Supplementary Materials:

Table S1. Classification of aridity index (AI) categories.

Classification	Aridity Index (AI)
Hyper-arid	AI ≤ 0.05
Arid	0.05 ≤ AI ≤ 0.20
Semi-arid	0.20 ≤ AI ≤ 0.50
Dry sub-humid	0.50 ≤ AI ≤ 0.65
Sub-humid	0.65 ≤ AI ≤ 0.80
Humid	0.80 ≤ AI ≤ 1.50
Very humid	1.5 ≤ AI

Table 2. Significant regression models describing the relationship between physiological and single or combined environmental parameters over different time intervals. The adjusted R^2 values and the levels of significance are presented. The models in bold are the most significant ones with the highest adjusted R^2, explaining the variation in the respective physiological parameter, which are presented in figures.

	Physiological parameters			
Environmental parameters; exact day of measurements	Midday Ψ	$\delta^{13}C$	A_{max} (November–March)	Hourly Q_l (October–March)
VPD	0.55, $p < 0.01$	0.36, $p < 0.01$	-	0.52, $p < 0.001$
Daytime VPD	0,41, $p < 0.01$	0.52, $p = 0.001$	-	-
PET	**0.78, $p < 0.001$**	0.51, $p = 0.001$	-	-
aSWC	0.32, $p < 0.01$	-	-	-
Net radiation	0.68, $p < 0.001$	0.32, $p < 0.05$	0.47, $p < 0.05$	0.49, $p < 0.001$
Daytime net radiation	0.54, $p < 0.001$	0.26, $p < 0.05$	-	-
T_{mean}	0.65, $p < 0.001$	0.47, $p < 0.01$	0.25, $p < 0.05$	-
T_{min}	0.59, $p < 0.001$	0.44, $p < 0.01$	-	-
T_{max}	0.54, $p < 0.001$	0.37, $p < 0.01$	-	-
aSWC, PET	0.70, $p < 0.001$	0.50, $p < 0.01$	-	-
aSWC, VPD	0.53, $p < 0.001$	0.31, $p < 0.01$	-	-
PET, Net radiation	0.75, $p < 0.001$	0.48, $p < 0.01$	-	-

VPD, Net radiation	0.74, $p < 0.001$	0.38, $p < 0.05$	**-**	**0.62, $p < 0.001$**
T_{mean}, Net Radiation	0.76, $p < 0.001$	0.44, $p < 0.01$	**0.62, $p < 0.05$**	-
SWC, T_{mean}, Net radiation	0.76, $p < 0.001$	0.44, $p < 0.05$		-
Environmental parameters; 1 week prior to measurements	Midday Ψ	$\delta^{13}C$		
VPD	0.60, $p < 0.001$	0.52, $p < 0.001$		
Daytime VPD	0.59, $p < 0.001$	0.48, $p < 0.01$		
PET	0.69, $p < 0.001$	0.49, $p < 0.01$		
aSWC	0.34, $p < 0.01$	0.23, $p < 0.05$		
Net radiation	0.72, $p < 0.001$	0.31, $p < 0.05$		
Daytime net radiation	0.70, $p < 0.001$	0.26, $p < 0.05$		
Tmean	0.58, $p < 0.001$	0.30, $p < 0.05$		
Tmin	0.37, $p < 0.01$	0.29, $p < 0.05$		
Tmax	0.58, $p < 0.001$	0.29, $p < 0.05$		
aSWC, PET	0.68, $p < 0.001$	0.44, $p < 0.05$		
aSWC, VPD	0.60, $p < 0.001$	0.48, $p < 0.05$		
PET, Net radiation	0.74, $p < 0.001$	0.44, $p < 0.05$		
VPD, Net radiation	0.73, $p < 0.001$	0.48, $p < 0.05$		
T_{mean}, Net Radiation	0.73, $p < 0.001$	0.29, $p < 0.05$		
SWC, T_{mean}, Net radiation	0.72, $p < 0.001$	0.36, $p < 0.05$		
Environmental parameters; 2 weeks prior to measurements	Midday Ψ	$\delta^{13}C$		
VPD	0.64, $p < 0.001$	**0.64, $p < 0.001$**		
Daytime VPD	0.66, $p < 0.001$	0.62, $p < 0.001$		
PET	0.70, $p < 0.001$	0.50, $p = 0.001$		
aSWC	0.31, $p < 0.05$	0.26, $p < 0.05$		
Net radiation	0.75, $p < 0.001$	0.31, $p < 0.05$		
Daytime net radiation	0.73, $p < 0.001$	0.25, $p < 0.05$		
T_{mean}	0.29, $p < 0.05$	0.29, $p < 0.05$		
T_{min}	-	-		
T_{max}	0.27, $p < 0.05$	0.27, $p < 0.05$		
aSWC, PET	0.46, $p < 0.01$	0.46, $p < 0.01$		

aSWC, VPD	0.61, $p = 0.001$	0.61, $p = 0.001$
PET, Net radiation	0.47, $p < 0.01$	0.47, $p < 0.01$
VPD, Net radiation	0.32, $p < 0.05$	0.32, $p < 0.05$
T_{mean}, Net Radiation	0.28, $p < 0.05$	0.28, $p < 0.05$
SWC, T_{mean}, Net radiation	-	-
Environmental parameters; Preceding month	Midday Ψ	$\delta^{13}C$
VPD	0.22, $p < 0.05$	0.55, $p = 0.001$
Daytime VPD	0.48, $p < 0.001$	0.57, $p = 0.001$
PET	0.34, $p < 0.01$	0.61, $p < 0.001$
aSWC	-	0.31, $p < 0.01$
Net radiation	0.60, $p < 0.001$	0.35, $p < 0.01$
Daytime net radiation	0.48, $p < 0.001$	0.57, $p < 0.001$
T_{mean}	0.38, $p < 0.01$	0.33, $p = 0.001$
T_{min}	0.28, $p < 0.01$	0.58, p = 0.001
T_{max}	0.23, $p < 0.05$	0.44, $p < 0.01$
aSWC, PET	0.35, $p < 0.01$	0.58, $p < 0.01$
aSWC, VPD	0.62, $p < 0.001$	0.52, $p < 0.01$
PET, Net radiation	0.60, $p < 0.001$	0.58, $p < 0.01$
VPD, Net radiation	0.60, $p < 0.001$	0.55, $p < 0.01$
T_{mean}, Net Radiation	0.58, $p < 0.001$	0.34, $p < 0.01$
SWC, T_{mean}, Net radiation	0.56, $p = 0.001$	0.43, $p < 0.05$
Environmental parameters; Current month	G_s	
VPD	0.58, $p < 0.001$	
Daytime VPD	**0.62, $p < 0.001$**	
PET	**0.69, $p < 0.001$**	
aSWC	**0.72, $p < 0.001$**	
Net radiation	0.37, $p < 0.01$	
Daytime net radiation	0.34, $p < 0.01$	
T_{mean}	0.68, $p < 0.001$	
T_{min}	0.55, $p < 0.001$	

T_{max}	0.69, $p < 0.001$
aSWC, PET	0.70, $p < 0.001$
aSWC, VPD	0.73, $p < 0.001$
PET, Net radiation	0.67, $p < 0.001$
VPD, Net radiation	0.59, $p < 0.001$
T_{mean}, Net Radiation	0.70, $p < 0.001$
SWC, T_{mean}, Net radiation	0.69, $p < 0.001$

Table 3. Characterization of the study site, in comparison to other Aleppo pine sites of Mediterranean countries.

Site	**T_{mean} [°C]**	**Annual Rainfall [mm]**	**Source**
Sani, Greece (15 m.a.s.l., 40°06′N, 23°19′E	16.2	568	Present study
Girona, Spain (190 m.a.s.l., 42°01' N, 03°00' E)	14.0	835	Del Castigio et al. 2014, Trees: DOI 10.1007/s00468-014-1106-y.
Rasquera, Spain (180 m.a.s.l., 41°01' N, 00°36' E)	15.3	547	
Riba-roja, Spain (80 m.a.s.l., 41°20' N, 00°30' E)	15.1	395	
Otricoli, Italy (400 m.a.s.l., 42°26′N, 12°28′ E)	13.0	830	Michelozzi et al. 2011, *Photosynthetica*: DOI: 10.1007/s11099-011-0068-1
Taranto, Italy (40°299 N, 16°589 E, sea level).	16.0	535	Borghetti et al. 1998, *Trees*: DOI: 10.1007/pl00009709
Beit Dagan, Israel (20 m.a.s.l., 31°59′ N, 34°48′ E)	20	490	Klein et al. 2013, *ForEcolManage*: DOI: 10.1016/j.foreco.2013.03.044