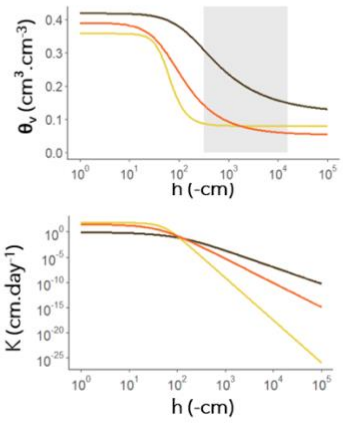
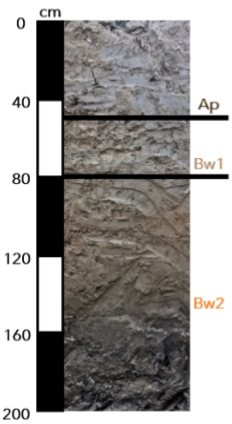
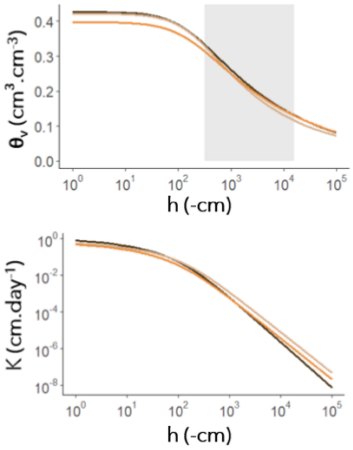
CBa



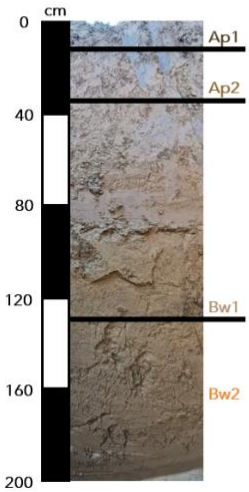


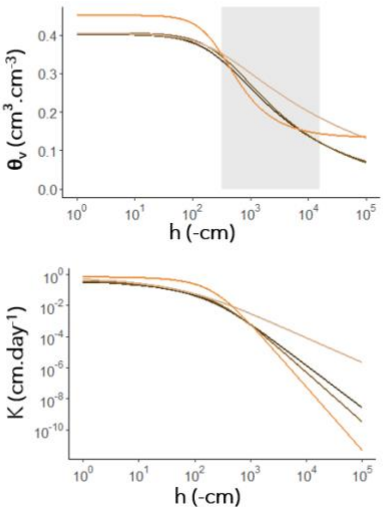
CBb





DWa





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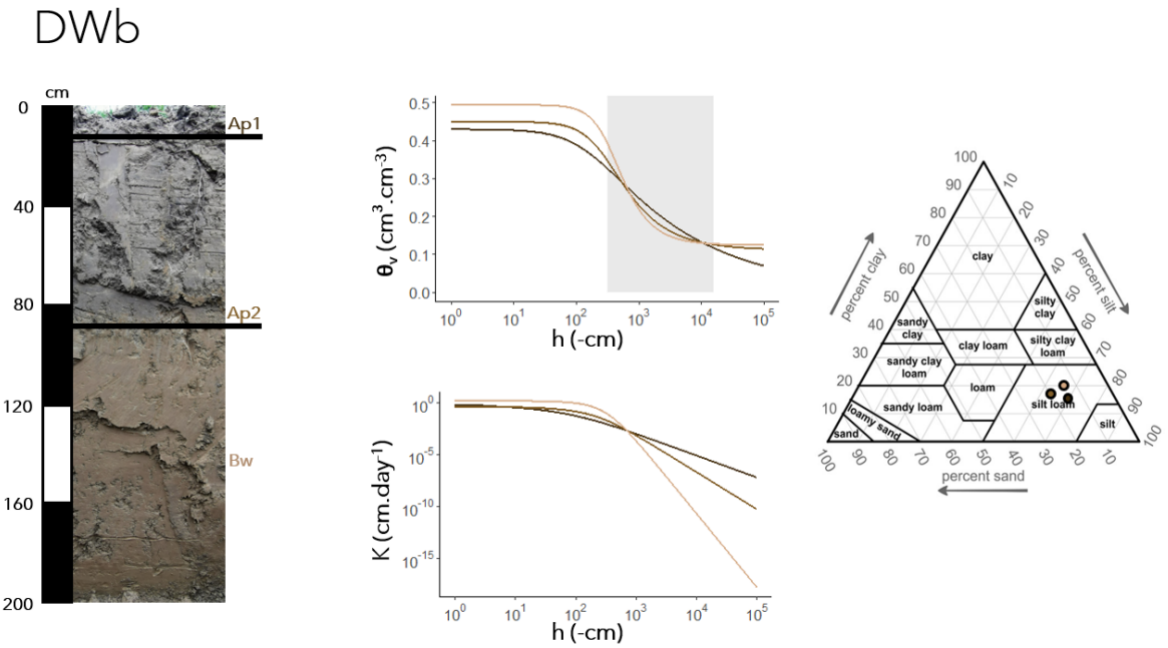

Figure S1. Delineation of soil profile horizons, their unsaturated hydraulic properties (water retention curve $\theta_v(h)$ and hydraulic conductivity curve (K(h); θ_v is the soil volumetric water content, K is the soil hydraulic conductivity and h is the soil suction) and their textural class for each subplot.

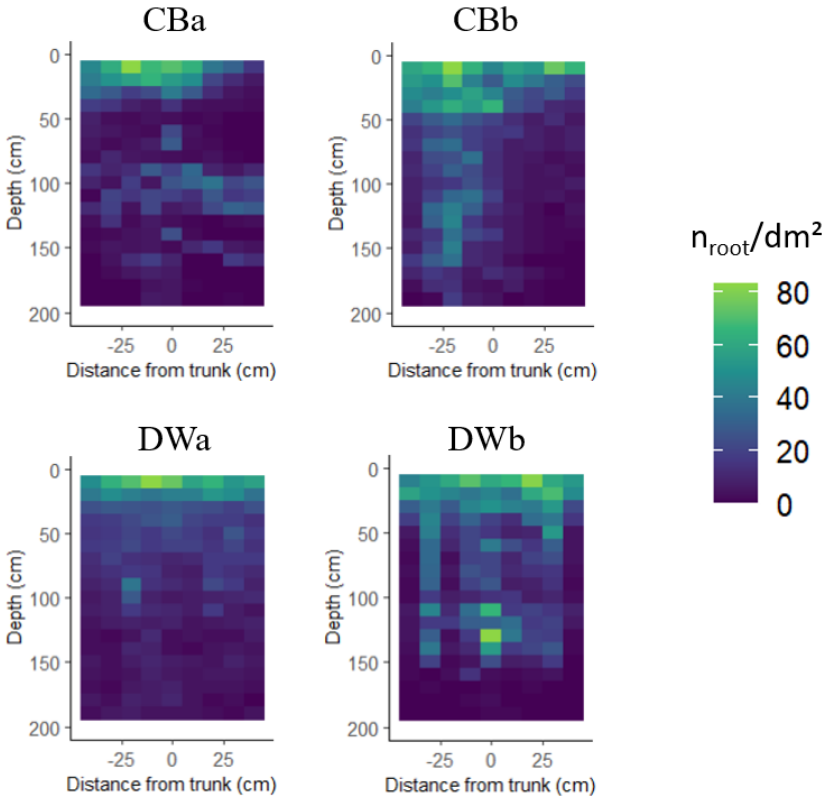

Figure S2. 2D grapevine root density up to 2 m deep in each subplot.

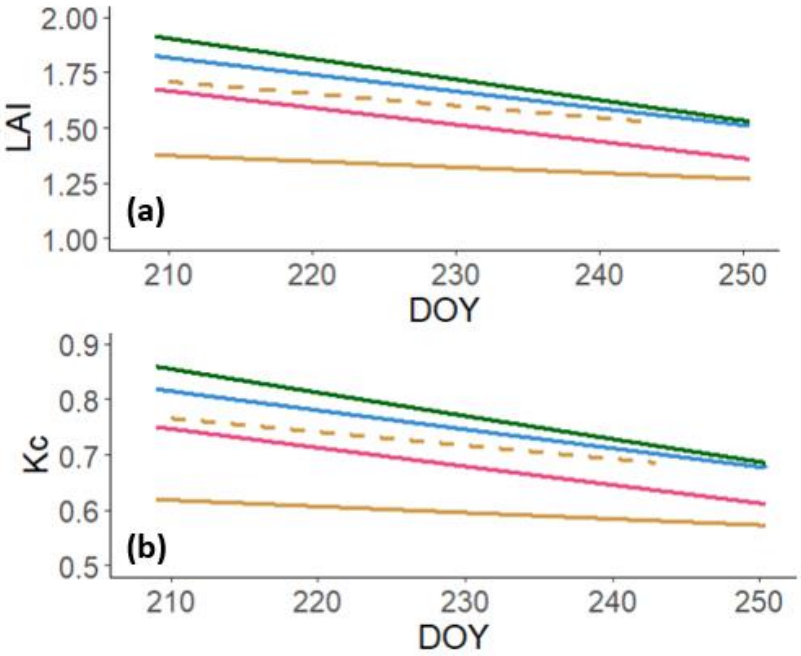

Figure S3. (a) Time series of leaf area index (LAI) in each subplot. The LAI was measured in the DOY 208 and DOY 250 in 2022, and the DOY 208 and 243 in 2023. LAI is linearly interpolated between the two dates of the same year. (b) Time series of cultural coefficient (Kc) estimated with the Kc-LAI relationship described by Netzer *et al*. (2009). The full blue, pink and green lines correspond respectively to the subplots CBb, DWa and DWb; the full brown line corresponds to the subplot CBa in 2022; the dashed brown line corresponds to the subplot CBa in 2023.

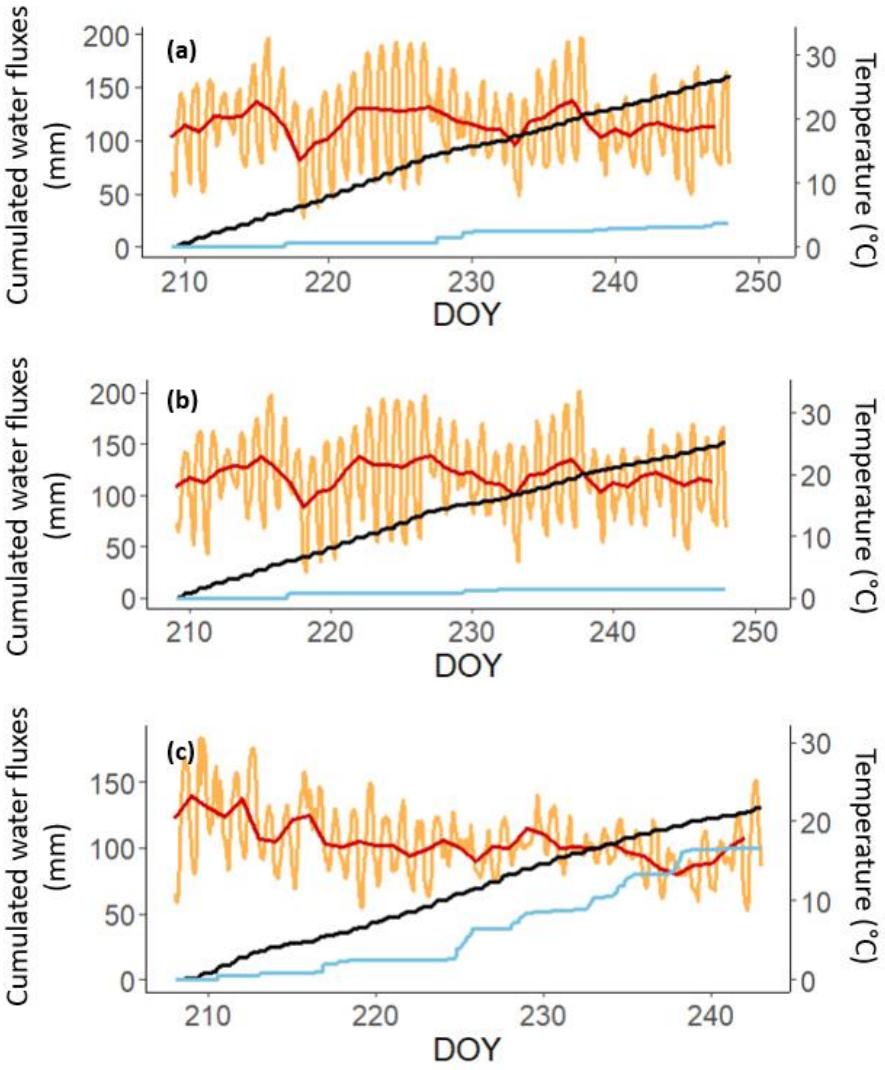

Figure S4. Cumulated precipitation (mm, blue), cumulated reference evapotranspiration (mm, black), hourly mean temperature (°C, orange) and daily mean temperature (°C, red) during the measurement campaign at (a) CB vineyard in 2022, (b) DW vineyard in 2022 and (c) CB vineyard in 2023.

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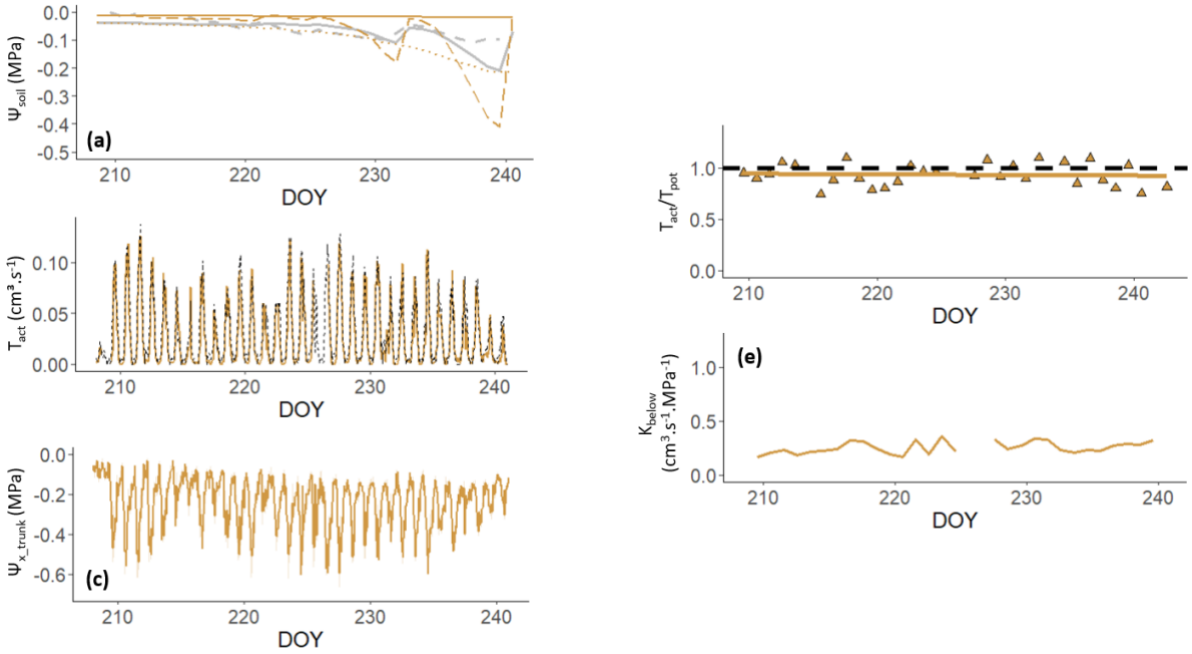

Figure S5. Time series of (a) soil water potential Ψ_{soil}, (b) actual transpiration T_{act}, (c) trunk xylem water potential, (d) T_{act}/T_{pot} and (e) belowground hydraulic conductance K_{below} over the 2023 wet experimental period in the CBa subplot. In (a), the dashed brown line, dotted brown line and full brown line correspond respectively to the bulk soil water potentials $\Psi_{bulk\ soil}$ at depths of 10 cm, 40 cm and 100 cm; the full grey line is the root-effective soil water potential Ψ_{soil_eff}, and the dashed grey line is the predawn water potential $\Psi_{x\_trunk\_PD}$. In (d) and (e), only one value is represented per day, corresponding to the daily peak of T_{pot}. In (d), the dotted black line is T_{act}/T_{pot} = 1; the brown full line is the linear regression of T_{act}/T_{pot} over time. The slope of this linear regression is not different from 0 (p-value > 0.05).

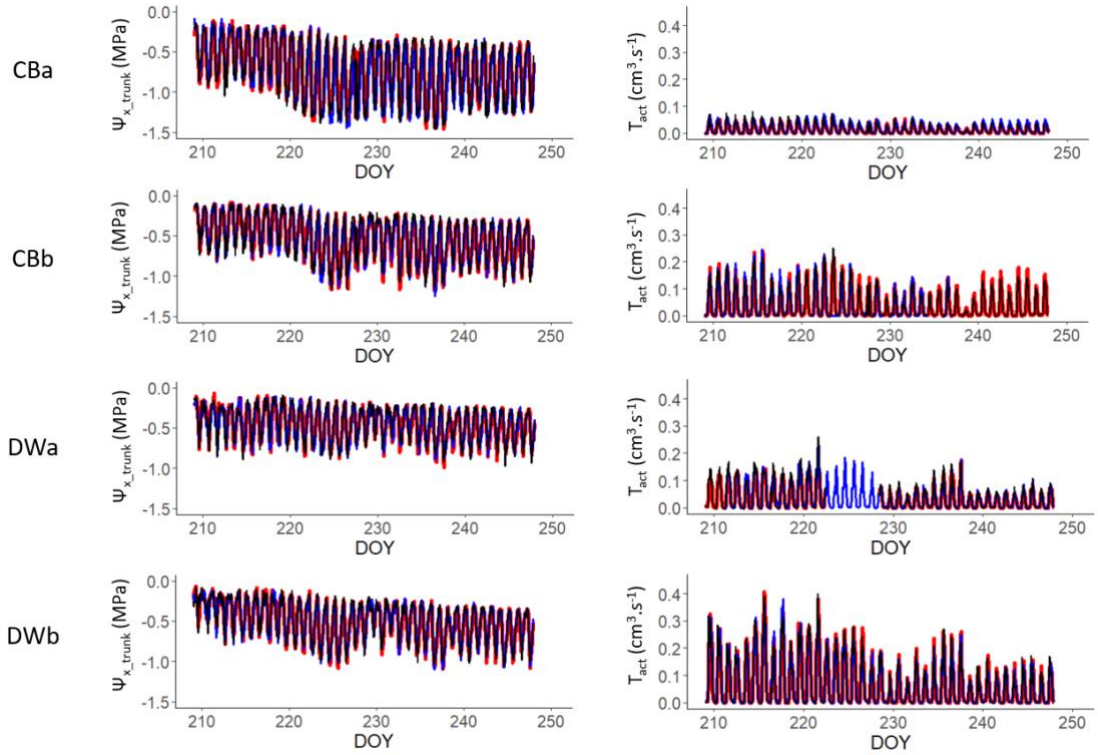

Figure S6. Time series of trunk xylem water potential (Ψ_{x_trunk}—column left) and transpiration (T_{act}—column right) for each of the three replicates in the different subplots. Each colour (red, blue or black) corresponds to one of the three replicates of the subplot.

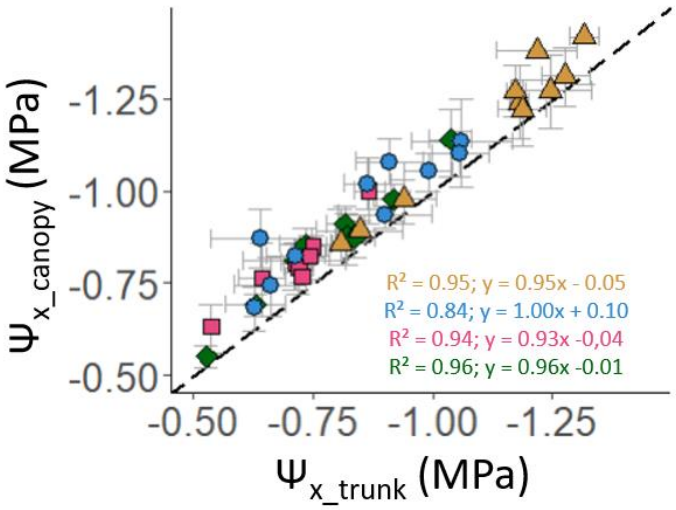

Figure S7. Comparison between Ψ_{x_trunk} and Ψ_{x_canopy} measured regularly over the experimental period. Each point corresponds to each measurement taken at the same time for both water potentials. The brown triangles, blue circles, pink squares and green diamonds correspond, respectively, to the study areas CBa, CBb, DWa and DWb. The dashed black line is the 1:1 line. The slopes of each linear regression are not statistically different to 1 (p-value > 0.05; Table S2).

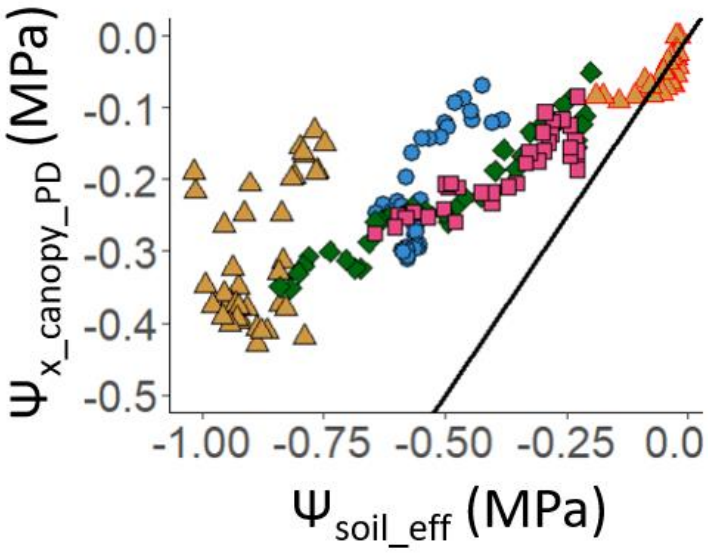

Figure S8. Comparison between Ψ_{soil_eff} and $\Psi_{x\_trunk\_PD}$. $\Psi_{x\_trunk\_PD}$ corresponds to the daily maximum (less negative) Ψ_{x_trunk}. Each point corresponds to one day of the measurement period; the Ψ_{soil_eff} and $\Psi_{x\_trunk\_PD}$ compared were measured at the same time, i.e., at night when grapevine transpiration is null, between 3 am and 6 am. The brown triangles, blue circles, pink squares and green diamonds correspond respectively to the study areas CBa, CBb, DWa and DWb. The brown triangles surrounded in red are data collected in 2023. The full black line is the 1:1 line.