Supporting Information

Precipitation gradient drives divergent relationship between non-structural carbohydrates and water availability in *Pinus tabulaeformis* of Northern China

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Supplementary Table S1. Basic information for four sampling sites

Sites	Lat./Lon.	Elevation (m)[a]	MAT (℃)[b]	MAP (mm)[b]	VPD[b]	DBH (cm)[c]	Stand Density (/ha)	Tree Age (year)	Soil Type
WLS	40.66°N 108.78°E	1913	10.3	185	1.46	\	\	68	gray-cinnamon
GLB	40.56°N 111.49°E	1250	7.8	315	1.23	\	\	65	kastanozems
QLY	36.33°N 112.00°E	1600	13.3	524	0.94	18.6	752	60	cinnamon
HDT	34.00°N 108.30°E	1600	13.1	917	0.45	24.4	656	61	brown soil

[a]Elevation in m (above sea level)

[b]MAT, mean annual temperature; MAP, mean annual precipitation; VPD, mean growing-season vapor pressure deficit, which is calculated based on climate observations (http://data.cma.cn/).

[c]DBH, mean diameter at breast height

[d]Soil type, obtained from the forestry station

Supplementary Table S2. The linear mixed-effect model (LME) results explaining the effects of different variables on influencing the TNC concentrations. TNC: total non-structural carbohydrate.

Fixed effects	Estimates	SE	P	Random	SE
Intercept	2.579	0.429	<.0001	Sampling year	0.504
Site	0.001	0.048	0.105	Sampling ID	0.094
Time	-0.136	0.089	0.219		
Organ	-0.026	0.023	0.052		
Pre	-1.107	0.032	<.0001		
VPD	0.671	0.065	<.0001		
Ψ_{leaf}^{PD}	-0.046	0.044	0.457		
Pre×VPD	0.084	0.027	0.002		

Model: TNC~Site+Time+Organ+Pre*VPD+Ψ_{leaf}^{PD}, random=Sampling year/ Sampling ID.

Note: Organ (sampling organs of NSCs), Pre (monthly precipitation), VPD (monthly VPD), Tem (monthly temperature), Ψ_{leaf}^{PD} (pre-dawn leaf water potential). SE: Standard Error, SD: Standard Deviation.
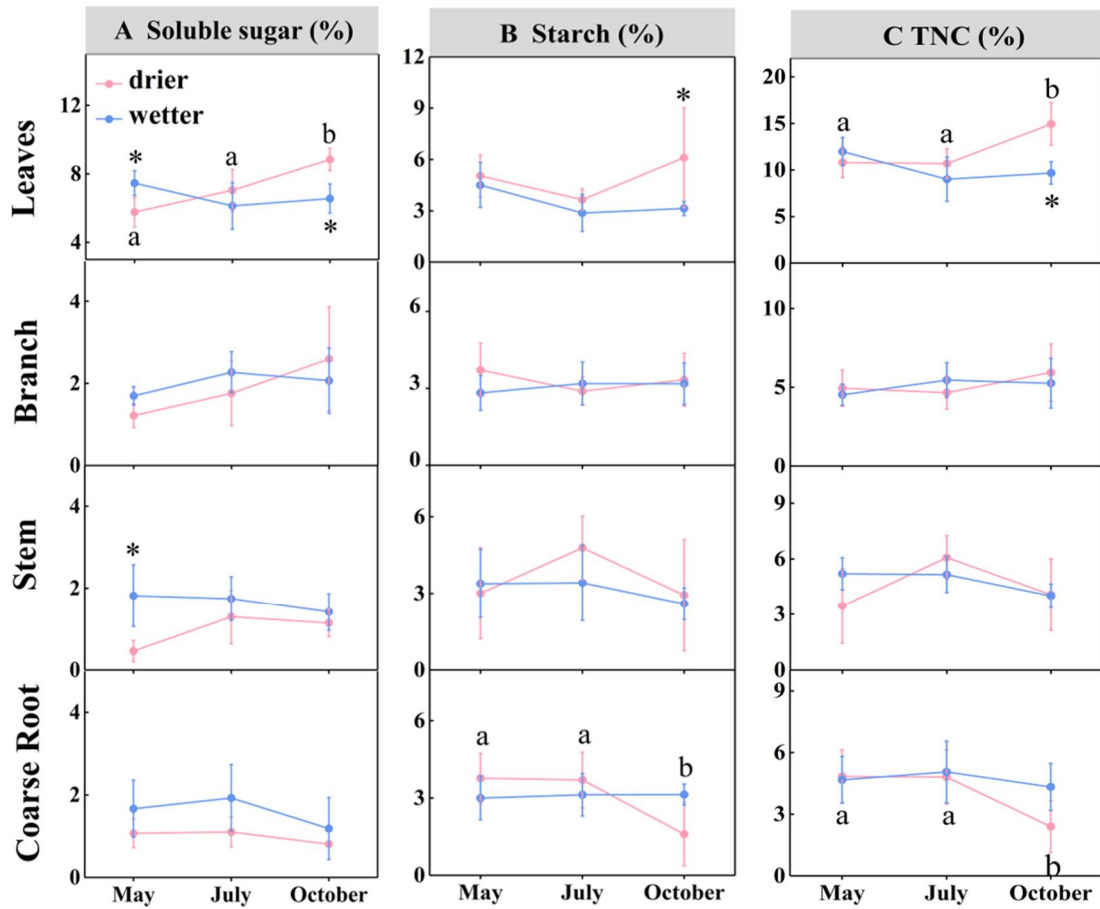
Supplementary Figure S1. The dynamics of (A) soluble sugars, (B) starch and (C) TNC at different organs in two group sites. Each point represents the mean values of two study sites, for drier sites including WLS and GLB (red), wetter sites including QLY and HDT (blue). Error bars, ± SD (standard deviation). Asterisks represent the results of ANOVA between sites (*, $p \leq 0.05$). Letters represent the results of ANOVA between seasons ($\alpha = 0.05$, only marked in drier sites, and no marked in wetter sites for no differences).
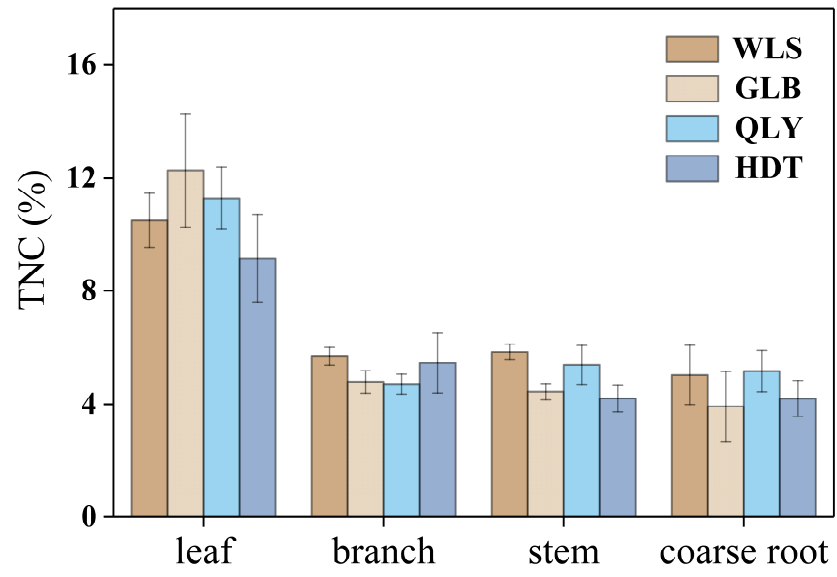
Supplementary Figure S2. Concentrations of TNC among different organs across study sites. Error bars, ± SD (standard deviation, n=6 for per organ).
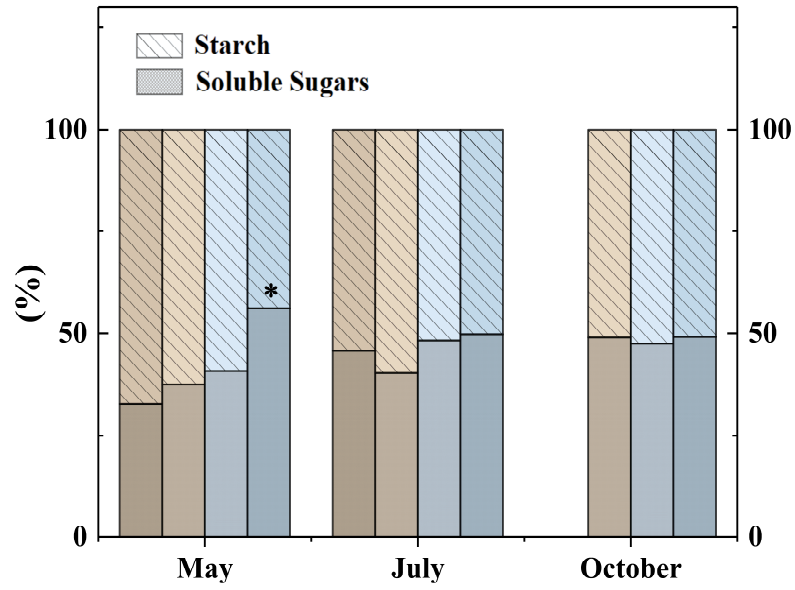
Supplementary Figure S3. The proportion of different components of TNC during the growing season.

The asterisks denote significant difference of among study sites (*, $p < 0.05$).