***New Phytologist* Supporting Information**

Article title: Homeostatic levels of non-structural carbohydrates after 13 years of drought and irrigation in *Pinus sylvestris* L.
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The following Supporting Information is available for this article:

Fig. S1 *Volumetric water content of the soil (VWC) in the year 2014 and 2015 in control (solid lines) and irrigated plots (dashed lines) of the Pfynwald experiment. Vertical lines indicate the 3 sampling campaigns in 2015.*

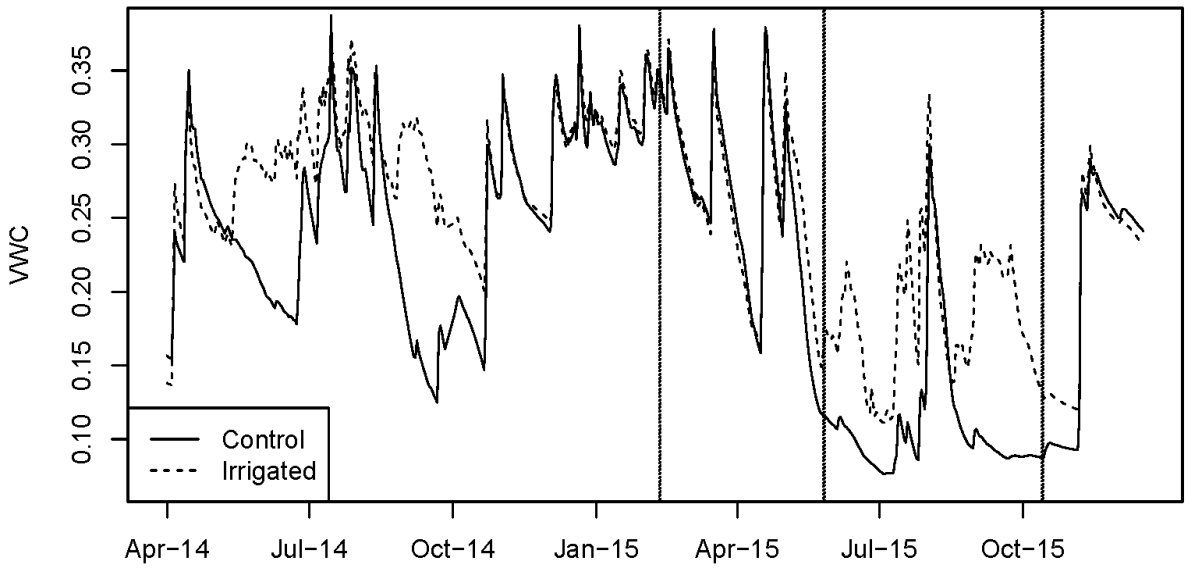
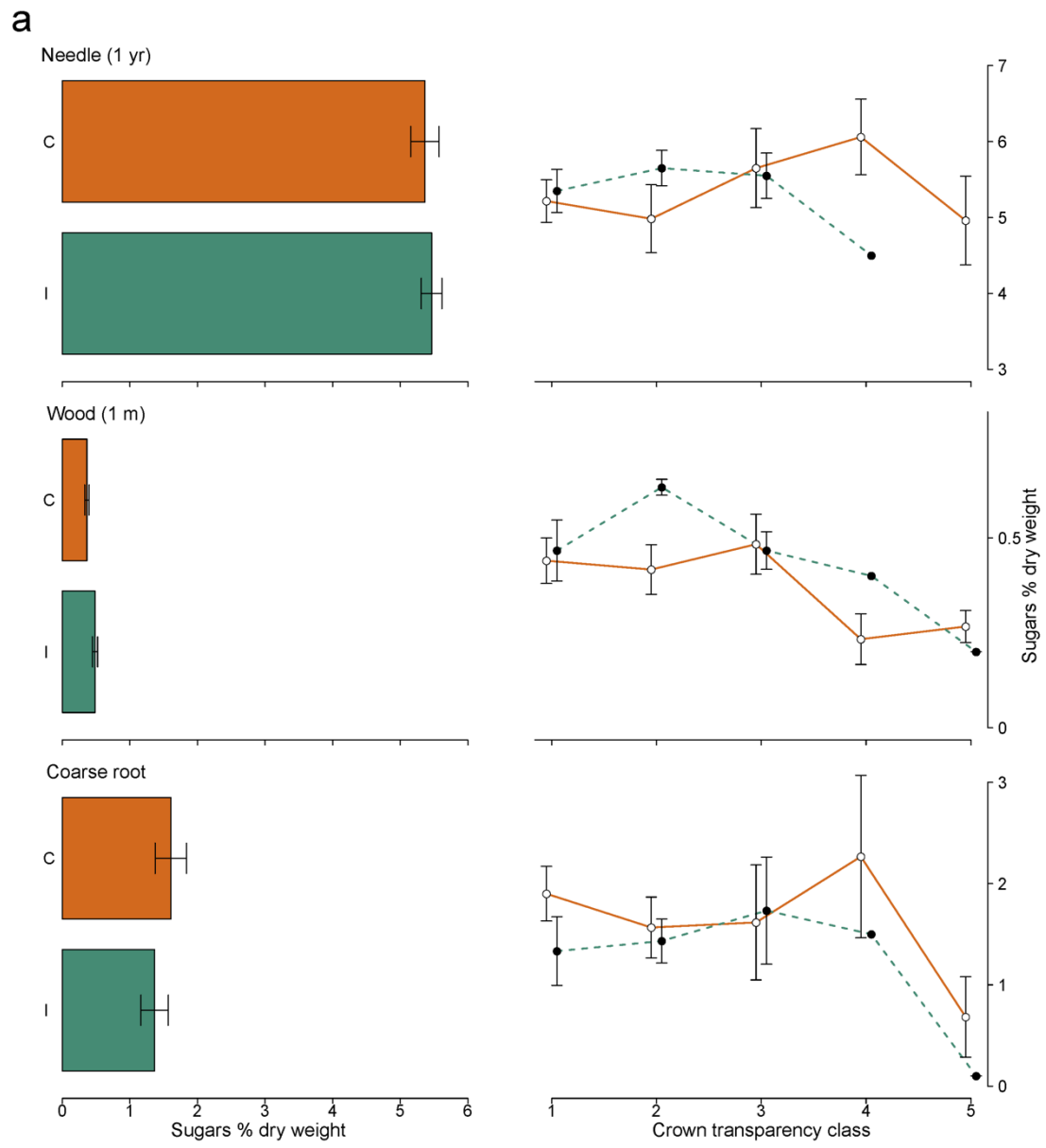


Fig. S2 *Winter levels of sugars (a) and starch (b) in 1 yr needles, stem wood at 1 m height and coarse roots of Pinus sylvestris trees. Left panels show differences between control and irrigated plots. Right panels show the starch and sugar levels against leaf area classes for control (orange) and irrigated (green) plots. Bars indicate SE of the mean.*



b

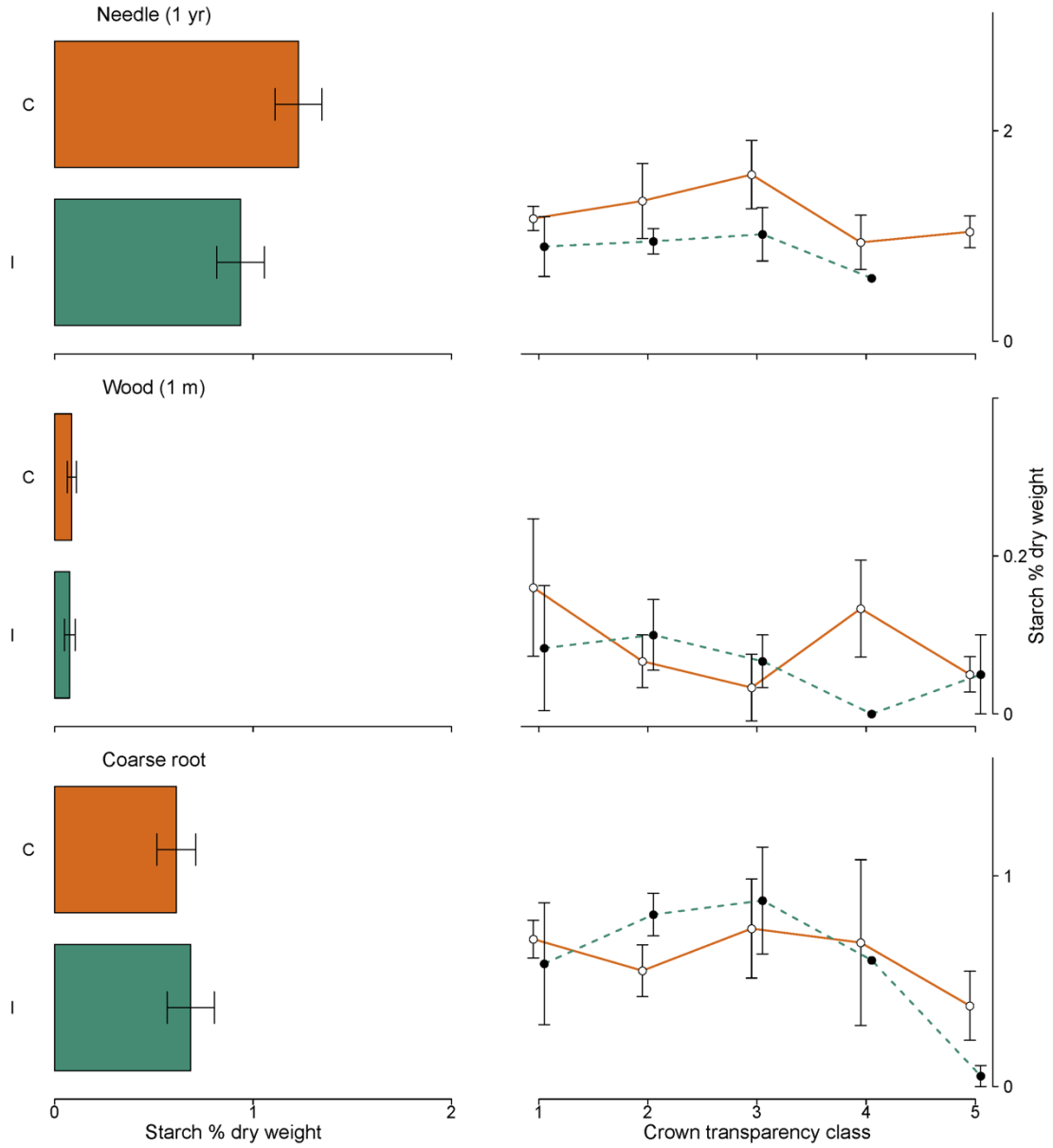
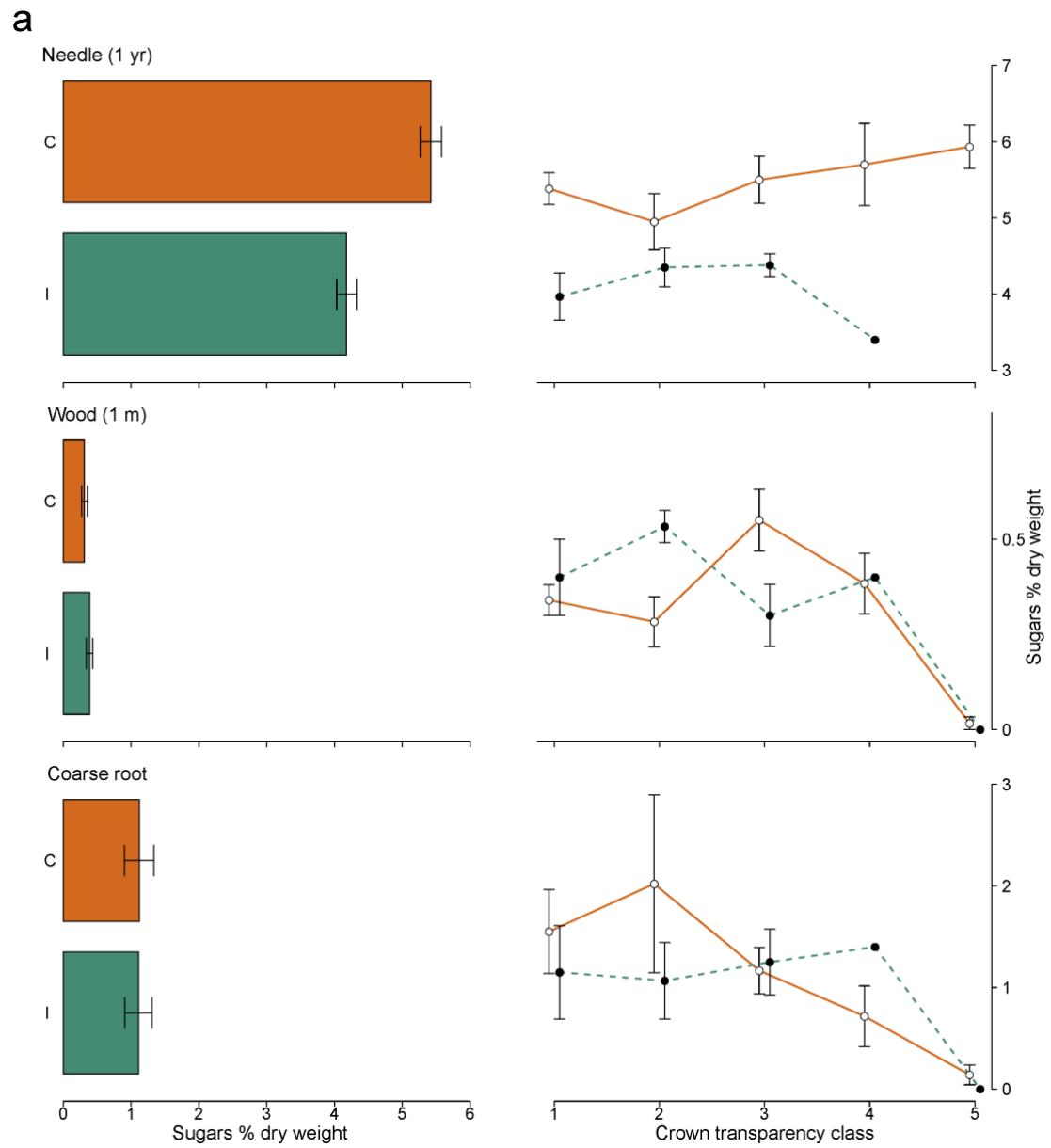

Needle (1 yr)
C
I
Wood (1 m)
C
I
Coarse root
C
I
0
1
2
Starch % dry weight
1
2
3
4
5
Crown transparency class
0
2
0
0.2
0
1
0
Starch % dry weight

Fig. S3 *Autumn levels of sugars (a) and starch (b) in 1 yr needles, stem wood at 1 m height and coarse roots of Pinus sylvestris trees. Left panels show differences between control and irrigated plots. Right panels show the starch and sugar levels against leaf area classes for control (orange) and irrigated (green) plots. Bars show SE of the mean.*



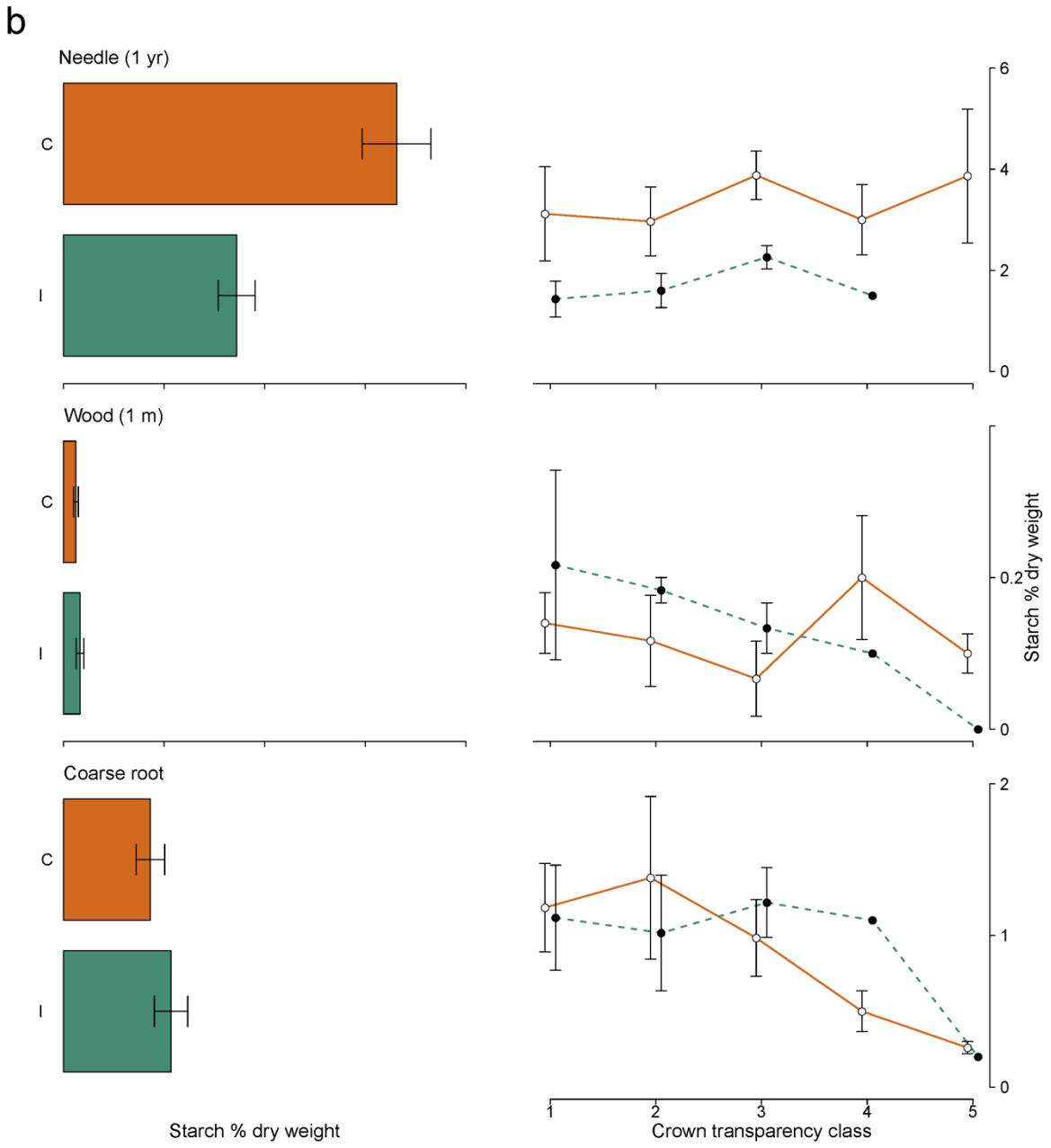

b
Needle (1 yr)
C
I
Wood (1 m)
C
I
Coarse root
C
I
Starch % dry weight
0
2
4
6
0
0.2
0
1
2
1
2
3
4
5
Crown transparency class
Starch % dry weight

Fig. S4 *Distribution of Pinus sylvestris trees with different relative leaf area in irrigated (green) and control (orange) plots in 2014, in steps of 5%. Vertical dotted lines show the mean crown transparency in irrigated and control plots.*

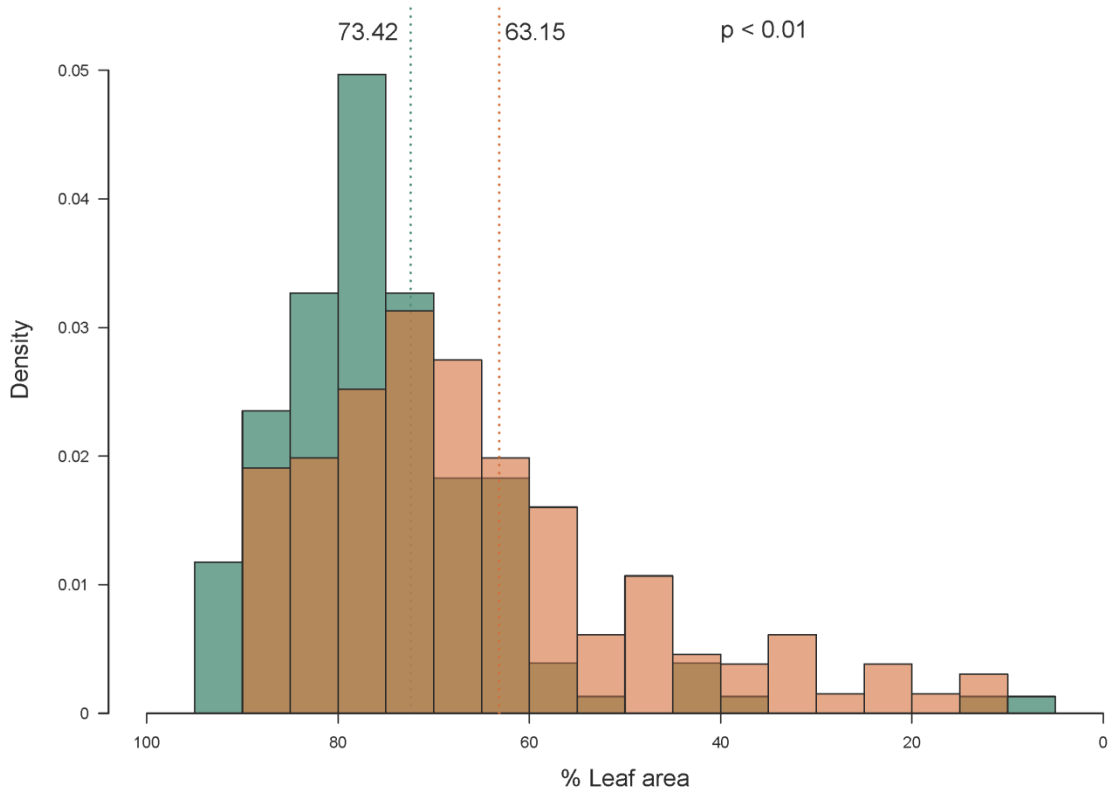


Fig. S5 *(top) Leaf water potential in July 2016, in 3 leaf area classes (1: 100%-60%, 3: 60-40%, 5: 40-0%); (middle) stomatal conductance (g_s) in June, July and October 2016; (bottom) A_{max} in June, July and October 2016. Bars show SE of the mean.*

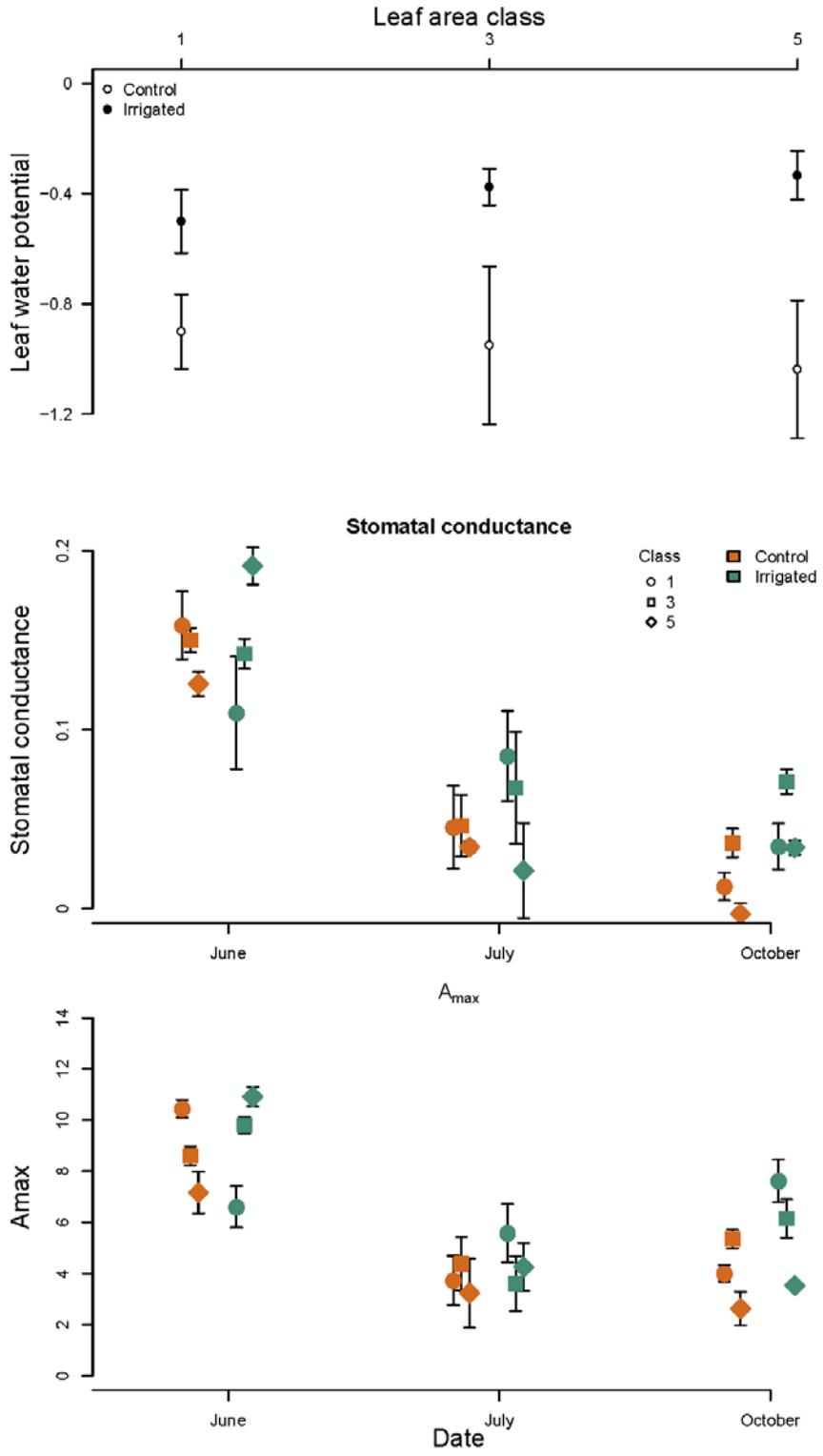


Fig. S6 *Shoot growth (y-axis) correlated to winter total NSC (sugars + starch) and starch levels (x-axis) in fine roots, 5 m stem wood and 3 year old needles. Sugars alone are not shown, as no significant correlations were found. Significant correlations are indicated by regression lines for control (brown), irrigation (blue) and average of control and irrigated plots (yellow).*

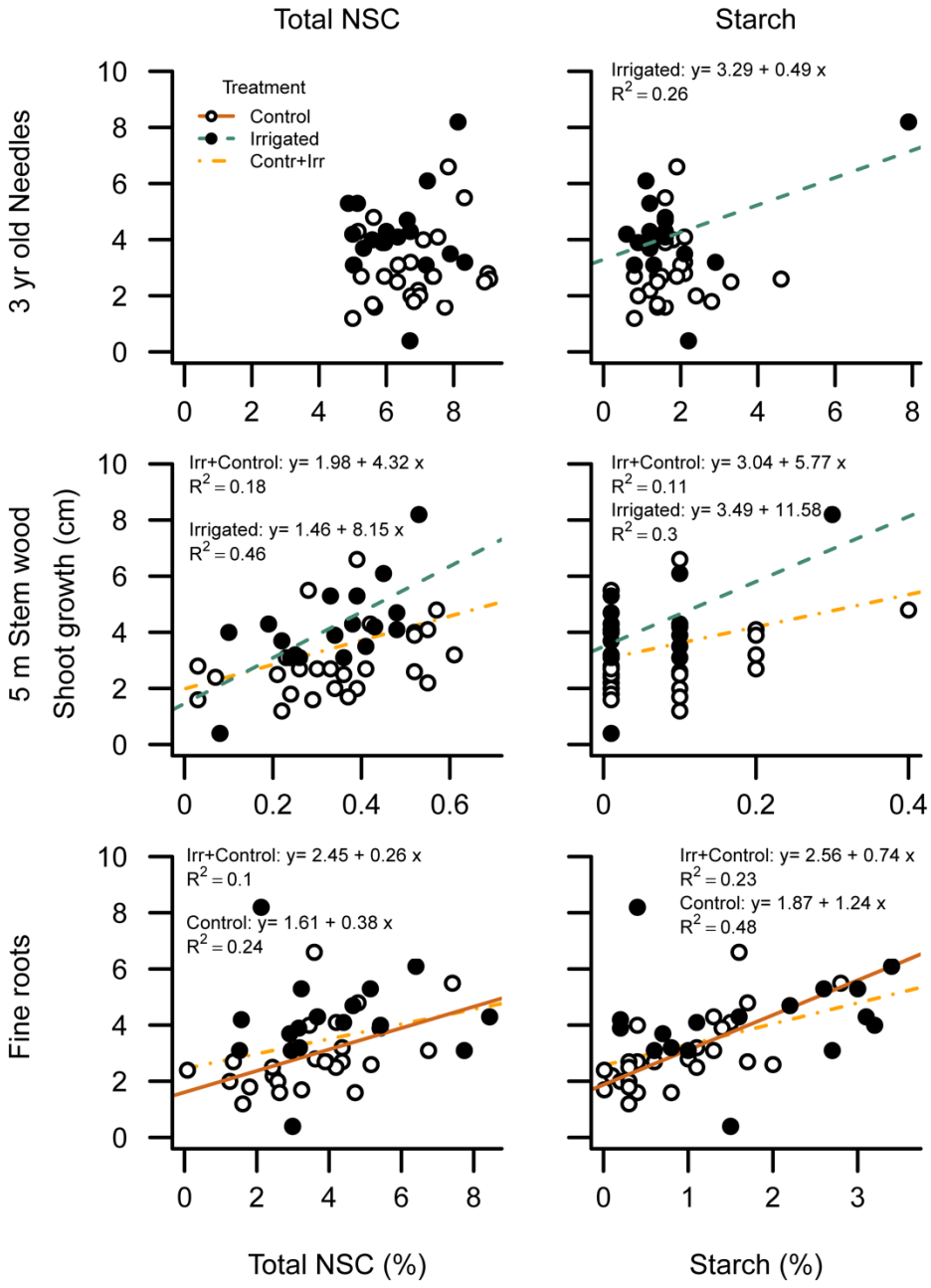


Fig. S7 *Total NSC pools in control (orange) and irrigated (green) trees in kg. Asterisks show significant differences between control and irrigated trees (**, p < 0.01, ***, p < 0.001). Bars indicate SE of the mean.*

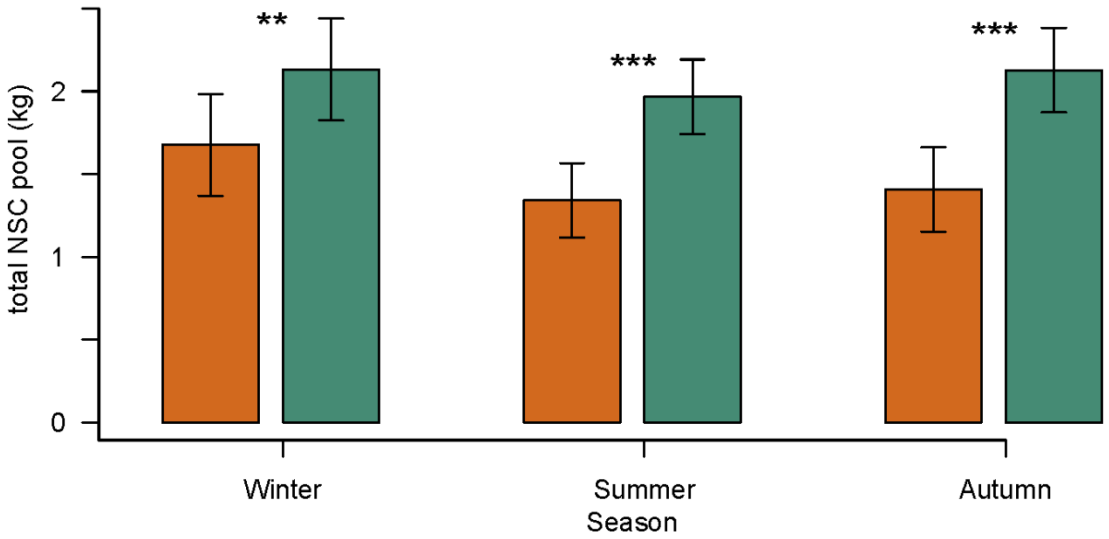


Table S1 *Results of the correlation analysis between DBH in 2002 and 2014, and NSC, Sugars and Starch. (Coef = correlation coefficient)*

	Total NSC		**Sugars**		**Starch**	
	Coef	*p-val*	*Coef*	*p-val*	*Coef*	*p-val*
DBH-02	-0.012	0.66	-0.008	0.78	-0.017	0.54
DBH-14	0.015	0.6	0.012	0.66	0.011	0.68

Table S2 *Parameters derived from Forrester et al (2017) for calculation of foliage, branch, stem and root biomass of P. sylvestris, for the equation ln(Y) = ln(β0) + β1* ln(d) where d is diameter at breast height.*

Tissue type	$\ln(\beta_0)$	β for ln(d)
Foliage	-3.5276	1.7471
Branch	-3.8377	2.1775
Stem	-2.3583	2.308
Root	-3.6347	2.3038

Table S3 *Results of the linear mixed effect model explaining starch, sugars and total NSC in needles (Tissue (Ti) factor consists of 3 generations), wood (Ti = 3 stem height samples) and roots (Ti = coarse and fine roots). Significant effects are shown in bold. Transformations used to reach normality of residuals are indicated in italics.*

		Starch		**Sugars**		**Total NSC**	
	df	F	p	F	p	F	p
Needles		*Log(x+1)*		*Log(x+1)*		*Log(x+1)*	
Season (S)	2	100.7	**< 0.001***	288.3	**< 0.001**	4.3	**0.014**
Treatment (Tr)	1	1.7	0.198	13.0	**0.001**	6.2	**0.014**
Class (Cl)	4	2.3	0.076	0.7	0.570	2.1	0.098
Tissue (Ti)	2	0.1	0.919	12.5	**< 0.001**	2.7	0.066
S x Tr	2	21.8	**< 0.001**	14.0	**< 0.001**	25.7	**< 0.001**
S x Cl	8	3.9	**< 0.001**	2.8	**0.005**	3.0	**0.003**
S x Ti	4	14.9	**< 0.001**	10.1	**< 0.001**	16.8	**< 0.001**
Tr x Cl	4	0.7	0.584	2.6	**0.047**	2.6	0.051
Tr x Ti	2	1.2	0.293	0.9	0.428	1.2	0.298
Cl x Ti	8	0.4	0.910	0.5	0.827	0.6	0.777
Wood		*Sqrt(log(x+1)*		*Log(x+1)*		*Log(x+1)*	
Season (S)	2	20.1	**< 0.001**	37.5	**< 0.001**	1.6	0.204
Treatment (Tr)	1	0.4	0.523	0.0	0.873	0.0	0.936
Class (Cl)	4	1.2	0.316	10.3	**< 0.001**	8.2	**< 0.001**
Tissue (Ti)	2	3.6	**0.029**	40.2	**< 0.001**	39.0	**< 0.001**
S x Tr	2	1.2	0.313	0.9	0.395	0.8	0.430
S x Cl	8	2.0	**0.045**	2.1	**0.033**	2.2	**0.024**
S x Ti	4	2.5	**0.042**	1.1	0.355	0.6	0.653
Tr x Cl	4	0.5	0.706	3.4	**0.017**	2.7	**0.042**
Tr x Ti	2	0.3	0.741	0.2	0.803	0.6	0.557
Cl x Ti	8	1.3	0.254	3.2	**0.002**	2.0	**0.046**
Roots		*Sqrt(log(x+1)*		*Log(x+1)*		*Log(x+1)*	
Season (S)	2	4.4	**0.014**	3.2	**0.041**	0.1	0.937
Treatment (Tr)	1	0.1	0.823	5.8	**0.020**	2.4	0.100
Class (Cl)	4	17.1	**< 0.001**	10.9	**< 0.001**	15.	**< 0.001**
Tissue (Ti)	1	50.0	**< 0.001**	59.9	**< 0.001**	67.9	**< 0.001**
S x Tr	2	0.7	0.489	0.3	0.715	0.4	0.683
S x Cl	8	0.7	0.662	0.5	0.870	0.4	0.916
S x Ti	2	5.3	**0.006**	0.7	0.479	2.1	0.130
Tr x Cl	4	3.1	0.026	1.2	0.308	2.0	0.117
Tr x Ti	1	0.0	0.964	0.4	0.505	0.3	0.556
Cl x Ti	4	0.3	0.901	0.2	0.961	0.2	0.909

Table S4 *Results of the linear mixed effect models for summer $\delta^{13}C$, Nitrogen and Phosphorus levels in needles. Significant effects are shown in bold. Transformations used to reach normality of residuals are indicated between brackets.*

		$\delta^{13}C$ (log(absolute value))		**N (log)**		**P (log)**	
	df	F	P	F	p	F	p
Needles							
Treatment (Tr)	1	17.7	**< 0.001**	3.1	0.084	0.1	0.777
Class (Cl)	4	8.0	**0.007**	0.0	0.875	0.0	0.974
Tissue (Ti)	2	0.7	0.497	12.7	**< 0.001**	7.0	**0.002**
Tr x Cl	4	6.2	**0.017**	2.9	0.098	0.1	0.811
Tr x Ti	2	2.1	0.126	5.4	**0.006**	1.3	0.277
Cl x Ti	8	0.9	0.412	0.3	0.723	0.0	0.976

Table S5 *Results of the linear mixed effect models explaining relative leaf area, shoot growth, absolute DBH and growth rate of Pinus sylvestris trees. Significant effects are shown in bold.*

		Relative leaf area		**Shoot (log) (only sampled trees)**		**DBH (^2)**		**Relative DBH increment (log(x+1))**	
	df	F	p	F	p	F	p	F	p
Treatm (Tr)	1	14.1	**< 0.001**	0.5	0.490	4.6	**0.033**	0.3	0.556
Year (Y)	1	234.5	**< 0.001**	9.7	**0.002**	317.4	**< 0.001**	272.9	**< 0.001**
Class (Cl)	4	72.4	**< 0.001**	1.0	0.395	2.8	**0.040**	73.8	**< 0.001**
Y x Tr	1	34.6	**< 0.001**	0.0	0.866	71.9	**< 0.001**	1.0	0.376
Tr x Cl	4	2.7	**0.029**	0.3	0.895	2.2	0.084	1.4	0.217
Y x Cl	4	172.4	**< 0.001**	2.5	**0.043**	27.9	**< 0.001**	55.8	**< 0.001**
Tr x Y x Cl	4	8.1	**< 0.001**	1.2	0.328	5.4	**0.001**	1.2	0.311

Table S5b *Contrasts for relative DBH increment, calculated using least square mean differences Control – Irrigated (estimated difference ; p value). Differences in 2002 are 0 as we standardized the DBH values. Significant effects are shown in bold.*

Year / Class	**1**	**2**	**3**	**4**	**5**
2002	1.000	1.000	1.000	1.000	1.000
2009	**-0.31 ; 0.0037**	**-0.30 ; < 0.001**	-0.18 ; 0.599	-0.06 ; 0.898	0.12 ; 0.552
2014	-0.18 ; 0.122	**-0.27 ; < 0.001**	-0.14 ; 0.682	0.23 ; 0.654	0.53 ; 0.100

Table S6 *Results of the Anova or linear mixed effect models explaining predawn leaf water potential (LWP), Photosynthesis (Amax) and stomatal conductance (gs) in Pinus sylvestris trees. Significant effects are shown in bold.*

	LWP (ANOVA type I)		**Amax (Mixed effect)**		**gs (Mixed effect)**	
	F	P	F	p	F	p
Treatment (Tr)	15.30	**< 0.001**	1.5	0.23	0.3	0.61
Class (Cl)	0.007	0.93	0.8	0.47	0.1	0.87
Date (D)	--	**--**	69.5	**< 0.001**	88.8	**< 0.001**
Tr x Cl	0.8	0.38	0.5	0.64	0.2	0.85
Tr x D	--	--	1.9	0.15	0.8	0.46
Cl x D	--	--	2.9	**0.03**	2.7	**0.04**
Tr x Cl x D	--	--	9.1	**< 0.001**	3.3	**0.01**

Table S7 *Results of the students t-test comparing total NSC pools (in kg) in irrigated and control trees, in winter, summer and autumn. Mean NSC pool for control and irrigated are given, as well as the p value. Significant effects are shown in bold.*

Season	Mean control	Mean irrigated	p value
Winter	1.71	2.18	**0.02**
Summer	1.27	1.91	**< 0.001**
Autumn	1.48	2.17	**< 0.001**