

Table S1. LS-mean and standard deviation obtained from forest measures. DBH, diameter at breast height; H, tree height.

Species	Area-Site	Defoliation class	Numbers of trees	DBH	H	Age
Spruce	GIR-A	D1-D2	6	16.5 ± 1.7	12.7 ± 1.1	43 ± 3
	GIR-B	D1-D2	6	14.9 ± 2.2	12.5 ± 0.6	53 ± 8
	GAS-A	D0	6	24.4 ± 3.2	15.2 ± 1.8	46 ± 3
	TDL-A	D1-D2	9	19.0 ± 5.6	13.1 ± 4.0	64 ± 4
	TDL-B	D1-D2	9	13.6 ± 2.7	10.5 ± 1.8	63 ± 6
Fir	GIR-A	D1- D3	9	16.4 ± 3.0	12.7 ± 1.1	48 ± 5
	GIR-B	D1- D3	9	14.0 ± 2.1	12.5 ± 0.8	58 ± 7
	GAS-A	D0	6	29.4 ± 6.3	17.4 ± 0.8	47 ± 6
	TDL-A	D1- D3	9	17.3 ± 3.9	14.1 ± 3.2	74 ± 4
	TDL-C	D1-D2	8	15.9 ± 3.6	10.6 ± 1.8	66 ± 9
	TDL-D	D3	7	17.1 ± 6.8	12.5 ± 3.9	82 ± 12

Table S2. LS-mean and standard deviation of sugar obtained for each month and defoliation results by mixed model. The first number is the LS-mean and second one is the standard deviation.

Least square mean and standard deviation of Soluble sugar							
Month	Def.	Black spruce			Balsam fir		
		Needles	Twig	Root	Needles	Twig	Root
May	D0	40.5 ± 4.1	19.0 ± 2.6	18.2 ± 2.4	36.1 ± 6.0	13.0 ± 2.1	14.2 ± 4.3
	D1	42.2 ± 5.8	14.1 ± 2.1	19.1 ± 4.1	48.0 ± 5.0	19.9 ± 1.8	15.0 ± 3.6
	D2	50.9 ± 2.9	13.9 ± 3.2	11.2 ± 5.5	51.9 ± 3.6	14.5 ± 1.2	20.6 ± 2.6
	D3	-	-	-	33.6 ± 4.0	12.0 ± 1.4	14.9 ± 2.9
June	D0	39.8 ± 4.0	15.0 ± 3.6	15.4 ± 2.4	58.4 ± 6.7	23.4 ± 2.4	28.1 ± 4.8
	D1	31.6 ± 4.5	14.7 ± 3.5	21.0 ± 4.1	45.8 ± 6.4	12.8 ± 4.8	23.9 ± 8.9
	D2	31.8 ± 4.7	14.1 ± 5.9	15.0 ± 5.5	37.9 ± 6.3	12.0 ± 1.1	25.0 ± 2.4
	D3	-	-	-	42.1 ± 5.8	12.3 ± 1.3	22.0 ± 2.8
Jul	D0	40.7 ± 5.9	15.1 ± 2.0	14.8 ± 2.4	50.5 ± 5.8	19.0 ± 2.7	25.2 ± 2.6
	D1	34.4 ± 7.0	11.6 ± 2.3	14.9 ± 4.1	34.0 ± 6.7	8.8 ± 4.8	19.2 ± 4.8
	D2	19.8 ± 5.1	6.8 ± 2.2	10.5 ± 5.5	31.4 ± 3.4	11.0 ± 1.1	18.5 ± 2.5
	D3	-	-	-	32.5 ± 3.9	9.2 ± 1.3	18.2 ± 2.8
Aug	D0	50.9 ± 4.7	15.2 ± 2.4	16.7 ± 2.4	41.8 ± 3.8	25.5 ± 2.7	17.8 ± 5.6
	D1	46.2 ± 7.7	13.3 ± 3.3	15.0 ± 4.1	46.0 ± 3.7	14.9 ± 2.5	19.0 ± 2.5
	D2	53.9 ± 8.3	12.2 ± 1.2	11.8 ± 5.5	56.1 ± 3.4	10.9 ± 1.2	17.2 ± 2.5
	D3	-	-	-	52.9 ± 3.9	10.1 ± 1.4	14.5 ± 2.2
Sep	D0	44.5 ± 5.2	16.7 ± 2.5	14.7 ± 2.4	46.6 ± 7.8	12.0 ± 2.7	15.9 ± 2.6
	D1	50.3 ± 5.7	16.1 ± 5.7	13.5 ± 4.1	42.1 ± 6.7	8.2 ± 7.2	20.0 ± 4.8
	D2	53.1 ± 7.1	15.8 ± 6.3	14.9 ± 5.5	47.1 ± 3.4	10.5 ± 1.2	20.8 ± 2.5
	D3	-	-	-	37.8 ± 3.9	9.1 ± 1.4	16.1 ± 2.9

Table S3. LS-mean and standard deviation of starch obtained for each month and defoliation results by mixed model. The first number is the LS-mean and second one is the standard deviation.

LS-mean and standard deviation of Starch							
Month	Def.	Black spruce			Balsam fir		
		Needles	Twig	Root	Needles	Twig	Root
May	D0	123.2 ± 4.1	38.2 ± 3.3	21.1 ± 4.8	107.2 ± 6.0	67.8 ± 6.0	44.3 ± 6.4
	D1	68.0 ± 12.5	30.0 ± 4.1	13.4 ± 8.3	78.1 ± 10.3	40.5 ± 5.1	14.4 ± 5.4
	D2	59.1 ± 15.6	30.1 ± 4.3	22.3 ± 11.0	48.2 ± 10.4	30.1 ± 4.5	24.0 ± 3.6
	D3	-	-	-	20.3 ± 14.0	28.1 ± 4.7	15.0 ± 4.3
June	D0	118.6 ± 9.2	35.2 ± 4.7	31.6 ± 4.8	119.6 ± 6.6	41.8 ± 6.5	53.6 ± 7.2
	D1	93.6 ± 12.5	29.3 ± 4.1	11.8 ± 8.3	73.7 ± 14.2	40.4 ± 9.5	50.4 ± 13.4
	D2	67.7 ± 15.6	30.0 ± 5.3	13.8 ± 11.0	32.3 ± 3.0	32.5 ± 4.4	24.3 ± 6.5
	D3	-	-	-	20.0 ± 3.8	31.6 ± 4.6	18.2 ± 6.1
Jul	D0	32.1 ± 9.8	21.2 ± 5.7	26.4 ± 4.8	49.9 ± 7.4	19.4 ± 7.4	56.5 ± 8.2
	D1	19.6 ± 5.3	26.3 ± 4.1	25.0 ± 8.3	50.0 ± 7.5	18.3 ± 6.0	6.3 ± 7.1
	D2	28.8 ± 7.6	28.5 ± 5.3	7.9 ± 11.0	11.4 ± 3.2	25.7 ± 4.4	22.9 ± 3.6
	D3	-	-	-	8.0 ± 3.8	22.2 ± 4.6	20.6 ± 4.1
Aug	D0	13.0 ± 9.8	21.6 ± 2.7	31.9 ± 4.8	9.1 ± 7.4	12.0 ± 4.4	15.0 ± 8.2
	D1	13.3 ± 12.5	21.3 ± 4.1	15.7 ± 8.3	5.3 ± 3.5	21.1 ± 6.0	22.4 ± 7.2
	D2	8.2 ± 15.6	27.2 ± 5.3	12.1 ± 11.0	5.1 ± 3.8	20.0 ± 4.0	22.3 ± 3.6
	D3	-	-	-	4.9 ± 3.8	19.4 ± 4.6	12.0 ± 4.1
Sep	D0	10.4 ± 9.8	8.1 ± 2.7	24.0 ± 4.8	8.0 ± 6.5	8.1 ± 5.9	20.2 ± 8.9
	D1	8.0 ± 12.5	13.7 ± 4.1	16.4 ± 8.3	3.4 ± 1.5	5.7 ± 6.5	20.6 ± 7.2
	D2	8.2 ± 15.6	18.4 ± 5.3	12.3 ± 11.0	4.0 ± 2.5	11.6 ± 5.4	19.8 ± 3.6
	D3	-	-	-	4.2 ± 2.5	11.4 ± 5.6	12.5 ± 4.1

Table S4. Least mean square and standard deviation of tree-ring index mixed model obtained for each year and defoliation classes.

Species	Year	Least square mean and standard deviation of Tree-ring index			
		D0	D1	D2	D3
Black spruce	2006	0	0	0	-
	2007	-0.16 ± 0.09	-0.08 ± 0.12	0.04 ± 0.07	-
	2008	-0.09 ± 0.13	-0.09 ± 0.10	-0.01 ± 0.09	-
	2009	-0.03 ± 0.12	-0.05 ± 0.14	-0.04 ± 0.08	-
	2010	-0.08 ± 0.15	-0.11 ± 0.13	-0.11 ± 0.07	-
	2011	-0.05 ± 0.14	-0.18 ± 0.17	-0.02 ± 0.10	-
	2012	-0.16 ± 0.12	-0.27 ± 0.08	-0.27 ± 0.19	-
	2013	-0.03 ± 0.23	-0.41 ± 0.19	-0.45 ± 0.20	-
	2014	-0.09 ± 0.15	-0.58 ± 0.24	-0.58 ± 0.29	-
	2015	0.03 ± 0.17	-0.61 ± 0.12	-0.61 ± 0.07	-
Balsam fir	2006	0	0	0	0
	2007	0.12 ± 0.21	-0.24 ± 0.25	-0.29 ± 0.16	-0.03 ± 0.15
	2008	0.18 ± 0.04	-0.21 ± 0.12	-0.28 ± 0.12	-0.02 ± 0.08
	2009	0.09 ± 0.09	-0.18 ± 0.14	-0.41 ± 0.14	-0.03 ± 0.12
	2010	0.23 ± 0.09	-0.19 ± 0.08	-0.43 ± 0.13	-0.10 ± 0.10
	2011	0.30 ± 0.12	-0.23 ± 0.18	-0.49 ± 1.90	-0.19 ± 0.15
	2012	0.30 ± 0.16	-0.38 ± 0.24	-0.56 ± 0.29	-0.59 ± 0.25
	2013	0.21 ± 0.18	-0.57 ± 0.23	-0.62 ± 0.23	-0.68 ± 0.30
	2014	0.26 ± 0.18	-0.68 ± 0.29	-0.75 ± 0.32	-0.78 ± 0.28
	2015	0.16 ± 0.15	-0.77 ± 0.16	-0.79 ± 0.20	-0.81 ± 0.22