

Supplementary material

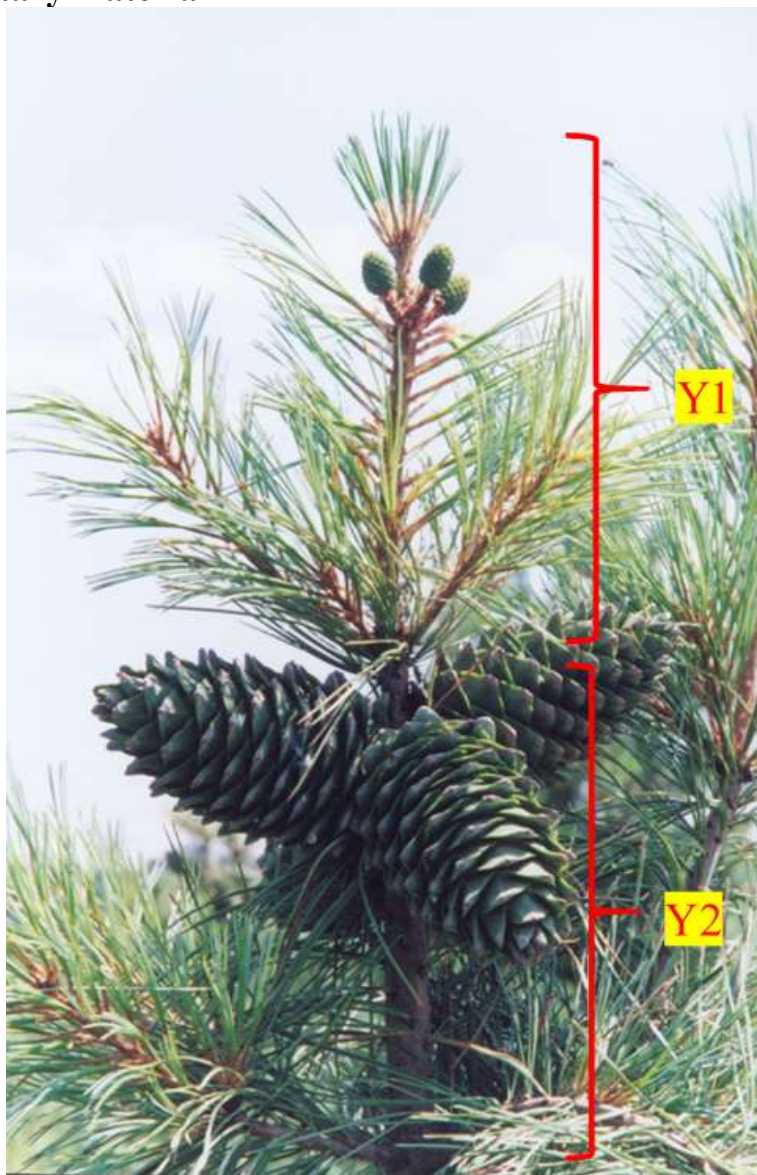


Figure S1. One-year-old (Y1) and two-years-old (Y2) shoots of reproductive branches of *Pinus koraiensis* trees monitored for “Experiment 1”.



Figure S2. Visual example of twig growth and cone development in girdled and defoliated branches at harvesting of one *Pinus koraiensis* tree manipulated for “Experiment 1”. Regardless of the defoliation intensity, branch and cone growth and survival rates were higher in ungirdled branches.

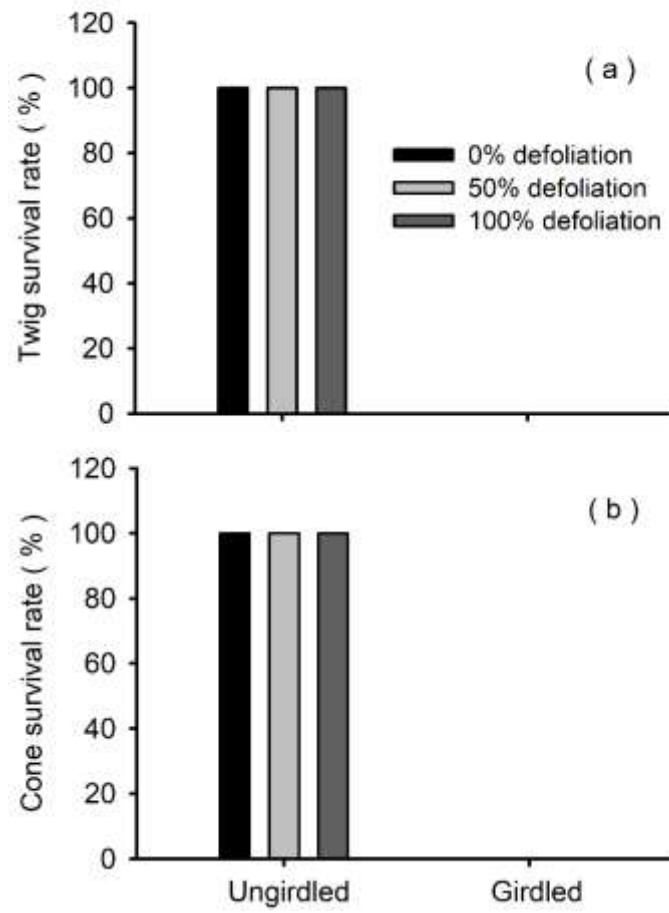


Figure S3. Twig and cone survival rate in *Pinus koraiensis* branches in response to girdling and defoliation treatments for “Experiment 1”. Twig and cone survival rate values were nil in girdled branches.

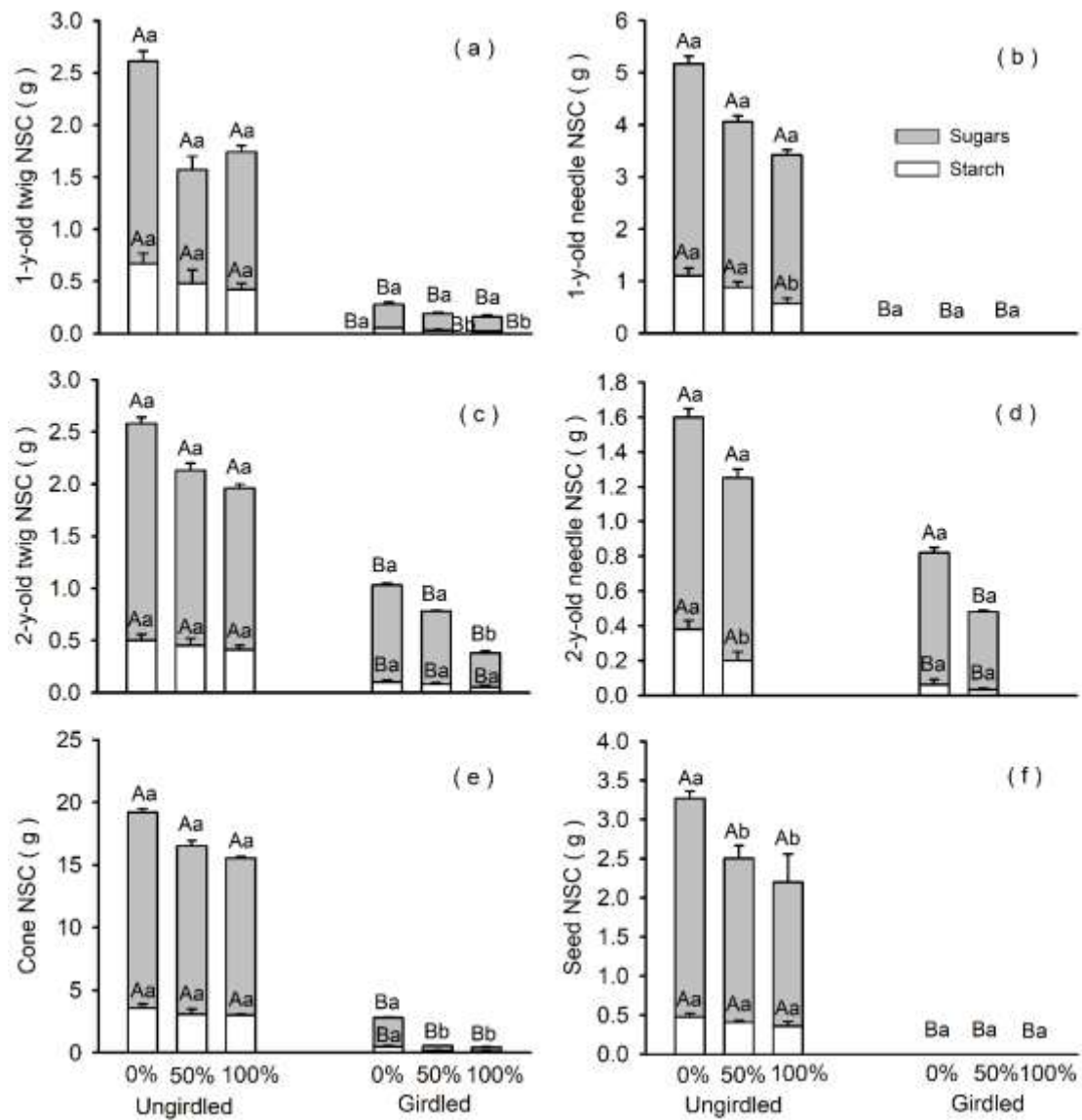


Figure S4. Non-structural carbohydrate content (NSC) of one-year-old (Y1; a, b and e) and two-year-old (Y2; c, d, and f) *Pinus koraiensis* branches in response to girdling and defoliation treatments for “Experiment 1”. One-year-old needle and seed NSC were nil in girdled branches. Bars and arrows represent the mean and corresponding standard error, respectively, per treatment combination. Different capital letters indicate a significant effect of girdling for a given defoliation intensity ($P < 0.05$). Different lowercase letters indicate significant differences among defoliation intensities for a given girdling group ($P < 0.05$). Means were compared using LSD tests.

Table S1. Effect of girdling (girdled and ungirdled) and defoliation (0 %, 50 % and 100 % intensity) and their interaction on branch growth and NSC concentrations in *Pinus koraiensis* trees (Experiment 1).

	1-year-old				2-year-old							1-year-old				2-year-old				Cone		Seed	
	NB	BB	BL	BD	NB	BB	BL	BD	CN	CB	SB	Branch [SS]	Branch [ST]	Needle [SS]	Needle [ST]	Branch [SS]	Branch [ST]	Needle [SS]	Needle [ST]	[SS]	[ST]	[SS]	[ST]
G	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
D	0.067	0.082	0.342	0.104	0.056	0.358	0.365	0.120	0.532	0.051	0.071	< 0.01	0.100	< 0.01	0.011	< 0.01	0.277	< 0.01	< 0.01	< 0.01	0.150	0.157	0.545
G × D	0.068	0.200	0.531	0.188	0.495	0.859	0.951	0.434	0.532	0.150	0.071	0.022	0.509	< 0.01	0.011	< 0.01	0.417	0.108	< 0.01	< 0.01	< 0.01	0.157	0.545

Linear mixed models were adjusted, with tree being considered as a random factor. *P*-values are shown. Significant ($P < 0.05$) results are in bold. Abbreviations: NB: Needle biomass; BB: Branch biomass; BL: Branch length; BD: Branch diameter; CN: number of mature cones; CB: Cone biomass; SB: Seed biomass; [SS]: Concentration of soluble sugars; [ST]: Concentration of starch; G: Girdling; D: Defoliation.

Table S2. F-value of two-way ANOVAs testing the effects of girdling (girdled and ungirdled) and harvesting time (4 h and 24 h) on the carbon isotopic composition ($\delta^{13}\text{C}$) and ^{13}C assimilation (^{13}C) throughout branch tissues (needles, twigs and cones) in reproductive and vegetative branches of *Pinus koraiensis*, and on the amount of undetected label after ^{13}C labelling-pulse applied to vegetative branches (Experiment 2).

	Reproductive branch						Vegetative branch				Undetected (^{13}C)
	Twig ($\delta^{13}\text{C}$)	Needle ($\delta^{13}\text{C}$)	Cone ($\delta^{13}\text{C}$)	Twig (^{13}C)	Needle (^{13}C)	Cone (^{13}C)	Twig ($\delta^{13}\text{C}$)	Needle ($\delta^{13}\text{C}$)	Twig (^{13}C)	Needle (^{13}C)	
Girdling	58.32 **	2100.84 **	14.11 **	64.73 **	531.64 **	36.56 **	14.11 **	52.62 **	0.9 ns	0.207 ns	30.94 **
Time	50.00 **	2162.10 **	35.26 **	36.78 **	578.76 **	19.61 **	1257.96 **	459.76 **	45.9 **	288.24 **	33.47 **
Girdling \times Time	40.94 **	2094.11 **	34.75 **	34.31 **	551.59 **	22.69 **	64.73 **	44.72 **	11.34 *	13.44 *	0.48 ns

ns denote a non-significant effect; * and ** indicate significant effects at 0.05 and 0.01 significance levels, respectively.