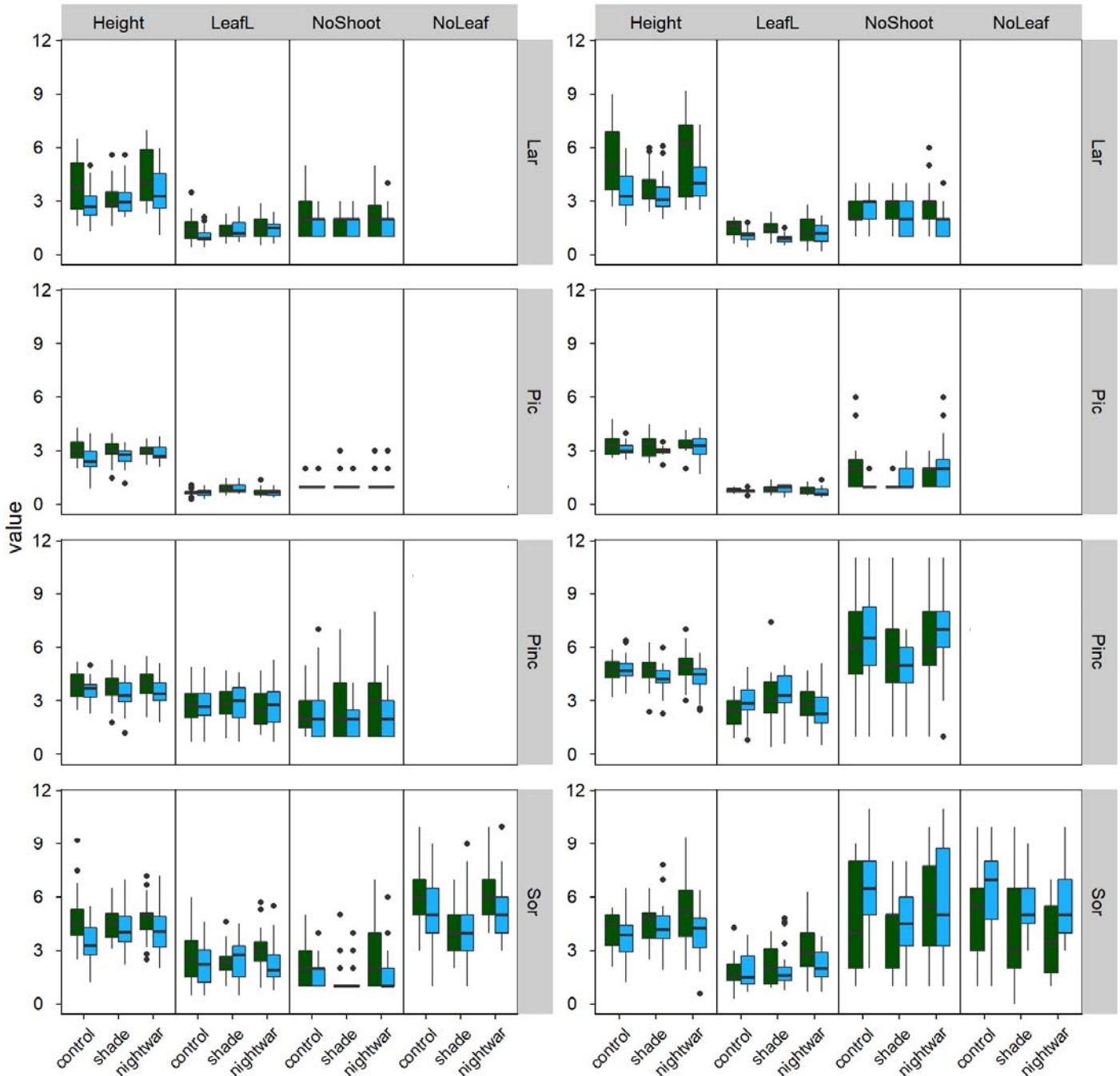


Figure S1 Morphological properties representing seedling size (height (cm), leaf length (cm), number of shoots (#), number of leaves (#) – columns) of tree seedlings near treeline in the French Alps. Numbers of leaves are not shown for the conifers because they were not counted when too numerous and set to 20 for nearly all individuals for *Larix decidua* (Lar) and *Picea abies* (Pic), 30 for *Pinus cembra* (Pinc) and 15 for *Pinus uncinata* (Pinu); Sor = *Sorbus aucuparia*. Colours indicate snow-melt treatments (early and late). X-axis indicates sky-exposure treatments: control (no roof), shade (shade roof during the day), and nightwar = night warming (shade roof during the night). S1A) Left : Seedlings planted 2012, measured August 2013, Right: Planted 2012, measured June 2014. S1B) Seedlings planted 2013, measured August 2014

S1A. Seedlings planted 2012, measured August 2013 (left) and June 2014 (right)



S1B. Seedlings planted 2013, measured August 2014

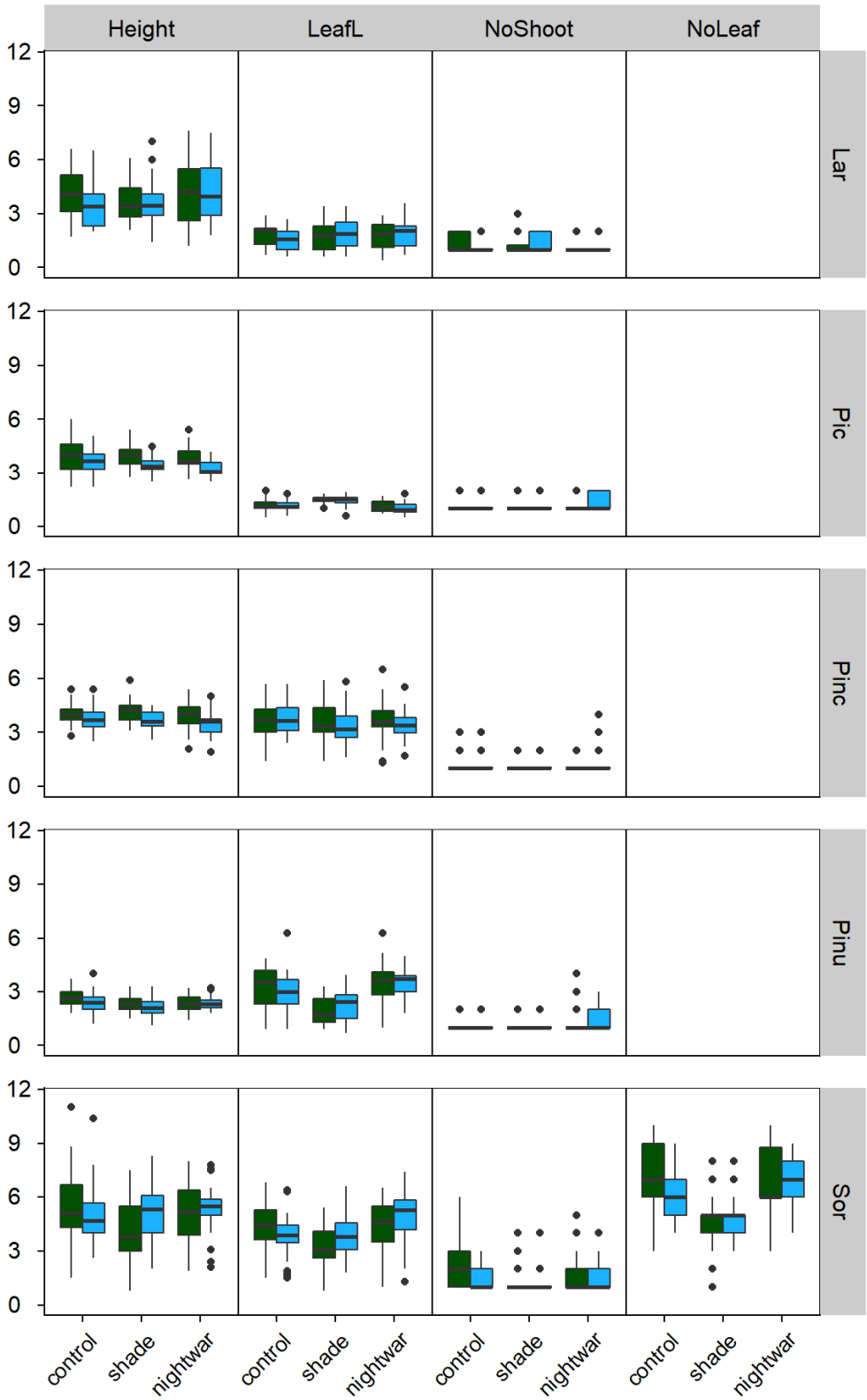


Table S1 Output of manova (multivariate analysis of variance) models assessing the effect of snow-melt timing and sky-exposure treatments on traits representing seedling size (height, longest-leaf length, number of leaves and number of shoots) of tree seedlings of five species near treeline in the French Alps. Measurements in August 2013 correspond to the end of the first growing season in the field for the seedlings planted in autumn 2012, those in June 2014 to these seedlings after snowmelt in their second year. Measurements in August 2014 are for seedlings planted in autumn 2013. Each square represents a model where degrees of freedom (Df.), F statistics (F) and p value (Pr(>F)) are shown, significant variables are in **bold**.

	<i>L. decidua</i> August 2013				June 2014			August 2014		
		Df	F	Pr(>F)	Df	F	Pr(>F)	Df	F	Pr(>F)
Height	treatS	1	9.80	<0.01	1	14.23	<0.001	1	2.33	0.13
	treatSH	2	7.65	<0.001	2	6.70	<0.01	2	4.6	<0.05
	Block	3	0.56	0.64				3	5.70	<0.001
	treatS:treats	2	3.44	<0.05	2	2.14	0.12			
	TreatS:treatSH:Block	15	2.93	<0.001				17	1.66	<0.05
Leaf length	treatS	1	2.51	0.12	1	15.03	<0.001	1	0.01	0.92
	treatSH	2	3.21	<0.05	2	0.63	0.53	2	1.08	0.34
	Block	3	3.08	<0.05				3	7.07	<0.001
	treatS:treatSH	2	4.92	<0.01	2	1.26	0.29			
	treatS:treatSH:Block	15	2.64	<0.01				17	2.77	<0.001
No Shoots	treatS	1	0.46	0.50	1	3.55	0.06	1	1.21	0.27
	treatSH	2	2.76	0.07	2	0.32	0.73	2	1.85	0.16
	Block	3	0.76	0.52				3	1.01	0.39
	treatS:treatSH	2	0.68	0.51	2	2.86	0.06			
	treatS:treatSH:Block	15	0.93	0.53				17	1.14	0.32
No Leaves	treatS	1	1.00	0.32	1	2.16	0.14	1	1.06	0.30
	treatSH	2	1.00	0.37	2	1.53	0.22	2	0.84	0.43
	Block	3	0.69	0.56				3	1.59	0.19
	treatS:treatSH	2	0.99	0.37	2	1.50	0.23			
	treatS:treatSH:Block	15	0.63	0.85				17	1.30	0.19

Supplementary material with: Bader, Loranger, Zotz & Mendieta-Leiva, 2017
Responses of tree seedlings near alpine treeline to delayed snowmelt and reduced sky exposure. Forests.

	<i>P. abies</i> August 2013				June 2014			August 2014		
		Df	F	Pr(>F)	Df	F	Pr(>F)	Df	F	Pr(>F)
Height	treatS	1	16.92	<0.001	1	0.96	0.06	1	22.90	<0.001
	treatSH	2	0.74	0.48	2	0.25	0.63	2	0.98	0.38
	Block	3	3.14	<0.05	3	2.55	<0.05			
	treatS:Block				3	2.34	<0.05			
	treatSH:Block	6	1.85	0.09	6	4.62	<0.05			
	treatS:treatSH:Block	11	1.62	0.10						
Leaf length	treatS	1	0.12	0.73	1	0.08	0.21	1	0.80	0.37
	treatSH	2	23.27	<0.001	2	0.27	0.07	2	28.99	<0.001
	Block	3	4.38	0.01	3	0.37	0.07			
	treatSH:Block	6	2.42	<0.05	6	0.26	0.52			
	treatS:Block				3	0.36	0.08			
	treatS:treatSH:Block	11	2.39	0.01						
No Shoots	treatS	1	0.70	0.40	1	0.01	0.92	1	0.16	0.69
	treatSH	2	1.12	0.33	2	13.46	<0.01	2	2.19	0.11
	Block	3	0.12	0.95	3	3.21	0.42			
	treatSH:Block	6	1.03	0.41	6	19.16	<0.05			
	treatS:treatSH:Block	11	0.93	0.51	3	2.12	0.60			
No Leaves	treatS	1	0.47	0.49	1	6.69	0.33	1	1.39	0.24
	treatSH	2	1.16	0.32	2	34.40	0.09	2	0.83	0.44
	Block	3	1.36	0.26	3	6.55	0.81			
	treatSH:Block	6	0.88	0.51	6	19.38	0.83			
	treatSH:Block				3	25.15	0.31			
	treatS:treatSH:Block	11	1.06	0.40						

Supplementary material with: Bader, Loranger, Zotz & Mendieta-Leiva, 2017
Responses of tree seedlings near alpine treeline to delayed snowmelt and reduced sky exposure. Forests.

	<i>P. cembra</i> August 2013				June 2014			August 2014		
		Df	F	Pr(>F)	Df	F	Pr(>F)	Df	F	Pr(>F)
Height	treatS	1	17.31	<0.001	1	6.68	0.01	1	36.52	<0.001
	treatSH	2	1.19	0.31	2	1.63	0.20	2	1.98	0.14
	Block	3	5.83	<0.001	3	2.84	<0.05	3	3.70	0.01
	treatSH:Block	6	1.95	0.07				6	5.09	<0.001
	treatS:treatSH:Block							11	2.06	<0.05
Leaf length	treatS	1	0.00	0.97	1	0.35	0.55	1	2.34	0.13
	treatSH	2	0.64	0.53	2	4.50	0.01	2	0.94	0.39
	Block	3	1.32	0.27	3	1.67	0.18	3	7.59	<0.001
	treatSH:Block	6	2.62	<0.05				6	3.50	<0.01
	treatS:treatSH:Block							11	2.21	0.01
No Shoots	treatS	1	6.77	<0.01	1	0.30	0.59	1	0.33	0.57
	treatSH	2	0.89	0.41	2	8.48	<0.001	2	4.52	0.01
	Block	3	1.76	0.16	3	0.41	0.74	3	1.49	0.22
	treatSH:Block	6	1.06	0.39				6	0.41	0.87
	treatS:treatSH:Block							11	1.70	0.07
No Leaves	treatS	1	5.67	<0.05	1	2.15	0.15	1	1.22	0.27
	treatSH	2	0.68	0.51	2	0.43	0.65	2	1.10	0.34
	Block	3	0.86	0.46	3	0.23	0.87	3	0.67	0.57
	treatSH:Block	6	1.36	0.23				6	0.66	0.68
	treatS:treatSH:Block							11	0.92	0.52

Supplementary material with: Bader, Loranger, Zotz & Mendieta-Leiva, 2017
Responses of tree seedlings near alpine treeline to delayed snowmelt and reduced sky exposure. Forests.

<i>S. aucuparia</i> August 2013					June 2014			August 2014		
		Df	F	Pr(>F)	Df	F	Pr(>F)	Df	F	Pr(>F)
Height	treatS	1	24.54	<0.001	1	4.54	<0.05	1	1.4175	0.23
	treatSH	2	2.75	0.07	2	2.57	0.08	2	7.7618	<0.001
	Block	3	1.64	0.18	3	2.06	0.11	3	2.2634	0.08
	treatS:treatSH	2	3.36	<0.05				2	6.365	<0.01
	treatS:Block				3	1.00	0.39			
	treatSH:Block				6	3.61	<0.001			
	treatS:treatSH:Block	15	2.52	<0.01						
Leaf length	treatS	1	8.19	<0.01	1	2.98	0.09	1	1.3216	0.25
	treatSH	2	0.29	0.75	2	4.89	<0.001	2	21.0919	<0.001
	Block	3	5.38	<0.01	3	7.08	<0.001	3	5.2627	<0.01
	treatS:treatSH	2	4.10	<0.05				2	10.4866	<0.001
	treatS:Block				3	0.58	0.63			
	treatSH:Block				6	3.03	0.01			
	treatS:treatSH:Block	15	4.08	<0.001						
No Shoots	treatS	1	7.48	<0.01	1	0.14	0.71	1	17.3366	<0.001
	treatSH	2	12.62	<0.001	2	7.87	<0.001	2	11.2068	<0.001
	Block	3	1.60	0.19	3	0.69	0.56	3	3.5573	<0.05
	treatS:treatSH	2	2.85	0.06				2	1.3753	0.25
	treatS:Block				3	2.97	<0.05			
	treatSH:Block				6	3.60	<0.01			
	treatS:treatSH:Block	15	1.80	<0.05						
No Leaves	treatS	1	22.87	<0.001	1	1.07	0.30	1	11.9601	<0.001
	treatSH	2	28.23	<0.001	2	4.51	0.01	2	34.586	<0.001
	Block	3	4.01	<0.01	3	1.13	0.34	3	2.4733	0.06
	treatS:treatSH	2	9.65	<0.001				2	4.8443	<0.01
	treatS:Block				3	0.32	0.81			
	treatSH:Block				6	3.43	<0.01			
	treatS:treatSH:Block	15	2.88	<0.001						

Supplementary material with: Bader, Loranger, Zotz & Mendieta-Leiva, 2017
 Responses of tree seedlings near alpine treeline to delayed snowmelt and reduced sky exposure. Forests.

<i>P. uncinata</i> August 2014				
	Variables	Df	F	Pr(>F)
Height	treatS	1	2.34	0.13
	treatSH	2	10.37	<0.001
	Block	3	5.62	<0.01
	treatS:Block	3	0.90	0.44
	treatS:treatSH:Block	14	2.44	0.00
Leaf length	treatS	1	0.13	0.72
	treatSH	2	46.20	<0.001
	Block	3	9.76	<0.001
	treatS:Block	3	0.42	0.74
	treatS:treatSH:Block	14	2.38	<0.01
No Shoots	treatS	1	1.23	0.27
	treatSH	2	14.37	<0.001
	Block	3	5.30	<0.01
	treatS:Block	3	9.28	<0.001
	treatS:treatSH:Block	14	4.23	<0.001
No Leaves	treatS	1	0.04	0.84
	treatSH	2	0.52	0.59
	Block	3	6.16	<0.001
	treatS:Block	3	0.13	0.94
	treatS:treatSH:Block	14	1.06	0.40