Supplementary Statistical Data

Standardized protocols and procedures can precisely and accurately quantify non-structural carbohydrates

Simon M. Landhäusser[1*]; Pak S. Chow[1]; L. Turin Dickman[2], Morgan E. Furze[3], Iris Kuhlman[4], Sandra Schmid[5], Julia Wiesenbauer[6]; Birgit Wild[7,8]; Gerd Gleixner[4]; Henrik Hartmann[4]; Günter Hoch[5], Nate G. McDowell[9]; Andrew D. Richardson[3,10]; Andreas Richter[6]; Henry D. Adams[11]

[1] Department of Renewable Resources, University of Alberta, Edmonton, Alberta, Canada
[2] Los Alamos National Laboratory, Earth and Environmental Sciences, Los Alamos, NM, USA
[3] Harvard University, Department of Organismic and Evolutionary Biology, Cambridge MA, USA
[4] Max Planck Institute for Biogeochemistry, Jena, Germany
[5] Department of Environmental Sciences - Botany, University of Basel, Basel, Switzerland
[6] University of Vienna, Department of Microbiology and Ecosystem Science, Vienna, Austria
[7] Stockholm University, Department of Environmental Science and Analytical Chemistry, Stockholm, Sweden
[8] University of Gothenburg, Department of Earth Sciences, Gothenburg, Sweden
[9] Pacific Northwest National Lab, Richland WA, USA.
[10] Northern Arizona University, Center for Ecosystem Science and Society and School of Informatics, Computing and Cyber Systems, Flagstaff AZ, USA.
[11] Oklahoma State University, Department of Plant Biology, Ecology, and Evolution, Stillwater, OK, USA

Table S6. A summary of Levene's test for unequal variance results for all statistical tests in the study where either ANOVA or the Kruskal-Wallis test was used in data analysis. "Experiment" refers to the corresponding experiment as described in Materials and Methods. "Analysis" refers to the specific analysis within that experiment. "Figure" refers to the figure which shows the data and results of this analysis. "Sample" is the specific tissue analyzed. "Quantification method" refers to either the ion chromatography (IC), enzyme, or phenol-sulfuric acid method used in sugar quantification. Quantification method is not noted where it was included as a main factor in the analysis (all analyses for experiments 1 and 2). The Levene's test result was either significant (*, $p < 0.05$) or not significant (ns, $p > 0.05$).

Experiment	Analysis	Figure	Sample	Quantification Method	NSC component	Levene's test result
1	Sample handling	1	Aspen leaf		Sugar	*
					Starch	ns
					Total NSC	*
			Aspen stem		Sugar	ns
					Starch	ns
					Total NSC	ns
			Spruce needle		Sugar	*
					Starch	ns
					Total NSC	ns
1	Storage x microwave at 8h	1	Aspen leaf		Sugar	ns
					Starch	ns
					Total NSC	ns
			Aspen stem		Sugar	ns
					Starch	ns
					Total NSC	ns
			Spruce needle		Sugar	ns
					Starch	ns
					Total NSC	ns
1	Storage x microwave x time	S1	Aspen leaf		Sugar	ns
					Starch	ns
					Total NSC	ns
			Aspen stem		Sugar	ns
					Starch	ns
					Total NSC	ns
			Spruce needle		Sugar	ns
					Starch	ns
					Total NSC	ns
2	Plant materials x quantification	4	Aspen Fine Root		Sugar	ns
					Starch	ns

					Total NSC	ns
			Aspen leaf		Sugar	*
					Starch	ns
					Total NSC	*
			Aspen phloem		Sugar	*
					Starch	*
					Total NSC	*
			Aspen xylem		Sugar	*
					Starch	ns
					Total NSC	*
			Pine fine root		Sugar	ns
					Starch	*
					Total NSC	*
			Pine needle		Sugar	ns
					Starch	*
					Total NSC	ns
			Pine phloem		Sugar	*
					Starch	ns
					Total NSC	*
			Pine xylem		Sugar	*
					Starch	*
					Total NSC	*
			Plum leaf		Sugar	*
					Starch	ns
					Total NSC	*
3	Independent vs. central extraction	5	Aspen fine root	IC	Sugar	*
					Starch	ns
					Total NSC	ns
				Enzyme	Sugar	*
					Starch	ns
					Total NSC	*
				Acid	Sugar	ns
					Starch	*
					Total NSC	ns
			Pine fine root	IC	Sugar	ns
					Starch	*
					Total NSC	*
				Enzyme	Sugar	*
					Starch	ns
					Total NSC	*
				Acid	Sugar	ns
					Starch	ns
					Total NSC	ns
3	Centralized quantification	6	Aspen fine root	Acid	Sugar	ns
					Starch	ns
					Total NSC	*
			Pine fine root	Acid	Sugar	*
					Starch	ns
					Total NSC	ns

Table S7. Kruskal-Wallis summary table for analysis of aspen leaf sugar, Fig 1, left panel

N	Test statistic	df	p
9	7.2	2	0.027

Table S8. ANOVA summary table for analysis of aspen leaf starch, Fig. 1, left panel. Sum of squares is type III.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.007	2	.004	4.431	.066
Intercept	.156	1	.156	184.651	<.001
Treatment	.007	2	.004	4.431	.066
Error	.005	6	.001		
Total	.168	9			

Table S9. Kruskal-Wallis summary table for analysis of aspen leaf NSC, Fig 1, left panel

N	Test statistic	df	p
9	7.2	2	0.027

Table S10. ANOVA summary table for analysis of aspen stem sugar, Fig. 1, left panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.137	2	.068	5.500	.044
Intercept	1259.384	1	1259.384	101453.431	<.001
Treatment	.137	2	.068	5.500	.044
Error	.074	6	.012		
Total	1259.595	9			

Table S11. ANOVA summary table for analysis of aspen stem starch, Fig. 1, left panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.025	2	.513	9.602	.013
Intercept	77.481	1	77.481	1451.031	<.001
Treatment	1.025	2	.513	9.602	.013
Error	.320	6	.053		
Total	78.826	9			

Table S12. ANOVA summary table for analysis of aspen stem NSC, Fig. 1, left panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.906	2	.953	24.188	.001
Intercept	1961.899	1	1961.899	49794.400	<.001
Treatment	1.906	2	.953	24.188	.001
Error	.236	6	.039		
Total	1964.042	9			

Table S13. Kruskal-Wallis summary table for analysis of spruce needle sugar, Fig 1, left panel

N	Test statistic	df	p
9	5.6	2	0.061

Table S14. ANOVA summary table for analysis of spruce needle starch, Fig. 1, left panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.022	2	.011	10.307	.011
Intercept	3.080	1	3.080	2900.301	<.001
Treatment	.022	2	.011	10.307	.011
Error	.006	6	.001		
Total	3.108	9			

Table S15. ANOVA summary table for analysis of spruce needle NSC, Fig. 1, left panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.356	2	.178	5.630	.042
Intercept	2657.059	1	2657.059	83936.573	<.001
Treatment	.356	2	.178	5.630	.042
Error	.190	6	.032		
Total	2657.605	9			

Table S16. ANOVA summary table for analysis of aspen leaf sugar, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	3.527	3	1.176	37.175	0
Intercept	3741.672	1	3741.672	118326.978	0
Treatment	3.298	1	3.298	104.31	0
Storage	0.224	1	0.224	7.078	0.029
Storage x Treatment	0.004	1	0.004	0.138	0.72
Error	0.253	8	0.032		
Total	3745.452	12			

Table S17. ANOVA summary table for analysis of aspen leaf starch, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.012	3	.004	1.941	.202
Intercept	.238	1	.238	117.654	<.001
Treatment	.012	1	.012	5.726	.044
Storage	3.180E-05	1	3.180E-05	.016	.903
Storage x Treatment	.000	1	.000	.080	.784
Error	.016	8	.002		
Total	.266	12			

Table S18. ANOVA summary table for analysis of aspen leaf NSC, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	3.918	3	1.306	38.746	<.001
Intercept	3801.012	1	3801.012	112761.792	<.001
Treatment	3.685	1	3.685	109.326	<.001
Storage	.227	1	.227	6.731	.032
Storage x Treatment	.006	1	.006	.180	.682
Error	.270	8	.034		
Total	3805.200	12			

Table S19. ANOVA summary table for analysis of aspen stem sugar, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	2.240	3	.747	16.481	.001
Intercept	1821.378	1	1821.378	40195.274	<.001
Treatment	.085	1	.085	1.879	.208
Storage	1.435	1	1.435	31.663	<.001
Storage x Treatment	.721	1	.721	15.901	.004
Error	.363	8	.045		
Total	1823.981	12			

Table S20. ANOVA summary table for analysis of aspen stem starch, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.196	3	.065	1.135	.392
Intercept	100.270	1	100.270	1740.320	<.001
Treatment	.064	1	.064	1.106	.324
Storage	.013	1	.013	.228	.646
Storage x Treatment	.119	1	.119	2.071	.188
Error	.461	8	.058		
Total	100.927	12			

Table S21. ANOVA summary table for analysis of aspen stem NSC, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.432	3	.477	5.198	.028
Intercept	2776.129	1	2776.129	30227.339	<.001
Treatment	.002	1	.002	.018	.897
Storage	1.178	1	1.178	12.828	.007
Storage x Treatment	.252	1	.252	2.747	.136
Error	.735	8	.092		
Total	2778.296	12			

Table S22. ANOVA summary table for analysis of spruce needle sugar, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.385	3	.128	2.196	.166
Intercept	3223.859	1	3223.859	55103.333	<.001
Treatment	.236	1	.236	4.027	.080
Storage	.007	1	.007	.123	.735
Storage x Treatment	.143	1	.143	2.437	.157
Error	.468	8	.059		
Total	3224.712	12			

Table S23. ANOVA summary table for analysis of spruce needle starch, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.164	3	.055	33.233	<.001
Intercept	3.527	1	3.527	2143.007	<.001
Treatment	.142	1	.142	86.169	<.001
Storage	.000	1	.000	.065	.806
Storage x Treatment	.022	1	.022	13.465	.006
Error	.013	8	.002		
Total	3.704	12			

Table S24. ANOVA summary table for analysis of spruce needle NSC, Fig. 1, right panel.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.036	3	.345	5.295	.026
Intercept	3440.853	1	3440.853	52773.824	<.001
Treatment	.750	1	.750	11.503	.009
Storage	.010	1	.010	.148	.711
Storage x Treatment	.276	1	.276	4.234	.074
Error	.522	8	.065		
Total	3442.411	12			

Table S25. One-sample t-test summary table for analysis of s1, IC method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	1.190	5	.288	.77667
Starch	1.590	5	.173	.47215
Total NSC	2.541	5	.052	1.24983

Table S26. One-sample t-test summary table for analysis of s1, enzyme method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	-1.457	5	.205	-.58333
Starch	1.453	5	.206	.09795
Total NSC	-1.286	5	.255	-.48612

Table S27. One-sample t-test summary table for analysis of s1, acid method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	-.741	5	.492	-.33500
Starch	-.195	5	.853	-.09158
Total NSC	-.616	5	.565	-.42622

Table S28. One-sample t-test summary table for analysis of s2, IC method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	.918	5	.401	.63167
Starch	-.173	5	.869	-.04765
Total NSC	1.211	5	.280	.61545

Table S29. One-sample t-test summary table for analysis of s2, enzyme method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	-1.618	4	.181	-1.09000
Starch	-1.153	4	.313	-.52840
Total NSC	-4.015	4	.016	-1.61484

Table S30. One-sample t-test summary table for analysis of s2, acid method, Fig 2.

Component	t	df	p	Mean Difference
Sugar	5.475	5	.003	.85000
Starch	-1.403	5	.219	-.60262
Total NSC	.622	5	.561	.25110

Table S31. ANOVA summary table for analysis of aspen fine root sugar, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	3791.463	1	3791.463	553.402	<.001
Intercept, error	20.554	3	6.851		
Method, hypothesis	480.226	2	240.113	35.047	.008
Method, error	20.554	3	6.851		
Lab(method), hypothesis	20.554	3	6.851	34.559	<.001
Lab(method), error	2.379	12	.198		

Table S32. ANOVA summary table for analysis of aspen fine root starch, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	3945.840	1	3945.840	850.656	<.001
Intercept, error	13.916	3	4.639		
Method, hypothesis	.422	2	.211	.045	.956
Method, error	13.916	3	4.639		
Lab(method), hypothesis	13.916	3	4.639	16.035	<.001
Lab(method), error	3.471	12	.289		

Table S33. ANOVA summary table for analysis of aspen fine root NSC, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	15472.164	1	15472.164	29246.411	<.001
Intercept, error	1.587	3	.529		
Method, hypothesis	452.151	2	226.075	427.341	<.001
Method, error	1.587	3	.529		
Lab(method), hypothesis	1.587	3	.529	1.276	.327
Lab(method), error	4.975	12	.415		

Table S34. Kruskal-Wallis summary table for analysis of aspen leaf sugar, Fig 4.

N	Test statistic	df	p
18	13.053	2	0.001

Table S35. ANOVA summary table for analysis of aspen leaf starch, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	.240	1	.240	6.118	.090
Intercept, error	.118	3	.039		
Method, hypothesis	.003	2	.002	.039	.962
Method, error	.118	3	.039		
Lab(method), hypothesis	.118	3	.039	26.465	<.001
Lab(method), error	.018	12	.001		

Table S36. Kruskal-Wallis summary table for analysis of aspen leaf NSC, Fig 4.

N	Test statistic	df	p
18	12.551	2	0.002

Table S37. Kruskal-Wallis summary table for analysis of aspen phloem sugar, Fig 4.

N	Test statistic	df	P
18	12.316	2	0.002

Table S38. Kruskal-Wallis summary table for analysis of aspen phloem starch, Fig 4.

N	Test statistic	df	p
18	7.906	2	0.019

Table S39. Kruskal-Wallis summary table for analysis of aspen phloem NSC, Fig 4.

N	Test statistic	df	p
18	12.129	2	0.002

Table S40. Kruskal-Wallis summary table for analysis of aspen xylem sugar, Fig 4.

N	Test statistic	df	P
17	12.933	2	0.002

Table S41. ANOVA summary table for analysis of aspen xylem starch, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	1.592	1	1.592	1025.612	<.001
Intercept, error	.005	3.031	.002		
Method, hypothesis	.097	2	.049	31.264	.010
Method, error	.005	3.014	.002		
Lab(method), hypothesis	.005	3	.002	2.176	.149
Lab(method), error	.008	11	.001		

Table S42. Kruskal-Wallis summary table for analysis of aspen xylem NSC, Fig 4.

N	Test statistic	df	p
18	13.8345	2	0.001

Table S43. ANOVA summary table for analysis of pine fine root sugar, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	139.556	1	139.556	150.990	.001
Intercept, error	2.773	3	.924		
Method, hypothesis	47.677	2	23.839	25.792	.013
Method, error	2.773	3	.924		
Lab(method), hypothesis	2.773	3	.924	23.370	<.001
Lab(method), error	.475	12	.040		

Table S44. Kruskal-Wallis summary table for analysis of pine fine root starch, Fig 4.

N	Test statistic	df	p
18	12.616	2	0.002

Table S45. Kruskal-Wallis summary table for analysis of pine fine root NSC, Fig 4.

N	Test statistic	df	p
18	8.225	2	0.016

Table S46. ANOVA summary table for analysis of pine needle sugar, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	538.576	1	538.576	440.313	<.001
Intercept, error	3.670	3	1.223		
Method, hypothesis	104.550	2	52.275	42.737	.006
Method, error	3.670	3	1.223		
Lab(method), hypothesis	3.670	3	1.223	29.553	<.001
Lab(method), error	.497	12	.041		

Table S47. Kruskal-Wallis summary table for analysis of pine needle starch, Fig 4.

N	Test statistic	df	p
18	11.368	2	0.003

Table S48. ANOVA summary table for analysis of pine needle NSC, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	1277.483	1	1277.483	237.023	.001
Intercept, error	16.169	3	5.390		
Method, hypothesis	46.830	2	23.415	4.344	.130
Method, error	16.169	3	5.390		
Lab(method), hypothesis	16.169	3	5.390	56.296	<.001
Lab(method), error	1.149	12	.096		

Table S49. Kruskal-Wallis summary table for analysis of pine phloem sugar, Fig 4.

N	Test statistic	df	p
18	11.453	2	0.003

Table S50. ANOVA summary table for analysis of pine phloem starch, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	14.136	1	14.136	47.095	.006
Intercept, error	.900	3	.300		
Method, hypothesis	2.118	2	1.059	3.528	.163
Method, error	.900	3	.300		
Lab(method), hypothesis	.900	3	.300	111.532	<.001
Lab(method), error	.032	12	.003		

Table S51. Kruskal-Wallis summary table for analysis of pine phloem NSC, Fig 4.

N	Test statistic	df	p
18	11.392	2	0.003

Table S52. Kruskal-Wallis summary table for analysis of pine xylem sugar, Fig 4.

N	Test statistic	df	p
18	11.509	2	0.003

Table S53. Kruskal-Wallis summary table for analysis of pine xylem starch, Fig 4.

N	Test statistic	df	p
18	12.367	2	0.002

Table S54. Kruskal-Wallis summary table for analysis of pine xylem NSC, Fig 4.

N	Test statistic	df	p
18	12.684	2	0.002

Table S55. Kruskal-Wallis summary table for analysis of plum leaf sugar, Fig 4.

N	Test statistic	df	p
18	14.014	2	0.001

Table S56. ANOVA summary table for analysis of plum leaf starch, Fig. 4.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	23.049	1	23.049	307.389	<.001
Intercept, error	.225	3	.075		
Method, hypothesis	2.948	2	1.474	19.661	.019
Method, error	.225	3	.075		
Lab(method), hypothesis	.225	3	.075	8.507	.003
Lab(method), error	.106	12	.009		

Table S57. Kruskal-Wallis summary table for analysis of plum leaf NSC, Fig 4.

N	Test statistic	df	p
18	14.764	2	0.001

Table S58. Mann-Whitney test summary table for analysis of aspen fine root sugar, IC method, Fig. 5.

N	Test statistic	p
12	12	0.394

Table S59. ANOVA summary table for aspen fine root starch, IC method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	2580.612	1	2580.612	1809.697	.015
Intercept, error	1.426	1	1.426		
Lab, hypothesis	1.426	1	1.426	.215	.724
Lab, error	6.640	1	6.640		
Extraction type, hypothesis	.785	1	.785	.118	.789
Extraction type, error	6.640	1	6.640		
Extraction type * Lab, hypothesis	6.640	1	6.640	10.023	.013
Extraction type * Lab, error	5.300	8	.662		

Table S60. ANOVA summary table for aspen fine root NSC, IC method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	7378.496	1	7378.496	1608.205	.016
Intercept, error	4.588	1	4.588		
Lab, hypothesis	4.588	1	4.588	4.296	.286
Lab, error	1.068	1	1.068		
Extraction type, hypothesis	4.514	1	4.514	4.227	.288
Extraction type, error	1.068	1	1.068		
Extraction type * Lab, hypothesis	1.068	1	1.068	1.308	.286
Extraction type * Lab, error	6.534	8	.817		

Table S61. Mann-Whitney test summary table for analysis of aspen fine root sugar, enzyme method, Fig 5.

N	Test statistic	p
12	2	0.009

Table S62. ANOVA summary table for aspen fine root starch, enzyme method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	2317.869	1	2317.869	277.681	.038
Intercept, error	8.347	1	8.347		
Lab, hypothesis	8.347	1	8.347	1.189	.473
Lab, error	7.022	1	7.022		
Extraction type, hypothesis	12.232	1	12.232	1.742	.413
Extraction type, error	7.022	1	7.022		
Extraction type * Lab, hypothesis	7.022	1	7.022	165.302	<.001
Extraction type * Lab, error	.340	8	.042		

Table S63. Mann-Whitney test summary table for analysis of aspen fine root NSC, enzyme method, Fig 5.

N	Test statistic	p
12	0	0.002

Table S64. ANOVA summary table for aspen fine root sugar, acid method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	5863.150	1	5863.150	466.986	.029
Intercept, error	12.555	1	12.555		
Lab, hypothesis	12.555	1	12.555	59.936	.082
Lab, error	.209	1	.209		
Extraction type, hypothesis	1.074	1	1.074	5.128	.265
Extraction type, error	.209	1	.209		
Extraction type * Lab, hypothesis	.209	1	.209	.942	.360
Extraction type * Lab, error	1.779	8	.222		

Table S65. Mann-Whitney test summary table for analysis of aspen fine root starch, acid method, Fig 5.

N	Test statistic	p
12	12	0.394

Table S66. ANOVA summary table for aspen fine root NSC, acid method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	15951.979	1	15951.979	119639844.000	<.001
Intercept, error	.000	1	.000		
Lab, hypothesis	.000	1	.000	.001	.976
Lab, error	.097	1	.097		
Extraction type, hypothesis	.053	1	.053	.549	.594
Extraction type, error	.097	1	.097		
Extraction type * Lab, hypothesis	.097	1	.097	.392	.549
Extraction type * Lab, error	1.983	8	.248		

Table S67. ANOVA summary table for pine fine root sugar, IC method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	38.231	1	38.231	27.806	.119
Intercept, error	1.375	1	1.375		
Lab, hypothesis	1.375	1	1.375	1.741	.413
Lab, error	.790	1	.790		
Extraction type, hypothesis	.097	1	.097	.123	.785
Extraction type, error	.790	1	.790		
Extraction type * Lab, hypothesis	.790	1	.790	22.201	.002
Extraction type * Lab, error	.285	8	.036		

Table S68. Mann-Whitney test summary table for analysis of pine fine root starch, IC method, Fig 5.

N	Test statistic	p
12	20	0.818

Table S69. Mann-Whitney test summary table for analysis of pine fine root NSC, IC method, Fig 5.

N	Test statistic	p
12	23	0.485

Table S70. Mann-Whitney test summary table for analysis of pine fine root sugar, enzyme method, Fig 5.

N	Test statistic	p
12	3	0.015

Table S71. ANOVA summary table for pine fine root starch, enzyme method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	49.970	1	49.970	20.214	.139
Intercept, error	2.472	1	2.472		
Lab, hypothesis	2.472	1	2.472	74.513	.073
Lab, error	.033	1	.033		
Extraction type, hypothesis	.088	1	.088	2.665	.350
Extraction type, error	.033	1	.033		
Extraction type * Lab, hypothesis	.033	1	.033	4.167	.076
Extraction type * Lab, error	.064	8	.008		

Table S72. Mann-Whitney test summary table for analysis of pine fine root NSC, enzyme method, Fig 5.

N	Test statistic	p
12	9	0.18

Table S73. ANOVA summary table for pine fine root sugar, acid method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	318.761	1	318.761	223.964	.042
Intercept, error	1.423	1	1.423		
Lab, hypothesis	1.423	1	1.423	9.334	.201
Lab, error	.152	1	.152		
Extraction type, hypothesis	.057	1	.057	.374	.650
Extraction type, error	.152	1	.152		
Extraction type * Lab, hypothesis	.152	1	.152	3.303	.107
Extraction type * Lab, error	.369	8	.046		

Table S74. ANOVA summary table for pine fine root starch, acid method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	16.765	1	16.765	545.077	.027
Intercept, error	.031	1	.031		
Lab, hypothesis	.031	1	.031	11.633	.182
Lab, error	.003	1	.003		
Extraction type, hypothesis	.065	1	.065	24.564	.127
Extraction type, error	.003	1	.003		
Extraction type * Lab, hypothesis	.003	1	.003	.462	.516
Extraction type * Lab, error	.046	8	.006		

Table S75. ANOVA summary table for pine fine root, acid method, Fig. 5.

Source	Sum of Squares	df	Mean square	F	p
Intercept, hypothesis	481.587	1	481.587	257.217	.040
Intercept, error	1.872	1	1.872		
Lab, hypothesis	1.872	1	1.872	9.474	.200
Lab, error	.198	1	.198		
Extraction type, hypothesis	.241	1	.241	1.219	.469
Extraction type, error	.198	1	.198		
Extraction type * Lab, hypothesis	.198	1	.198	3.717	.090
Extraction type * Lab, error	.425	8	.053		

Table S76. ANOVA summary table for analysis of aspen fine root sugar, Fig. 6.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	30.699	5	6.140	49.478	<.001
Intercept	7815.000	1	7815.000	62976.229	<.001
Lab	30.699	5	6.140	49.478	<.001
Error	1.489	12	.124		
Total	7847.189	18			

Table S77. ANOVA summary table for analysis of aspen fine root starch, Fig. 6.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.469	5	.294	.814	.562
Intercept	2533.059	1	2533.059	7018.512	<.001
Lab	1.469	5	.294	.814	.562
Error	4.331	12	.361		
Total	2538.859	18			

Table S78. Kruskal-Wallis summary table for analysis of aspen fine root NSC, Fig 6.

N	Test statistic	df	p
18	15.784	5	0.007

Table S79. Kruskal-Wallis summary table for analysis of pine fine root sugar, Fig 6. Despite a significant overall result, a post hoc Dunn's test showed significant differences between labs.

N	Test statistic	df	p
18	14.168	5	0.015

Table S80. ANOVA summary table for analysis of pine fine root starch, Fig. 6.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.150	5	.030	11.665	<.001
Intercept	8.584	1	8.584	3344.262	<.001
Lab	.150	5	.030	11.665	<.001
Error	.031	12	.003		
Total	8.764	18			

Table S81. ANOVA summary table for analysis of pine fine root NSC, Fig. 6.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	2.637	5	.527	9.189	.001
Intercept	442.823	1	442.823	7715.711	<.001
Lab	2.637	5	.527	9.189	.001
Error	.631	11	.057		
Total	461.286	17			

Table S82. ANOVA summary table for analysis of aspen leaf sugar, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	14.607	7	2.087	48.157	<.001
Intercept	7256.165	1	7256.165	167450.403	<.001
Treatment	12.092	1	12.092	279.037	<.001
Storage	1.328	3	.443	10.216	.001
Treatment *Storage	1.188	3	.396	9.136	.001
Error	.693	16	.043		
Total	7271.466	24			

Table S83. ANOVA summary table for analysis of aspen leaf starch, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.013	7	.002	2.039	.113
Intercept	.477	1	.477	535.042	<.001
Treatment	.002	1	.002	2.226	.155
Storage	.004	3	.001	1.626	.223
Treatment *Storage	.006	3	.002	2.390	.107
Error	.014	16	.001		
Total	.504	24			

Table S84. ANOVA summary table for analysis of aspen leaf NSC, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	14.958	7	2.137	49.043	<.001
Intercept	7373.469	1	7373.469	169229.462	<.001
Treatment	12.370	1	12.370	283.899	<.001
Storage	1.343	3	.448	10.271	.001
Treatment *Storage	1.246	3	.415	9.530	.001
Error	.697	16	.044		
Total	7389.124	24			

Table S85. ANOVA summary table for analysis of aspen stem sugar, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.274	7	.182	7.083	.001
Intercept	3492.551	1	3492.551	135911.509	<.001
Treatment	.026	1	.026	.993	.334
Storage	.880	3	.293	11.417	<.001
Treatment *Storage	.368	3	.123	4.780	.015
Error	.411	16	.026		
Total	3494.236	24			

Table S86. ANOVA summary table for analysis of aspen stem starch, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.649	7	.236	5.004	.004
Intercept	199.773	1	199.773	4244.303	<.001
Treatment	.735	1	.735	15.621	.001
Storage	.315	3	.105	2.233	.124
Treatment *Storage	.598	3	.199	4.235	.022
Error	.753	16	.047		
Total	202.175	24			

Table S87. ANOVA summary table for analysis of aspen stem NSC, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.949	7	.278	3.491	.018
Intercept	5362.864	1	5362.864	67245.944	<.001
Treatment	1.033	1	1.033	12.957	.002
Storage	.176	3	.059	.737	.545
Treatment *Storage	.739	3	.246	3.090	.057
Error	1.276	16	.080		
Total	5366.089	24			

Table S88. ANOVA summary table for analysis of spruce needle sugar, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	1.259	7	.180	2.881	.038
Intercept	6567.287	1	6567.287	105213.323	<.001
Treatment	.262	1	.262	4.194	.057
Storage	.382	3	.127	2.041	.149
Treatment *Storage	.615	3	.205	3.282	.048
Error	.999	16	.062		
Total	6569.544	24			

Table S89. ANOVA summary table for analysis of spruce needle starch, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	.411	7	.059	26.655	<.001
Intercept	6.988	1	6.988	3169.884	<.001
Treatment	.346	1	.346	157.078	<.001
Storage	.033	3	.011	5.000	.012
Treatment *Storage	.032	3	.011	4.837	.014
Error	.035	16	.002		
Total	7.435	24			

Table S90. ANOVA summary table for analysis of spruce needle NSC, Fig. S1.

Source	Sum of Squares	df	Mean square	F	p
Corrected Model	2.141	7	.306	5.364	.003
Intercept	7002.458	1	7002.458	122787.318	<.001
Treatment	1.220	1	1.220	21.384	<.001
Storage	.219	3	.073	1.283	.314
Treatment *Storage	.702	3	.234	4.104	.024
Error	.912	16	.057		
Total	7005.512	24			

Table S91. One-sample t-test summary table for analysis of s1 using water extraction, IC method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	-1.999	5	.102	-.96167
Starch	.581	5	.587	.89377
Total NSC	-.036	5	.973	-.06650

Table S92. One-sample t-test summary table for analysis of s1 using water extraction, enzyme method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	-2.363	5	.064	-2.32167
Starch	4.627	5	.006	2.44877
Total NSC	.109	5	.918	.12443

Table S93. One-sample t-test summary table for analysis of s1 using water extraction, acid method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	5.187	5	.004	23.72833
Starch	-7.776	5	.001	-36.95957
Total NSC	-69.392	5	<.001	-13.22907

Table S94. One-sample t-test summary table for analysis of s2 using water extraction, IC method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	.426	5	.688	.17833
Starch	-.979	5	.372	-1.85067
Total NSC	-.897	5	.411	-1.66803

Table S95. One-sample t-test summary table for analysis of s2 using water extraction, enzyme method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	-2.508	5	.054	-2.58167
Starch	.730	5	.498	.43767
Total NSC	-2.933	5	.033	-2.13803

Table S96. One-sample t-test summary table for analysis of s2 using water extraction, acid method, Tables S3, S4, S5.

Component	t	df	p	Mean Difference
Sugar	6.993	5	.001	39.63833
Starch	-8.336	5	<.001	-49.81900
Total NSC	-29.038	5	<.001	-10.17637