Supplement of Clim. Past, 16, 1043–1059, 2020
https://doi.org/10.5194/cp-16-1043-2020-supplement

Climate of the Past
Open Access
EGU

Supplement of

Application and evaluation of the dendroclimatic process-based model MAIDEN during the last century in Canada and Europe

Jeanne Rezsöhazy et al.

Correspondence to: Jeanne Rezsöhazy (jeanne.rezsohazy@uclouvain.be)

S1: Supplementary materials

Table S1. Main constants linked to site conditions and control parameters in the MAIDEN model.

Parameter	Meaning	Units
exp_site	Indicates if the species at the site is a deciduous (1) or evergreen (2) tree	no unit (1 or 2)
base_elev_cst	Station elevation	meters
base_isoh_cst	Station isohyet	centimeters
site_lat_cst	Site latitude	degrees
site_elev_cst	Site elevation	meters
site_slp_cst	Site slope	degrees
site_asp_cst	Site aspect	degrees
site_isoh_cst	Site isohyet	centimeters
site_ehoriz_cst	Site East slope	degrees
site_whoriz_cst	Site West slope	degrees
thick1-2-3 or 4	Soil layer thickness	meters
finefrac1-2-3 or 4	% of fine roots in the soil layer	Coeff. between 0-1
clay1-2-3 or 4	% of clay in the soil layer	%
sand1-2-3 or 4	% of sand in the soil layer	%

Table S2. GHCN (Table 2) stations used for daily climate data at the European sites (Fig. 2).

Site	Time period	Station name	Station lat/lon	Station elevation
FINL	1900-1944/1950-2000	Sodankyla	67.37N26.65E	179m
EALP	1950-2000	Zugspitze	47.42N10.99E	2964m
	1910-1949	Innsbruck	47.27N11.4E	577m
SWIT179	1910-2000	Saentis	47.25N9.35E	2502m

Table S3. Calibrated parameters of the MAIDEN model (Gennaretti et al., 2017).

	Process		Parameter	Units
Photosynthesis	Temperature dependence of photosynthesis	Asymptote	V_{max}	μmol C.m^{-2} of leaves . s^{-1}
		Slope	V_b	$^{\circ}$C^{-1}
		Inflection point	V_{ip}	$^{\circ}$C
	Water stress dependence of stomatal conductance	Slope	$soil_b$	mm^{-1}
		Inflection point	$soil_{ip}$	mm
	Acclimation to temperature of photosynthesis	Needed days	τ	days
Carbon allocation	Definition of canopy maximum amount of carbon	Slope of temperature dependence	*CanopyT*	$^{\circ}$C^{-1}
		Slope of precipitation dependence	*CanopyP*	mm^{-1}
	Start of the growing season (budburst)	GDD sum threshold	GDD_1	$^{\circ}$C
		Day before the later start	*vegphase23*	day of the year
		Acclimation to changing GDD sums	*day23_flex*	years
	Daily available carbon from buds reservoir	Storage C used by the tree	C_{bud}	gC.m^{-2} of stand . day^{-1}
	Partition of carbon to different tree compartments during growing season	Portion allocated to canopy and roots	*h3*	fraction (0-1)
	Partition of carbon to different tree compartments during summer period	Inflection point of the temperature dependence	st_{4temp}	$^{\circ}$C
	Photoperiod for transition from summer to fall season	Photoperiod threshold	*photoper*	hours
	Carbon losses from the canopy	Yearly canopy turnover rate	*PercentFall*	fraction (0-1)
		Approximate day of the year with maximum losses	*OutMax*	day of the year
		Index proportional to the length of the period with losses	*OutLength*	NA

Table S4. MAIDEN calibrated parameters values (Table S3) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites, five aggregated Eastern Canadian taiga sites (NRCAN (5') climatic dataset, Fig. 1, Table 2) and three European sites (GHCN station data, Fig. 2, Table 2).

Dataset	Site	GDD1	vegphase23	day23_flex	CanopyP	CanopyT	PercentFall	OutMax	OutLength	Cbud	h3	st4temp	photoper	Vmax	Vb	Vip	soilb	soilip	tau
NRCAN	QC_taiga	63.403	155.321	7.441	1.104	1.309	0.137	170.266	9.378	1.892	0.970	99.921	13.743	33.246	-0.135	20.301	-0.014	236.251	10.986
NRCAN	WCORPL	19.049	171.896	5.481	15.869	16.044	0.122	181.651	8.325	1.500	0.690	15.565	13.367	58.559	-0.229	11.111	-0.020	318.724	6.964
NRCAN	WNFLR1	74.008	170.197	8.624	16.625	17.049	0.099	177.628	11.309	1.983	0.324	42.883	13.348	26.483	-0.136	10.839	-0.023	260.840	6.672
NRCAN	WL42	86.427	176.503	3.561	1.425	1.644	0.091	199.670	11.317	1.384	0.506	17.047	13.128	61.034	-0.193	14.804	-0.018	300.386	13.380
NRCAN	WCORILE	97.375	168.303	4.367	19.023	4.940	0.108	159.102	9.390	1.390	0.285	7.698	12.889	71.462	-0.135	13.767	-0.013	368.213	2.123
NRCAN	WPOOL	17.709	167.718	6.990	3.910	9.930	0.097	172.567	10.908	1.299	0.124	45.731	12.300	28.358	-0.197	16.832	-0.016	119.184	1.510
NRCAN	WNIT	34.580	165.366	1.194	14.719	9.647	0.124	163.836	11.716	1.082	0.167	82.783	13.256	123.684	-0.176	19.069	-0.014	353.154	9.761
NRCAN	WCANE	28.189	178.133	3.459	7.511	1.942	0.114	181.293	9.072	1.135	0.023	94.195	13.767	128.890	-0.294	20.993	-0.024	202.876	1.249
NRCAN	WCEA	102.804	177.515	7.770	3.976	8.212	0.107	186.967	8.398	1.340	0.076	43.256	12.936	125.486	-0.163	23.795	-0.018	374.543	6.827
NRCAN	WDA1R	17.256	159.653	5.514	15.392	0.170	0.098	165.542	10.218	1.488	0.622	15.382	13.571	84.079	-0.136	19.056	-0.021	298.486	3.694
NRCAN	WHER	24.016	180.457	9.596	10.538	10.287	0.097	175.104	10.539	1.794	0.282	56.515	13.987	16.204	-0.119	12.972	-0.015	120.703	4.005
NRCAN	WHH1	34.570	161.348	6.628	15.612	18.041	0.103	178.681	11.085	1.575	0.253	22.939	13.779	26.570	-0.133	18.467	-0.023	114.641	9.420
NRCAN	WHM1	109.541	177.636	7.965	15.971	3.851	0.096	182.295	9.734	1.711	0.225	50.227	12.500	26.902	-0.142	17.533	-0.007	288.438	2.278
NRCAN	WHM2	39.917	178.020	2.164	16.710	18.633	0.127	172.894	7.970	1.481	0.479	32.984	12.304	63.905	-0.145	14.738	-0.022	398.449	4.107
NRCAN	WL32	60.984	156.171	7.108	13.672	16.074	0.090	169.621	9.887	1.472	0.469	6.886	13.946	31.660	-0.286	15.059	-0.010	129.900	3.464
NRCAN	WLECA	111.354	167.925	8.528	2.635	10.267	0.103	193.841	11.685	1.234	0.313	16.742	12.861	51.242	-0.193	20.333	-0.008	208.170	2.746
NRCAN	WNFL1V	14.210	169.452	7.227	13.154	4.663	0.121	165.126	11.766	1.263	0.998	52.112	12.437	36.575	-0.113	19.736	-0.012	377.023	1.067
NRCAN	WROZM	21.270	167.485	1.875	18.106	16.159	0.133	160.417	4.605	1.151	0.757	30.170	13.914	67.561	-0.104	21.151	-0.023	292.789	2.247
NRCAN	WROZX	43.035	168.173	1.593	12.498	19.278	0.096	169.720	7.006	1.310	0.276	34.586	13.553	27.911	-0.105	18.322	-0.022	243.454	18.665
NRCAN	WRT485	89.048	173.233	6.517	12.051	5.321	0.094	176.983	11.824	1.231	0.201	6.992	13.247	82.030	-0.129	29.358	-0.019	126.865	2.448
NRCAN	WTHH	15.963	167.972	5.069	0.742	19.062	0.110	168.375	11.230	1.049	0.267	8.399	13.325	72.763	-0.135	28.040	-0.018	127.278	2.044
NRCAN	WCOR	14.568	154.225	9.215	4.124	8.017	0.107	159.538	11.356	2.427	0.256	41.704	13.833	66.425	-0.100	13.036	-0.014	331.144	19.299
NRCAN	WNFL	96.049	159.796	3.996	15.297	9.355	0.092	184.498	10.207	2.389	0.265	47.119	13.405	41.677	-0.177	12.018	-0.020	273.574	3.263
NRCAN	WDA1R_WTHH	18.938	174.889	6.651	1.032	2.323	0.108	150.426	6.464	1.380	0.298	8.275	12.311	110.619	-0.142	13.209	-0.023	356.216	19.803
NRCAN	WROZ	26.364	153.589	1.601	15.775	18.630	0.147	161.491	9.386	1.133	0.620	2.697	13.254	96.710	-0.124	14.956	-0.014	396.201	13.193
NRCAN	WH	54.844	155.791	4.134	5.880	15.647	0.110	171.819	10.873	1.594	0.152	5.462	12.598	43.160	-0.143	13.597	-0.017	134.855	1.872
GHCN	EALP	176.466	92.590	7.835	3.483	2.651	0.263	145.638	3.635	13.142	0.993	8.250	14.028	80.946	-0.140	24.093	-0.029	342.517	14.468
GHCN	SWIT179	43.239	158.136	2.612	6.654	7.949	0.500	224.261	12.397	9.147	0.467	15.266	9.822	54.405	-0.175	14.108	-0.056	304.582	16.755
GHCN	FINL045	56.252	152.044	3.346	6.974	8.250	0.132	242.491	8.044	4.489	0.879	44.379	11.962	117.566	-0.173	18.193	-0.054	419.557	9.348

Table S5. MAIDEN calibrated parameters values (Table S3) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites and five aggregated Eastern Canadian taiga sites (GMF (1°) climatic dataset, Fig. 1, Table 2).

Dataset	Site	GDD1	vegphase23	day23_flex	CanopyP	CanopyT	PercentFall	OutMax	OutLength	Cbud	h3	st4temp	photoper	Vmax	Vb	Vip	soilb	soilip	tau
GMF	QC_taiga	75.663	152.558	1.636	2.863	8.957	0.134	189.983	10.825	1.200	0.983	99.616	13.737	13.314	-0.133	11.010	-0.009	242.325	5.220
GMF	WCORPL	19.614	154.658	5.627	0.264	19.840	0.131	168.635	9.027	1.895	0.780	26.895	13.139	65.571	-0.121	13.440	-0.019	368.897	3.752
GMF	WNFLR1	49.391	169.826	6.628	11.234	6.101	0.113	167.168	10.788	1.771	0.335	15.850	12.424	29.047	-0.188	11.749	-0.013	305.712	10.576
GMF	WL42	58.119	172.639	7.569	16.189	7.377	0.109	179.399	8.269	1.035	0.535	1.178	13.411	18.125	-0.176	10.952	-0.011	297.743	4.432
GMF	WCOR1LE	26.325	164.009	5.596	17.281	8.733	0.146	169.686	9.020	1.114	0.407	11.819	13.201	16.369	-0.125	12.854	-0.020	206.164	18.014
GMF	WPOOL	77.772	173.692	7.052	2.790	15.853	0.091	184.851	11.002	1.336	0.090	30.447	13.644	42.324	-0.169	20.228	-0.023	143.943	10.72
GMF	WNIT	30.784	166.823	2.741	13.505	7.509	0.134	164.790	11.952	1.678	0.373	22.584	12.858	24.049	-0.273	13.153	-0.009	174.770	6.647
GMF	WCANE	70.119	170.101	3.273	15.928	8.959	0.144	185.114	9.475	1.087	0.105	27.563	12.575	137.905	-0.280	18.917	-0.018	381.838	11.640
GMF	WCEA	85.430	161.229	1.943	18.883	12.005	0.142	153.534	5.886	1.193	0.431	78.100	13.618	107.353	-0.230	11.551	-0.020	394.208	1.954
GMF	WDAIR	24.320	152.898	8.400	1.016	14.503	0.129	174.207	11.061	1.974	0.905	61.826	13.600	108.395	-0.103	22.824	-0.024	325.118	4.721
GMF	WHER	81.055	154.396	2.065	7.682	9.018	0.095	157.001	9.334	1.102	0.589	2.016	13.400	16.916	-0.121	11.807	-0.012	336.875	12.949
GMF	WHH1	14.275	174.618	2.949	10.268	0.171	0.093	171.613	10.146	1.223	0.292	13.350	12.947	21.290	-0.235	13.151	-0.022	222.973	13.111
GMF	WHM1	32.838	167.438	6.757	6.371	5.958	0.110	155.831	8.873	1.181	0.360	11.616	13.477	18.910	-0.104	17.042	-0.011	151.966	2.310
GMF	WHM2	91.379	152.520	3.743	1.271	17.498	0.128	151.777	9.601	1.037	0.502	10.550	12.253	13.764	-0.140	10.661	-0.011	273.032	5.109
GMF	WL32	95.642	180.031	4.224	4.193	14.564	0.098	177.032	11.805	1.861	0.073	34.838	13.185	53.737	-0.203	20.427	-0.025	143.028	5.336
GMF	WLECA	116.601	172.242	7.905	18.894	4.609	0.104	163.603	4.515	1.150	0.577	20.228	13.408	13.865	-0.118	12.874	-0.005	118.175	4.252
GMF	WNFL1V	58.951	159.826	8.953	13.153	12.897	0.114	178.394	10.591	1.169	0.480	8.190	12.041	70.906	-0.106	29.684	-0.014	246.196	10.527
GMF	WROZM	34.123	154.326	1.391	1.824	12.766	0.133	175.840	7.810	1.120	0.503	14.596	12.224	38.683	-0.147	17.125	-0.019	268.996	1.033
GMF	WROZX	61.982	157.946	3.203	7.807	13.029	0.140	176.400	8.099	1.644	0.869	72.129	13.874	112.519	-0.101	23.261	-0.025	395.291	5.423
GMF	WRT485	24.015	169.276	8.934	18.033	7.811	0.133	172.579	11.565	1.588	0.701	12.111	12.298	17.253	-0.221	11.145	-0.024	205.932	3.025
GMF	WTHH	68.680	177.619	9.452	9.448	17.848	0.119	167.538	7.717	1.080	0.571	4.714	13.603	19.948	-0.185	14.189	-0.010	212.170	6.833
GMF	WCOR	20.805	178.574	2.620	10.231	19.250	0.105	154.684	6.307	1.818	0.469	12.603	12.393	42.352	-0.117	12.343	-0.009	376.197	4.200
GMF	WNFL	47.029	161.315	3.861	6.531	8.277	0.094	182.211	10.528	2.095	0.382	16.444	12.828	45.482	-0.230	11.637	-0.014	311.371	1.951
GMF	WDAIR_WTHH	39.429	180.587	4.740	0.007	10.191	0.120	167.530	6.059	1.446	0.568	3.757	13.472	26.760	-0.124	11.530	-0.009	290.608	2.714
GMF	WROZ	29.498	180.242	3.967	0.403	9.470	0.120	175.502	8.817	1.364	0.338	8.931	13.680	44.734	-0.103	11.303	-0.009	388.244	12.917
GMF	WH	66.488	154.640	2.067	9.850	1.462	0.098	182.743	10.232	2.314	0.260	9.865	13.106	33.213	-0.103	10.300	-0.013	225.312	4.833

Table S6. MAIDEN calibrated parameters values (Table S3) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites and five aggregated Eastern Canadian taiga sites (20CRv2c corr. (2°) climatic dataset, Fig. 1, Table 2).

Dataset	Site	GDD1	vegphase23	day23_flex	CanopyP	CanopyT	PercentFull	OutMax	OutLength	Cbud	h3	st4temp	photoper	Vmax	Vb	Vip	soilb	soilip	tau
20CRv2c corr.	QC_taiga	113.370	152.798	8.744	0.222	16.280	0.147	171.699	7.445	1.342	0.998	90.354	13.635	27.746	-0.102	12.668	-0.006	142.220	11.427
20CRv2c corr.	WCORPL	67.994	167.436	7.342	11.186	15.686	0.111	167.320	11.872	1.700	0.129	87.342	12.581	32.381	-0.109	21.452	-0.010	214.488	17.015
20CRv2c corr.	WNFLR1	78.261	174.734	6.191	2.768	8.093	0.092	162.590	5.851	1.877	0.192	58.798	13.299	65.388	-0.122	15.216	-0.023	287.940	2.384
20CRv2c corr.	WL42	29.260	178.089	9.434	13.527	17.155	0.093	167.099	11.168	1.024	0.954	4.132	13.363	30.286	-0.113	11.358	-0.022	357.574	19.205
20CRv2c corr.	WCORILE	12.599	174.353	6.890	0.700	4.433	0.129	195.443	9.126	1.850	0.930	85.955	13.050	53.561	-0.296	10.832	-0.025	365.462	6.040
20CRv2c corr.	WPOOL	112.458	180.716	8.072	14.904	17.606	0.097	198.678	11.974	1.244	0.120	25.553	13.383	78.202	-0.130	29.083	-0.017	182.063	4.687
20CRv2c corr.	WNIT	19.219	176.941	6.150	12.806	9.017	0.136	151.973	11.449	2.039	0.427	35.933	13.733	134.551	-0.269	16.502	-0.024	390.727	9.147
20CRv2c corr.	WCANE	78.482	167.604	9.756	10.507	8.310	0.099	164.636	11.268	2.186	0.994	90.511	12.379	51.995	-0.289	16.932	-0.019	236.149	13.742
20CRv2c corr.	WCEA	81.167	178.414	7.441	0.210	15.923	0.116	169.741	4.922	1.348	0.389	75.341	13.536	58.210	-0.127	23.997	-0.012	382.036	5.418
20CRv2c corr.	WDA1R	104.308	160.431	3.691	5.556	7.740	0.140	161.868	10.006	1.481	0.659	1.507	13.440	104.597	-0.103	21.727	-0.023	344.532	6.344
20CRv2c corr.	WHER	63.043	166.470	2.476	17.934	16.531	0.091	177.202	10.553	1.785	0.195	61.706	13.385	15.438	-0.113	10.067	-0.021	314.001	14.469
20CRv2c corr.	WHH1	89.238	162.196	2.490	14.260	5.373	0.113	184.458	10.997	1.528	0.299	16.712	13.163	35.179	-0.100	24.270	-0.022	257.149	1.324
20CRv2c corr.	WHM1	89.658	165.179	2.332	15.537	19.911	0.097	174.207	11.409	1.661	0.047	98.363	12.489	124.366	-0.154	29.038	-0.012	233.181	3.418
20CRv2c corr.	WHM2	110.167	170.088	4.846	0.043	12.045	0.105	165.444	7.855	1.318	0.274	34.803	12.197	19.156	-0.111	16.353	-0.023	167.282	7.595
20CRv2c corr.	WL32	116.547	178.676	5.965	5.265	15.111	0.092	184.089	10.907	1.766	0.053	58.663	13.483	42.173	-0.269	16.806	-0.014	145.674	1.660
20CRv2c corr.	WLECA	90.354	180.902	5.626	11.212	8.273	0.109	199.300	7.751	1.013	0.010	49.618	12.033	22.119	-0.212	13.036	-0.015	313.818	12.315
20CRv2c corr.	WNFL1V	40.318	179.836	6.997	1.668	9.648	0.129	171.170	8.712	1.515	0.137	57.226	12.209	30.784	-0.127	20.251	-0.012	171.664	9.904
20CRv2c corr.	WROZM	63.805	164.546	2.513	2.971	13.699	0.101	169.451	11.196	1.358	0.154	70.833	12.796	15.280	-0.103	11.943	-0.017	153.426	18.963
20CRv2c corr.	WROZX	11.256	158.783	1.475	6.717	11.490	0.100	169.016	8.972	1.305	0.162	68.989	13.289	15.439	-0.129	12.107	-0.022	197.314	15.718
20CRv2c corr.	WRT485	102.122	173.485	9.331	3.189	13.364	0.121	181.631	11.174	1.024	0.318	3.755	12.111	67.786	-0.127	27.347	-0.005	366.987	3.936
20CRv2c corr.	WTHH	48.844	171.447	6.643	0.289	9.060	0.139	170.923	8.826	1.182	0.534	7.378	12.208	21.961	-0.136	16.102	-0.010	143.590	3.259
20CRv2c corr.	WCOR	56.468	179.615	3.574	16.008	1.242	0.114	157.886	7.560	2.017	0.263	14.179	13.968	102.747	-0.115	16.294	-0.019	397.049	10.996
20CRv2c corr.	WNFL	20.771	164.646	4.922	5.208	12.450	0.127	155.527	11.352	2.304	0.078	63.865	12.954	39.707	-0.116	17.774	-0.016	211.665	3.658
20CRv2c corr.	WDA1R_WTHH	59.728	175.202	8.912	7.291	15.136	0.110	168.798	10.731	1.586	0.169	25.445	12.855	72.407	-0.127	13.938	-0.019	382.916	3.795
20CRv2c corr.	WROZ	19.524	173.178	3.238	19.948	17.295	0.091	151.863	8.737	1.837	0.247	61.332	12.374	89.821	-0.107	14.736	-0.021	397.978	15.062
20CRv2c corr.	WH	119.083	165.796	1.176	2.114	8.057	0.104	184.843	11.733	2.771	0.067	18.052	13.788	76.144	-0.105	22.057	-0.006	328.383	1.022

Table S7. MAIDEN calibrated parameters values (Table S3) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites and five aggregated Eastern Canadian taiga sites (20CRv2c (2°) climatic dataset, Fig. 1, Table 2).

Dataset	Site	GDD1	vegphase23	day23_flex	CanopyP	CanopyT	PercentFall	OutMax	OutLength	Cbud	h3	st4temp	photoper	Vmax	Vb	Vip	soilb	soilip	tau
20CRv2c	QC_taiga	75.720	162.168	9.429	3.806	4.436	0.142	161.784	7.128	2.868	0.947	95.218	13.485	22.246	-0.157	13.200	-0.008	397.024	2.846
20CRv2c	WCORPL	44.431	158.330	7.142	2.826	19.045	0.099	187.010	5.206	1.043	0.026	36.677	13.618	103.760	-0.116	20.246	-0.018	374.728	19.391
20CRv2c	WNFLR1	75.809	167.038	1.718	13.416	9.042	0.111	179.207	11.314	1.385	0.099	84.442	13.892	39.007	-0.135	18.911	-0.006	369.090	2.293
20CRv2c	WL42	83.970	161.752	3.598	18.021	15.015	0.117	196.304	10.705	1.179	0.471	89.359	12.869	21.043	-0.193	11.375	-0.022	248.490	12.055
20CRv2c	WCORILE	101.474	154.897	6.015	7.926	5.971	0.099	167.905	11.464	1.061	0.057	35.086	12.627	68.195	-0.152	14.843	-0.017	397.308	11.180
20CRv2c	WPOOL	107.070	163.868	5.215	12.717	14.609	0.097	181.672	11.563	1.112	0.119	38.952	12.915	20.150	-0.206	12.698	-0.015	181.127	12.122
20CRv2c	WNIT	46.340	174.983	5.523	0.065	19.960	0.135	170.592	11.654	1.573	0.321	26.871	13.769	16.621	-0.275	10.872	-0.010	130.537	18.718
20CRv2c	WCANE	117.593	165.327	6.518	9.262	8.489	0.095	190.972	5.377	1.301	1.000	55.147	13.234	24.946	-0.191	15.154	-0.018	212.148	15.867
20CRv2c	WCEA	16.999	178.818	2.874	3.271	4.543	0.104	168.800	7.396	1.062	0.250	85.997	12.675	19.907	-0.270	10.342	-0.020	358.779	9.664
20CRv2c	WDA1R	44.501	175.164	5.003	11.839	13.155	0.108	170.377	9.474	1.092	0.243	81.989	12.506	84.785	-0.112	17.687	-0.022	348.379	1.489
20CRv2c	WHER	55.843	154.795	8.234	8.967	17.999	0.097	180.100	11.782	1.427	0.310	54.276	12.896	16.450	-0.101	13.173	-0.017	202.653	15.885
20CRv2c	WHH1	115.526	170.285	2.370	12.582	17.775	0.119	189.149	10.913	1.159	0.309	17.661	13.287	38.614	-0.139	21.284	-0.020	211.300	3.248
20CRv2c	WHM1	66.111	172.640	8.305	0.824	4.900	0.091	193.059	11.798	1.214	0.164	18.974	13.369	28.720	-0.181	16.652	-0.008	287.187	2.558
20CRv2c	WHM2	116.989	170.119	8.727	6.623	1.158	0.150	194.261	11.175	1.263	0.389	59.636	12.473	29.252	-0.129	18.507	-0.011	169.127	1.643
20CRv2c	WL32	15.396	176.894	2.706	6.839	15.526	0.122	170.542	11.614	1.120	0.182	87.455	13.711	110.276	-0.295	14.399	-0.022	353.621	1.233
20CRv2c	WLECA	100.826	174.227	3.438	17.519	17.296	0.096	186.546	10.267	1.244	0.302	37.580	12.352	27.111	-0.132	18.973	-0.023	179.091	1.122
20CRv2c	WNFL1V	79.176	173.450	1.076	16.285	11.663	0.129	158.549	7.783	1.072	0.293	85.854	12.496	57.088	-0.263	11.029	-0.021	338.566	2.186
20CRv2c	WROZM	83.289	168.105	1.265	14.963	12.219	0.094	166.930	10.533	1.808	0.291	40.019	12.166	19.213	-0.115	10.790	-0.006	306.374	3.024
20CRv2c	WROZX	24.634	167.104	2.377	4.668	10.024	0.125	174.838	11.551	1.205	0.147	93.212	13.551	47.811	-0.106	26.302	-0.013	183.486	19.587
20CRv2c	WRT485	103.114	171.036	1.519	11.590	19.660	0.098	185.015	11.226	1.171	0.134	19.026	12.543	126.788	-0.159	28.423	-0.014	238.127	1.085
20CRv2c	WTHH	45.979	154.621	7.085	13.906	8.149	0.117	195.802	11.858	1.393	0.700	63.045	13.618	41.220	-0.106	25.134	-0.006	127.995	6.676
20CRv2c	WCOR	89.792	169.235	3.771	8.555	10.056	0.110	190.627	10.764	1.682	0.433	10.341	13.024	119.892	-0.145	13.926	-0.019	357.625	16.816
20CRv2c	WNFL	81.661	173.171	2.122	18.413	9.513	0.102	180.427	11.517	1.867	0.064	57.458	13.358	36.924	-0.103	15.964	-0.006	292.632	14.260
20CRv2c	WDA1R_WTHH	118.615	156.106	2.599	0.986	19.844	0.101	176.546	11.917	1.675	0.301	14.910	12.911	100.050	-0.109	15.932	-0.015	372.220	19.135
20CRv2c	WROZ	81.338	152.814	7.145	0.332	5.040	0.117	186.358	11.717	1.722	0.214	53.164	12.543	-0.122	10.222	-0.009	394.353	15.502	
20CRv2c	WH	97.027	168.575	6.833	17.466	8.474	0.092	187.697	11.841	2.264	0.032	70.550	13.202	57.902	-0.106	17.880	-0.005	118.539	1.771

Table S8. VS-Lite calibrated parameters values (Sect. 2.3.2) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites (NRCAN (5') climatic dataset, Fig. 1a, Table 2) and three European sites (GHCN station data, Fig. 2, Table 2).

Dataset	Sites	T1	T2	M1	M2
NRCAN	QC_taiga	2.430	15.727	0.053	0.429
NRCAN	WCORPL	4.612	12.497	0.035	0.275
NRCAN	WNFLR1	4.914	11.493	0.033	0.357
NRCAN	WL42	7.259	11.658	0.070	0.457
NRCAN	WCORILE	3.058	12.002	0.032	0.194
NRCAN	WPOOL	7.899	11.514	0.066	0.194
NRCAN	WNIT	7.876	12.118	0.016	0.230
NRCAN	WCANE	7.264	11.557	0.077	0.171
NRCAN	WCEA	5.745	12.363	0.074	0.443
NRCAN	WDA1R	1.316	14.399	0.053	0.183
NRCAN	WHER	2.795	19.393	0.058	0.258
NRCAN	WHH1	7.490	11.677	0.007	0.190
NRCAN	WHM1	7.660	12.939	0.017	0.220
NRCAN	WHM2	8.843	12.165	0.040	0.168
NRCAN	WL32	7.642	13.785	0.013	0.231
NRCAN	WLECA	8.389	12.148	0.032	0.169
NRCAN	WNFL1V	3.575	11.542	0.086	0.465
NRCAN	WROZM	1.726	11.656	0.027	0.153
NRCAN	WROZX	6.170	11.382	0.070	0.473
NRCAN	WRT485	2.014	17.012	0.001	0.158
NRCAN	WTHH	3.996	13.065	0.020	0.119
GHCN	EALP	8.242	22.117	0.058	0.277
GHCN	SWIT179	1.480	21.912	0.052	0.294
GHCN	FINL045	2.517	19.159	0.007	0.120

Table S9. VS-Lite calibrated parameters values (Sect. 2.3.2) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites (GMF (1°) climatic dataset, Fig. 1a, Table 2).

Dataset	Sites	T1	T2	M1	M2
GMF	QC_taiga	7.934	20.259	0.036	0.210
GMF	WCORPL	2.574	12.366	0.027	0.233
GMF	WNFLR1	3.124	10.795	0.018	0.404
GMF	WL42	6.973	10.861	0.036	0.378
GMF	WCORILE	2.585	12.279	0.025	0.132
GMF	WPOOL	8.036	11.556	0.042	0.266
GMF	WNIT	8.193	13.365	0.028	0.219
GMF	WCANE	7.517	12.862	0.089	0.482
GMF	WCEA	6.072	11.476	0.080	0.469
GMF	WDA1R	1.613	22.429	0.003	0.318
GMF	WHER	4.808	12.558	0.040	0.439
GMF	WHH1	7.303	11.754	0.061	0.259
GMF	WHM1	2.750	13.427	0.009	0.223
GMF	WHM2	5.479	12.363	0.023	0.185
GMF	WL32	8.300	15.367	0.007	0.355
GMF	WLECA	7.638	11.770	0.017	0.464
GMF	WNFL1V	3.241	11.483	0.080	0.468
GMF	WROZM	1.867	15.193	0.060	0.386
GMF	WROZX	1.470	14.070	0.055	0.154
GMF	WRT485	1.141	17.046	0.075	0.386
GMF	WTHH	3.033	13.675	0.012	0.138

Table S10. VS-Lite calibrated parameters values (Sect. 2.3.2) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites (20CRv2c corr. (2°) climatic dataset, Fig. 1a, Table 2).

Dataset	Sites	T1	T2	M1	M2
20CRv2c corr.	QC_taiga	7.000	14.214	0.094	0.436
20CRv2c corr.	WCORPL	1.996	11.968	0.043	0.276
20CRv2c corr.	WNFLR1	2.443	19.159	0.011	0.246
20CRv2c corr.	WL42	7.672	11.259	0.080	0.447
20CRv2c corr.	WCORILE	3.102	12.325	0.056	0.254
20CRv2c corr.	WPOOL	6.812	10.631	0.005	0.221
20CRv2c corr.	WNIT	8.347	12.275	0.055	0.201
20CRv2c corr.	WCANE	8.277	12.194	0.017	0.200
20CRv2c corr.	WCEA	2.681	12.493	0.043	0.410
20CRv2c corr.	WDA1R	3.382	18.603	0.013	0.295
20CRv2c corr.	WHER	4.768	12.783	0.027	0.196
20CRv2c corr.	WHH1	7.464	11.322	0.058	0.116
20CRv2c corr.	WHM1	8.472	15.277	0.082	0.258
20CRv2c corr.	WHM2	8.383	18.934	0.053	0.218
20CRv2c corr.	WL32	8.446	14.245	0.011	0.108
20CRv2c corr.	WLECA	7.556	13.389	0.023	0.446
20CRv2c corr.	WNFL1V	3.803	15.342	0.011	0.168
20CRv2c corr.	WROZM	8.262	14.324	0.001	0.256
20CRv2c corr.	WROZX	8.633	14.984	0.017	0.262
20CRv2c corr.	WRT485	8.381	15.478	0.016	0.189
20CRv2c corr.	WTHH	3.802	15.778	0.033	0.105

Table S11. VS-Lite calibrated parameters values (Sect. 2.3.2) over the 1950-2000 period for the twenty-one Eastern Canadian taiga sites (20CRv2c (2°) climatic dataset, Fig. 1a, Table 2).

Dataset	Sites	T1	T2	M1	M2
20CRv2c	QC_taiga	8.378	13.382	0.036	0.319
20CRv2c	WCORPL	7.532	18.410	0.036	0.270
20CRv2c	WNFLR1	8.399	19.795	0.014	0.110
20CRv2c	WL42	6.012	10.591	0.031	0.314
20CRv2c	WCORILE	7.629	10.677	0.047	0.262
20CRv2c	WPOOL	7.219	10.537	0.076	0.281
20CRv2c	WNIT	7.990	12.538	0.035	0.267
20CRv2c	WCANE	7.118	10.445	0.015	0.279
20CRv2c	WCEA	5.313	15.658	0.019	0.238
20CRv2c	WDA1R	8.167	19.349	0.088	0.194
20CRv2c	WHER	3.440	17.681	0.062	0.366
20CRv2c	WHH1	6.951	19.205	0.051	0.366
20CRv2c	WHM1	7.395	22.139	0.031	0.266
20CRv2c	WHM2	7.551	18.823	0.024	0.212
20CRv2c	WL32	8.308	14.045	0.008	0.234
20CRv2c	WLECA	6.798	14.509	0.050	0.391
20CRv2c	WNFL1V	8.604	15.787	0.042	0.153
20CRv2c	WROZM	8.131	12.693	0.060	0.133
20CRv2c	WROZX	8.645	16.846	0.035	0.205
20CRv2c	WRT485	7.555	20.034	0.019	0.210
20CRv2c	WTHH	6.906	20.691	0.014	0.240

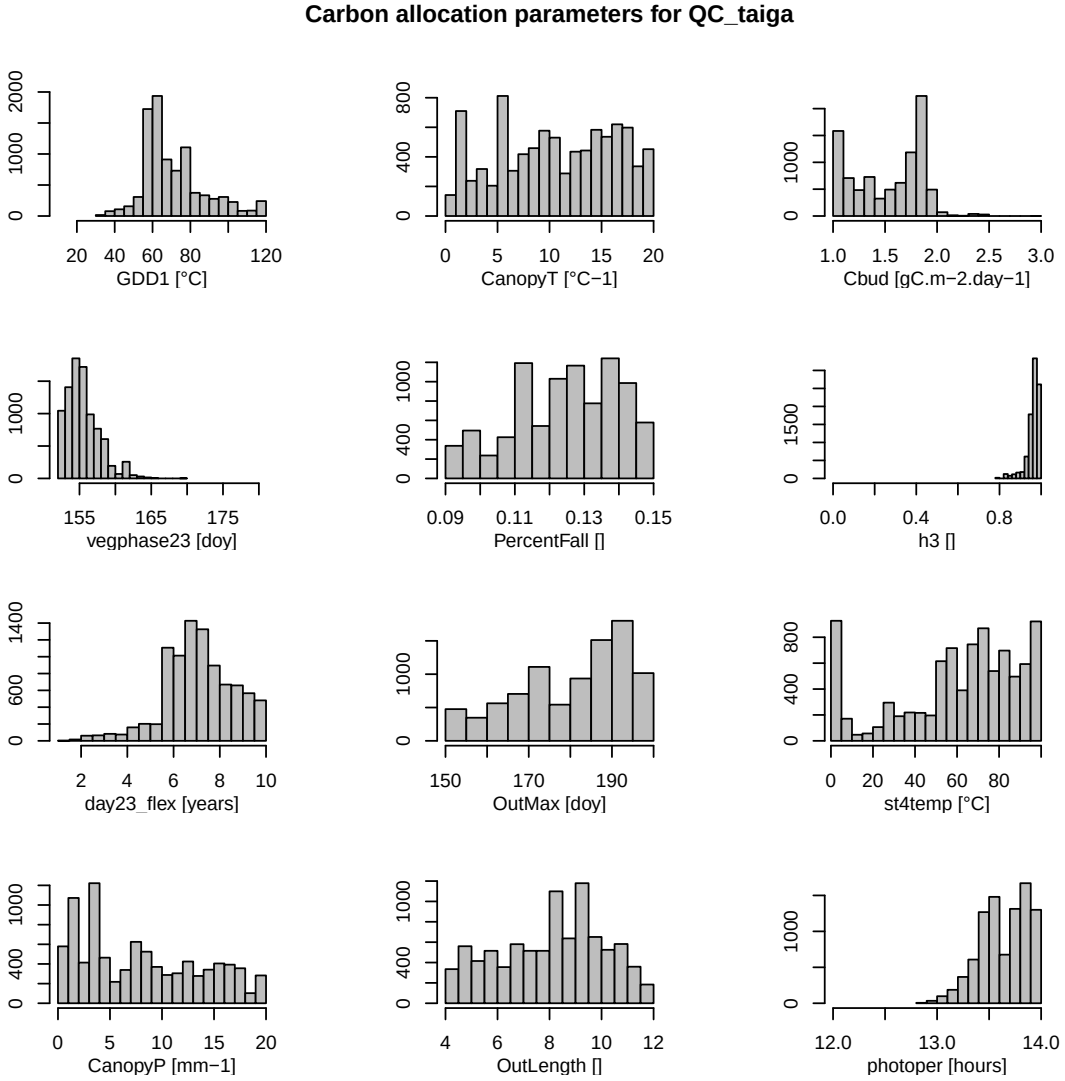


Figure S1. Posterior frequency distributions of carbon allocation parameters (Table S3) at QC_taiga site (NRCAN (5') climatic dataset) (Fig. 1a, Table 2) for the 1950-2000 calibration period.

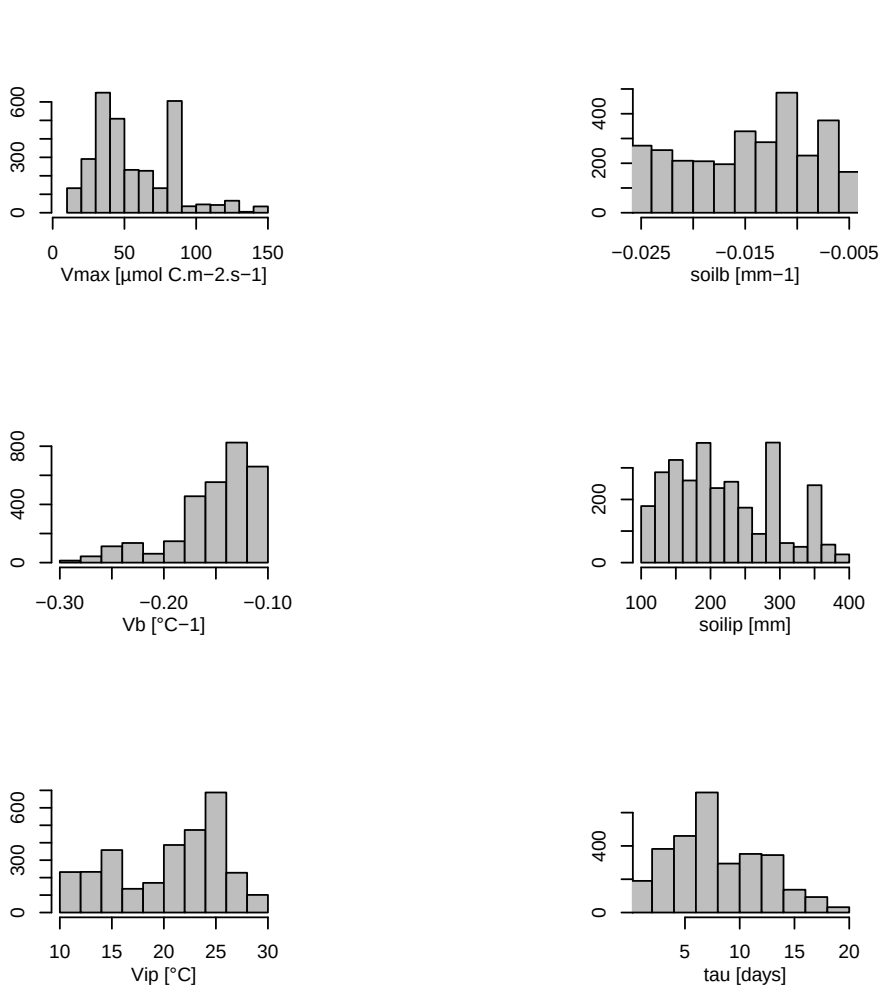


Figure S2. Posterior frequency distributions of photosynthesis parameters (Table S3) at QC_taiga site (NRCAN (5') climatic dataset) (Fig. 1a, Table 2) for the 1950-2000 calibration period.

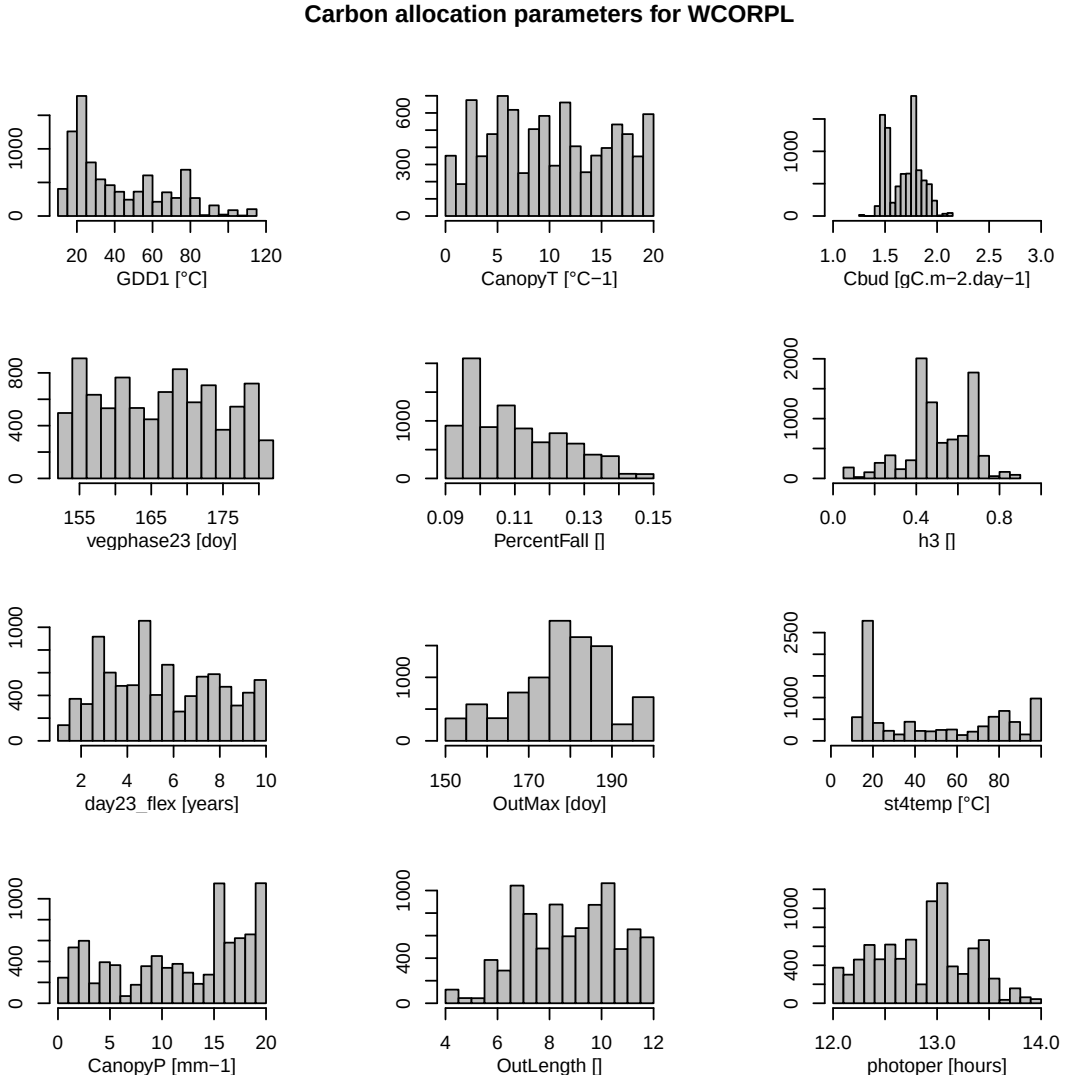


Figure S3. As in Fig. S1 at WCORPL site.

Figure S4. As in Fig. S2 at WCORPL site.

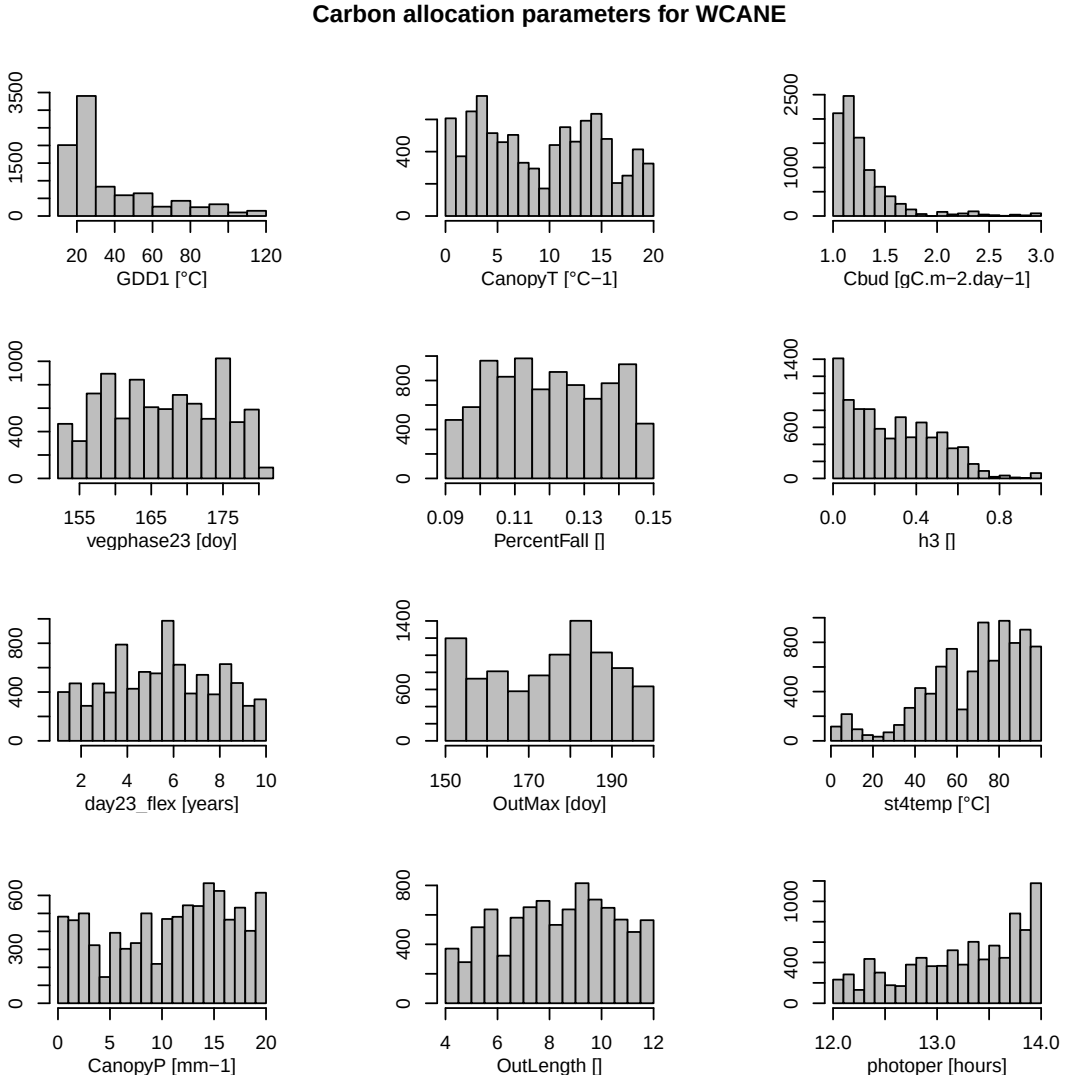


Figure S5. As in Fig. S1 at WCANE site.

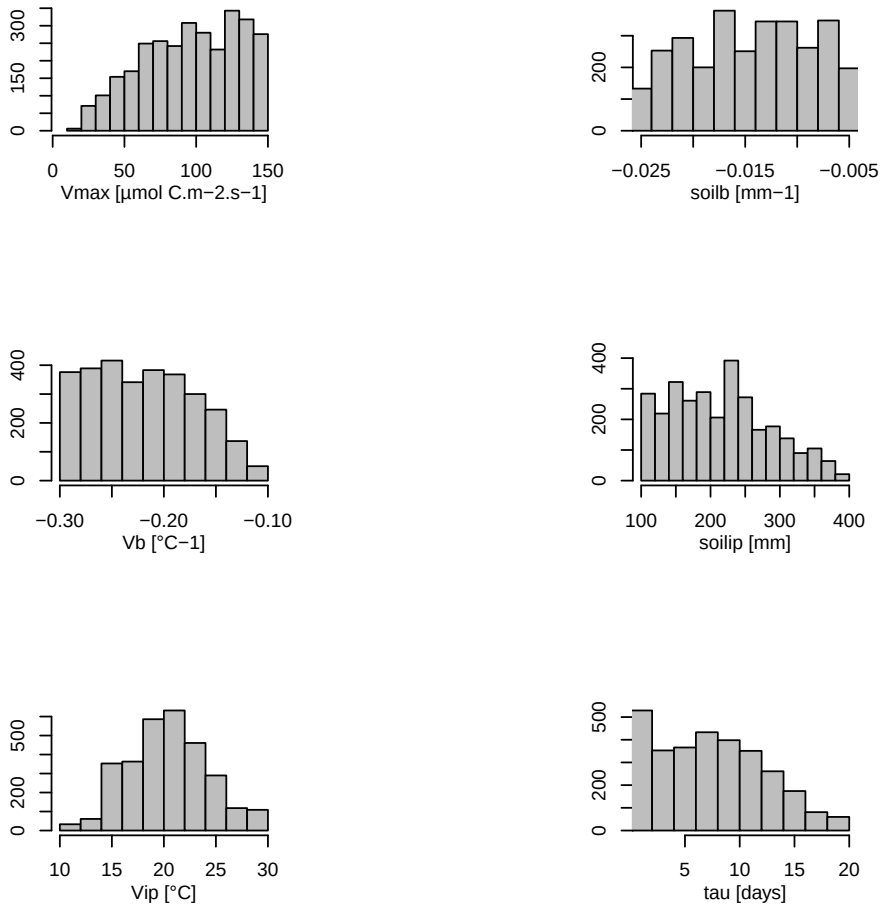


Figure S6. As in Fig. S2 at WCANE site.

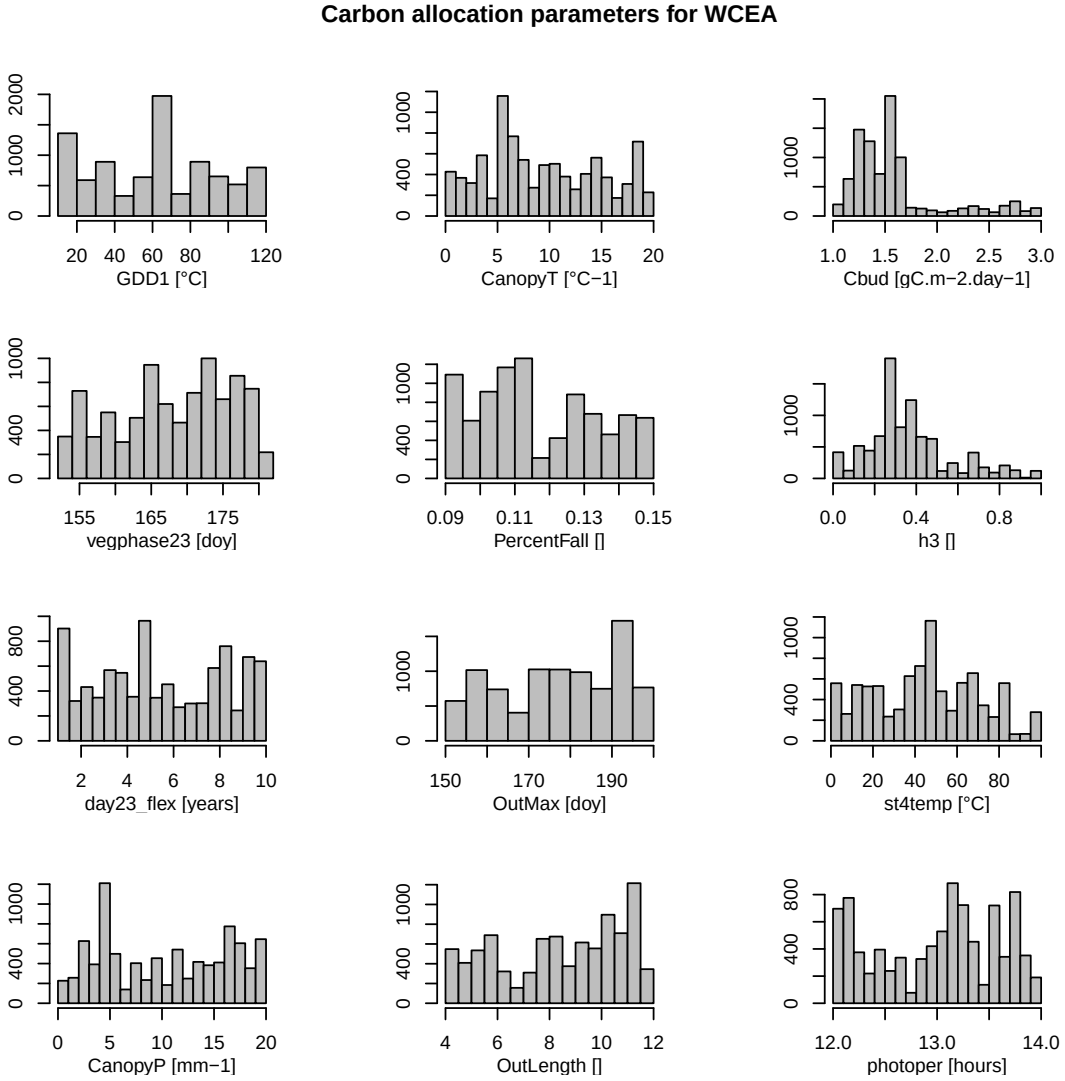


Figure S7. As in Fig. S1 at WCEA site.

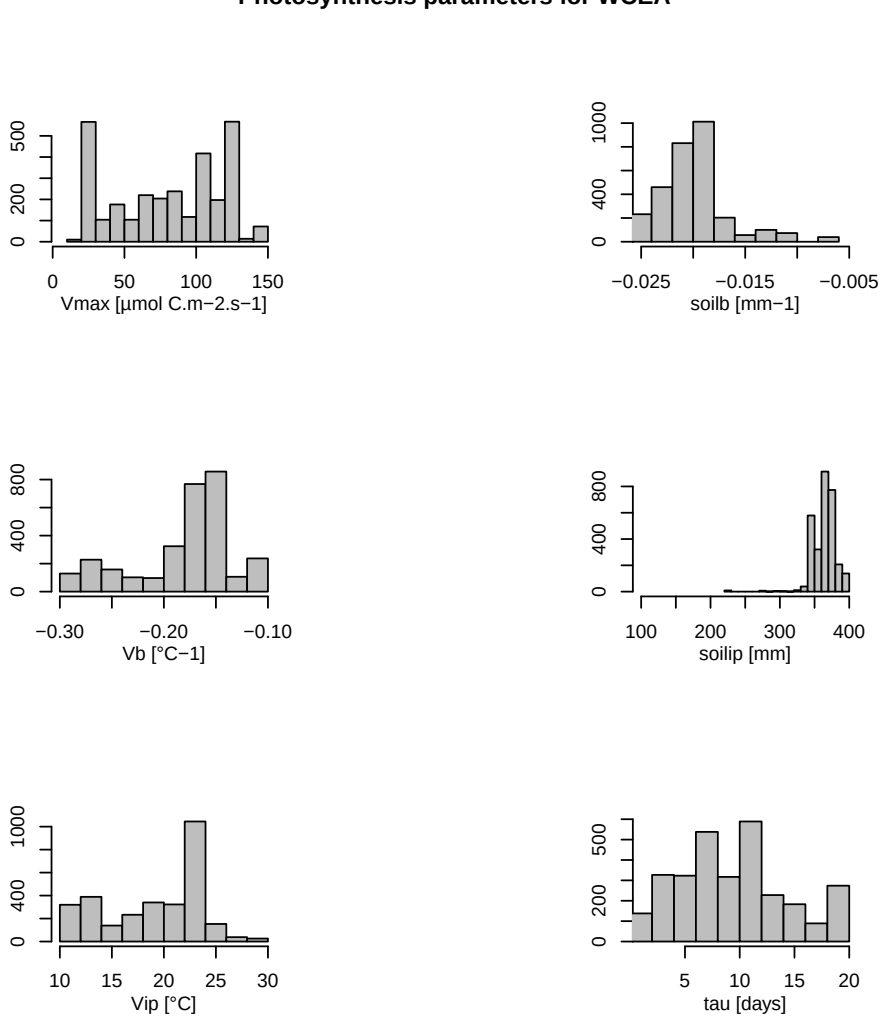


Figure S8. As in Fig. S2 at WCEA site.

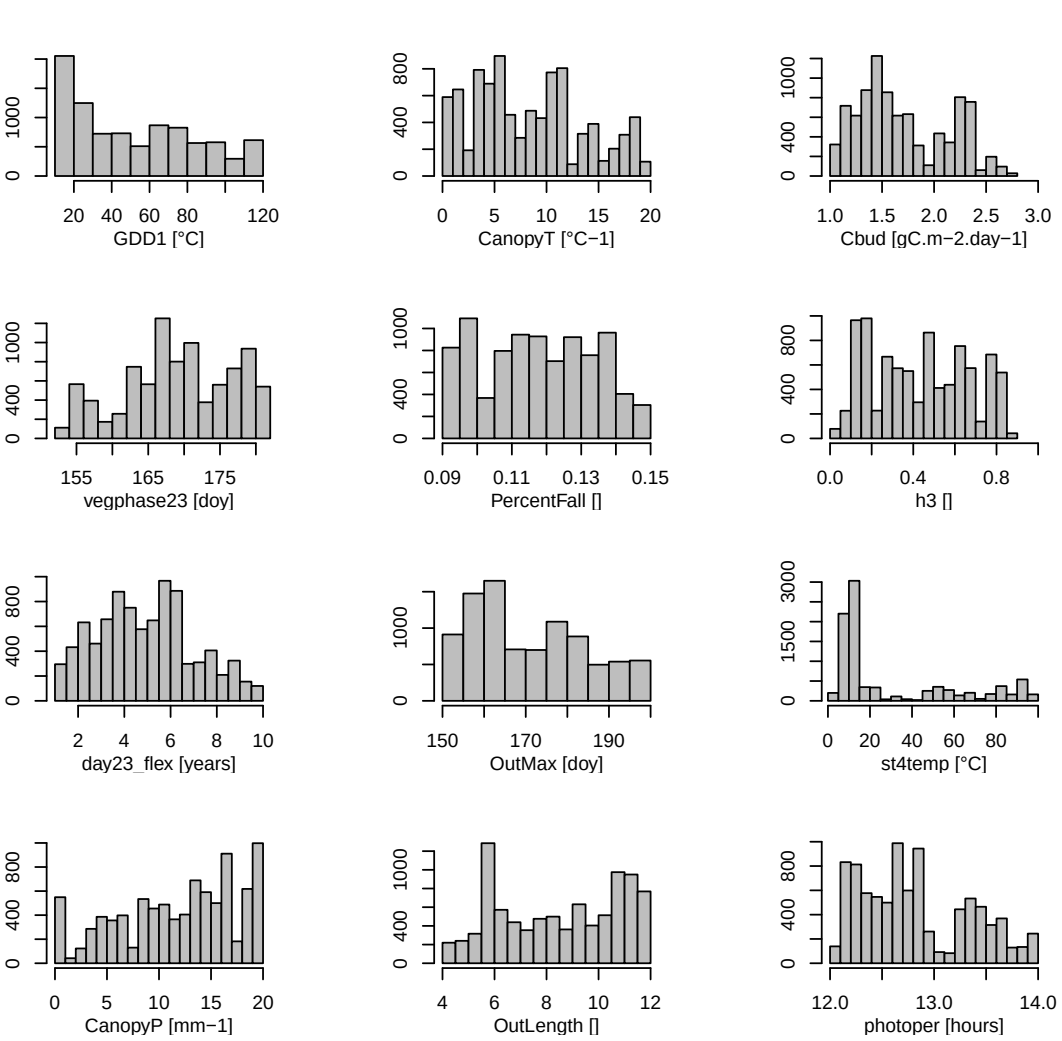


Figure S9. As in Fig. S1 at WCORILE site.

Figure S10. As in Fig. S2 at WCORILE site.

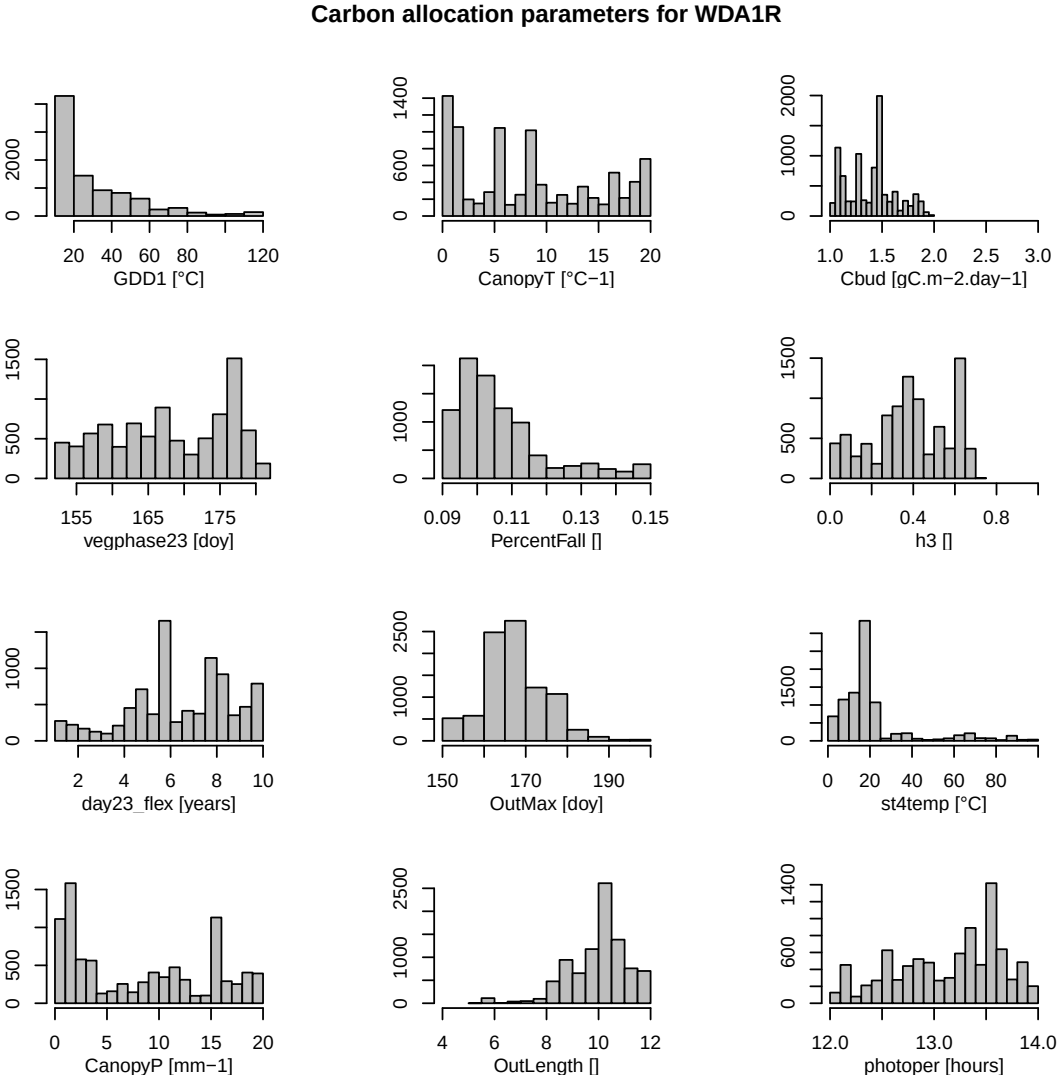


Figure S11. As in Fig. S1 at WDA1R site.

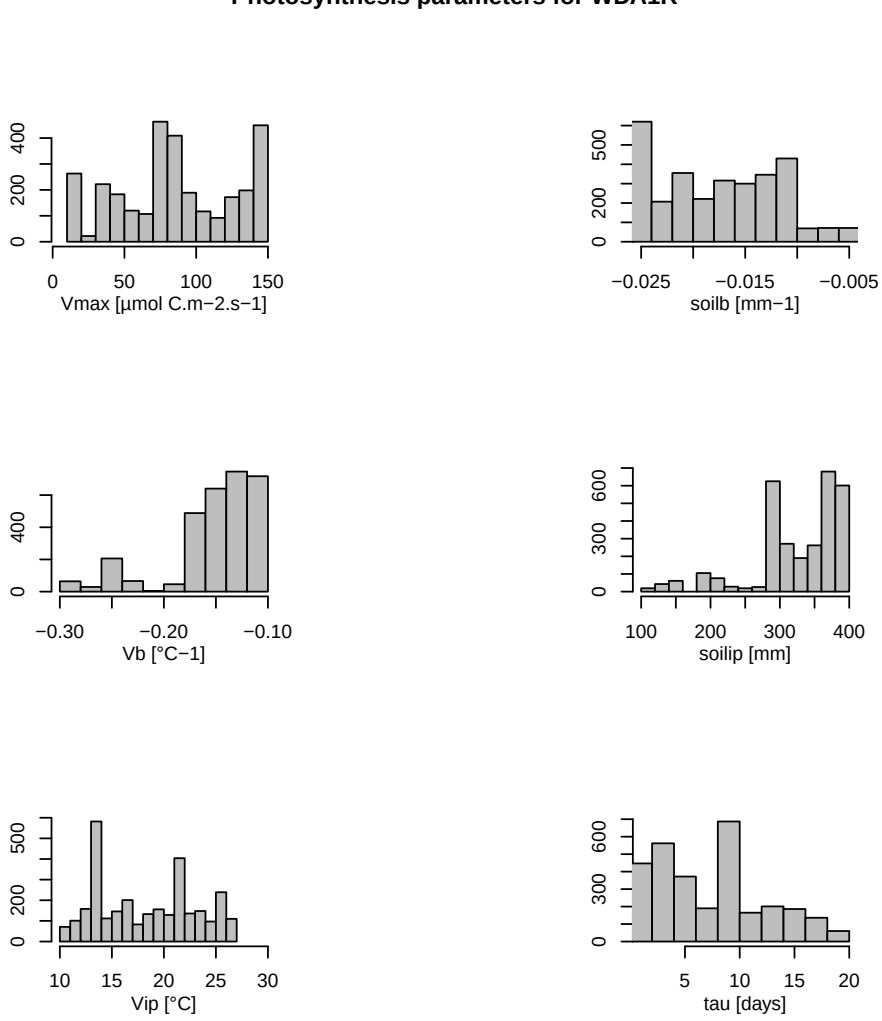


Figure S12. As in Fig. S2 at WDA1R site.

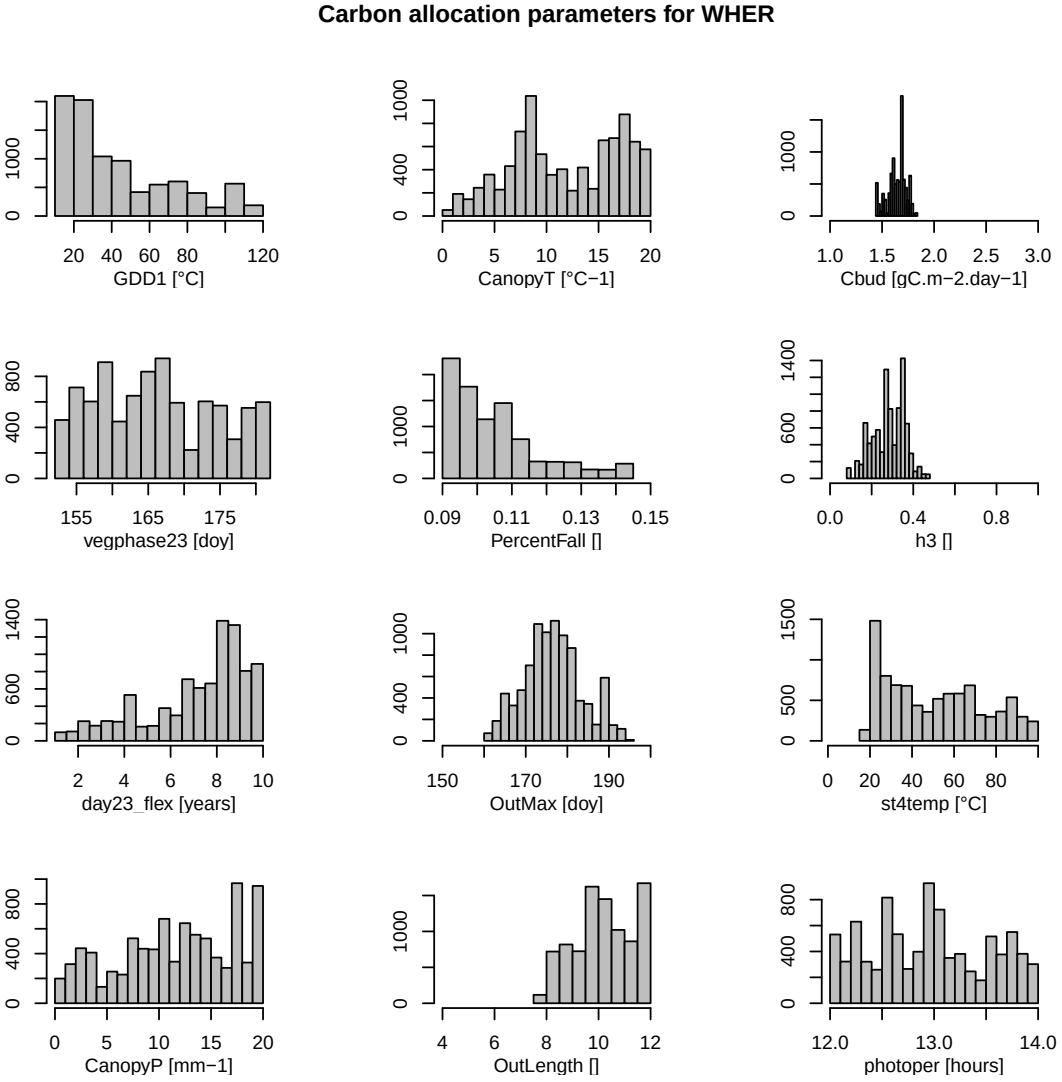


Figure S13. As in Fig. S1 at WHER site.

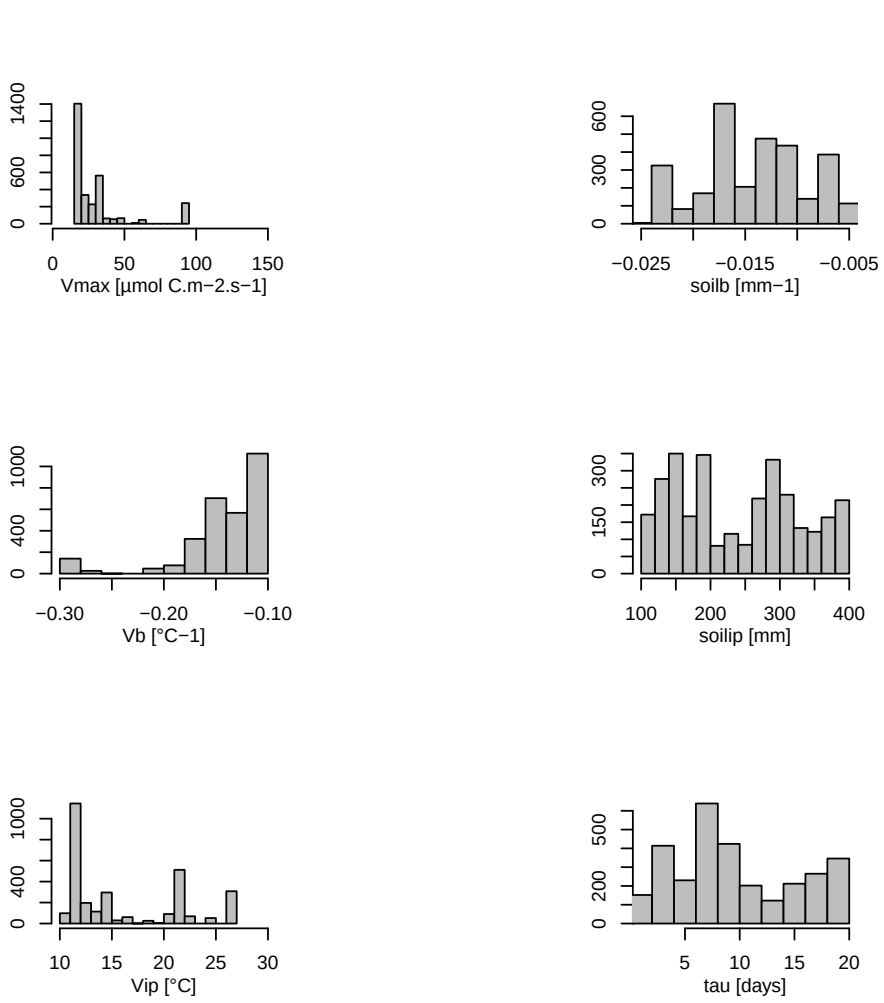


Figure S14. As in Fig. S2 at WHER site.

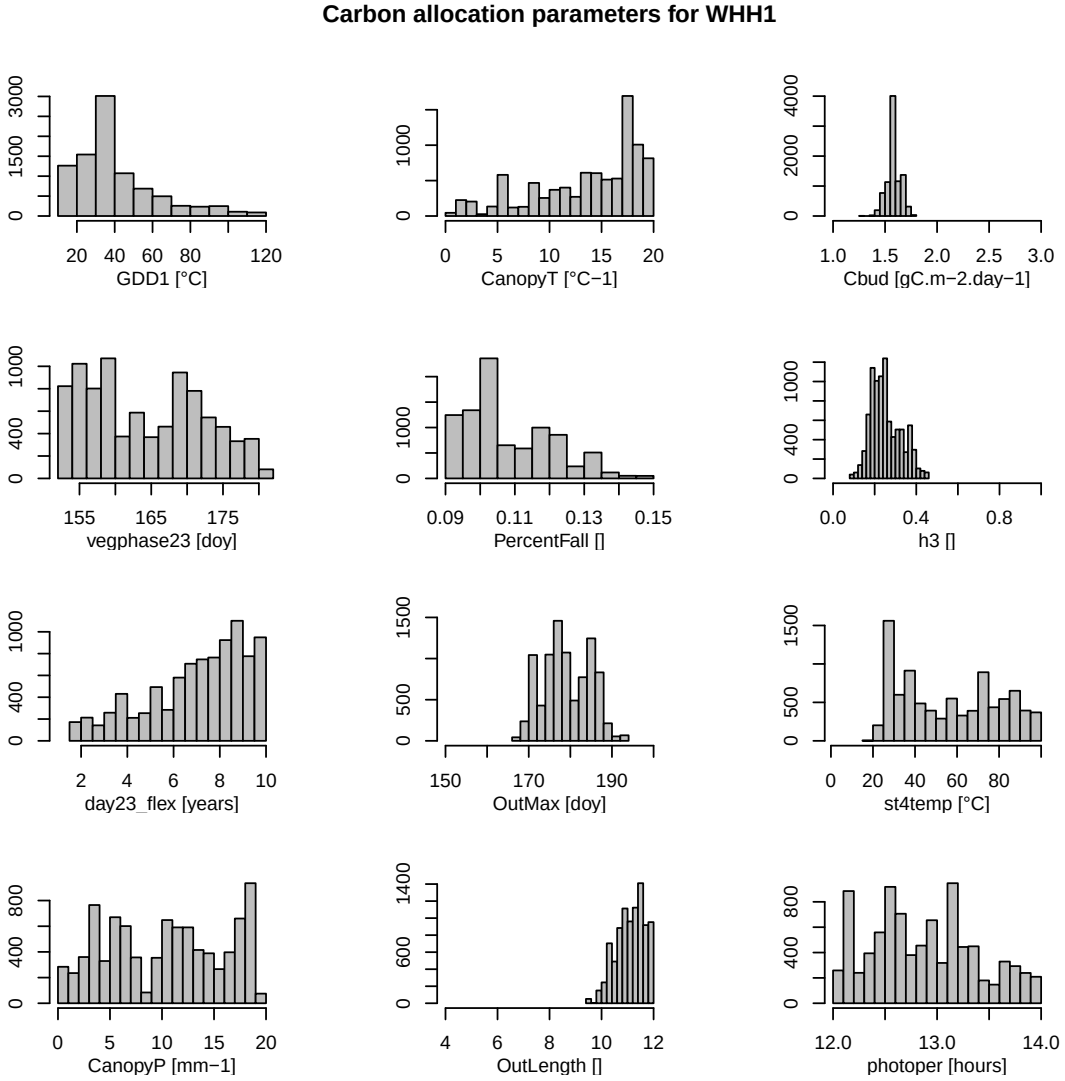


Figure S15. As in Fig. S1 at WHH1 site.

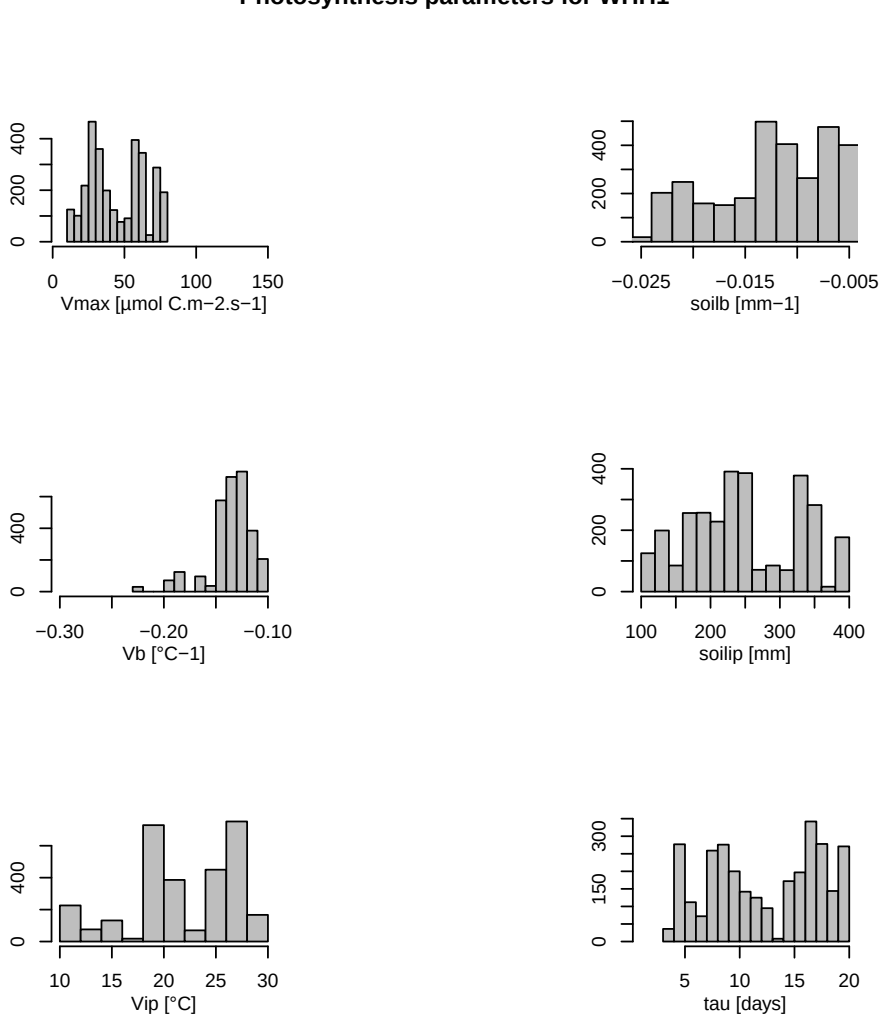


Figure S16. As in Fig. S2 at WHH1 site.

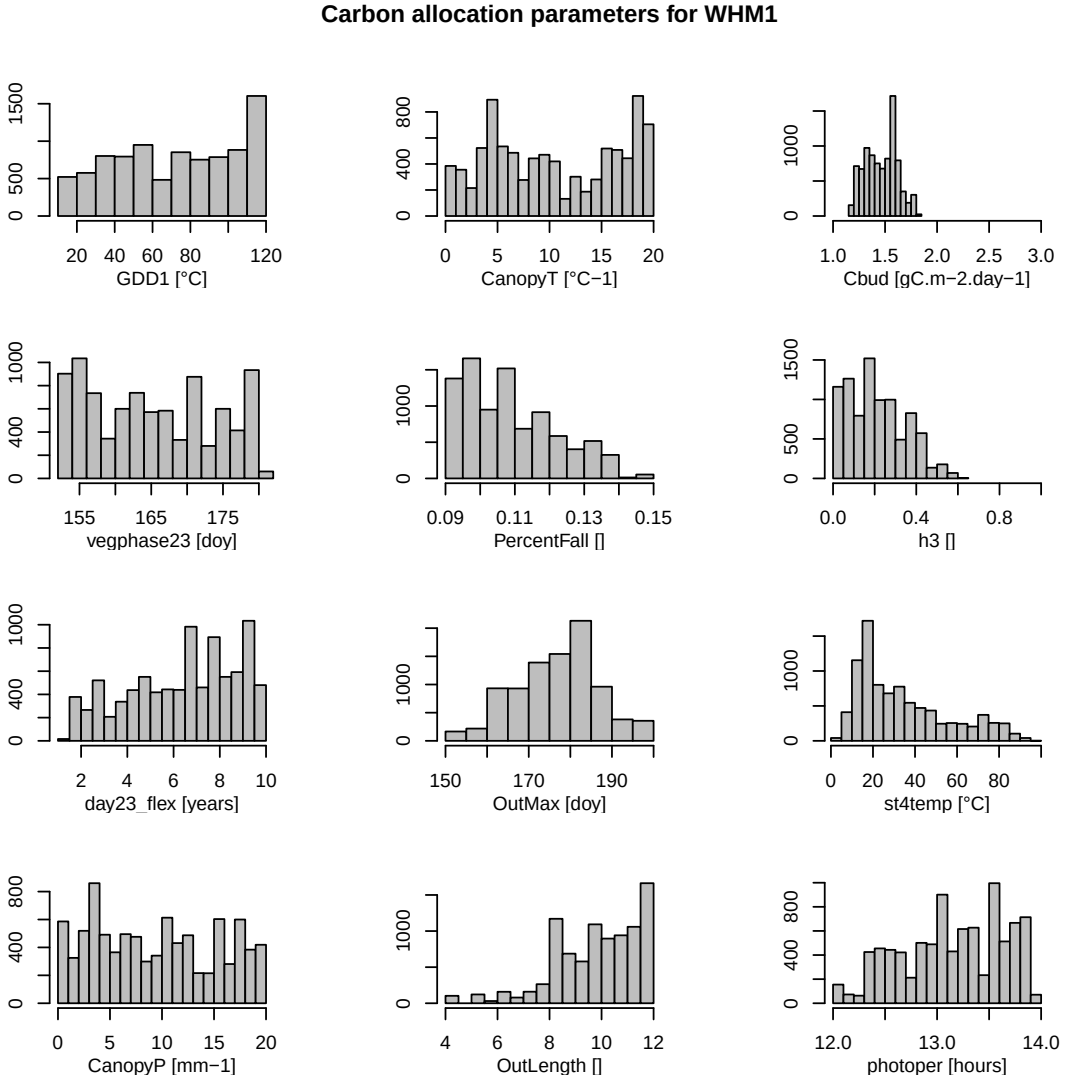


Figure S17. As in Fig. S1 at WHM1 site.

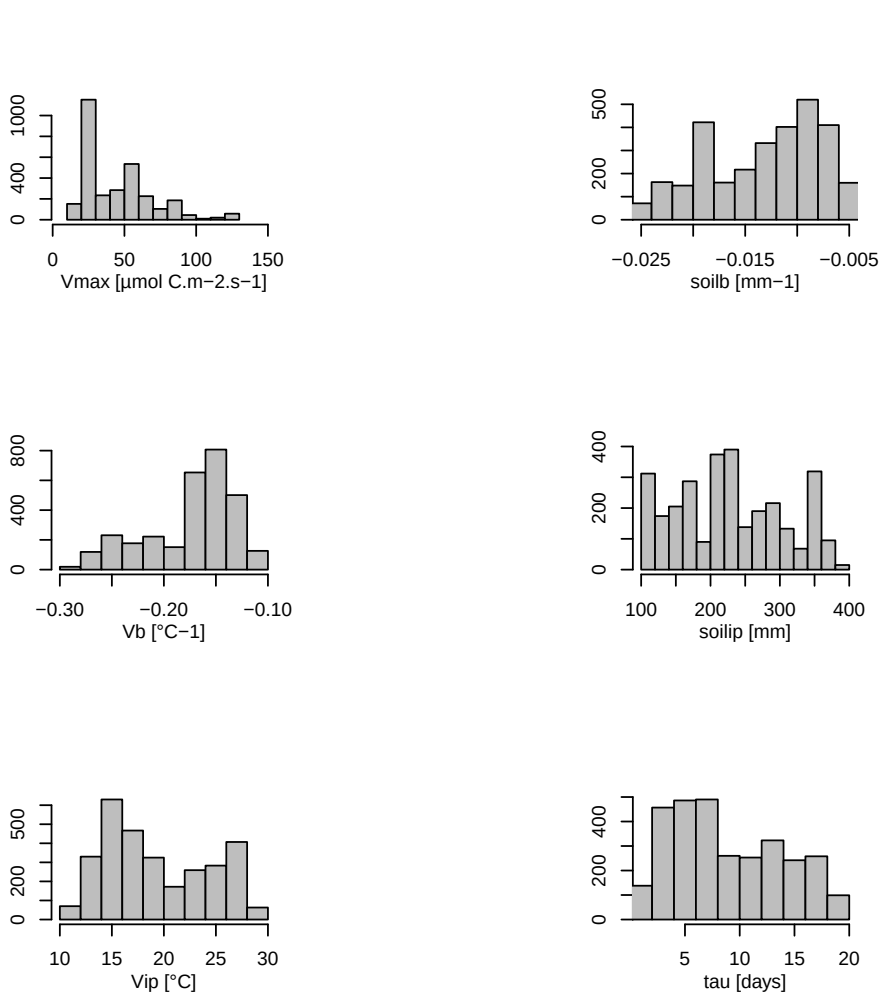


Figure S18. As in Fig. S2 at WHM1 site.

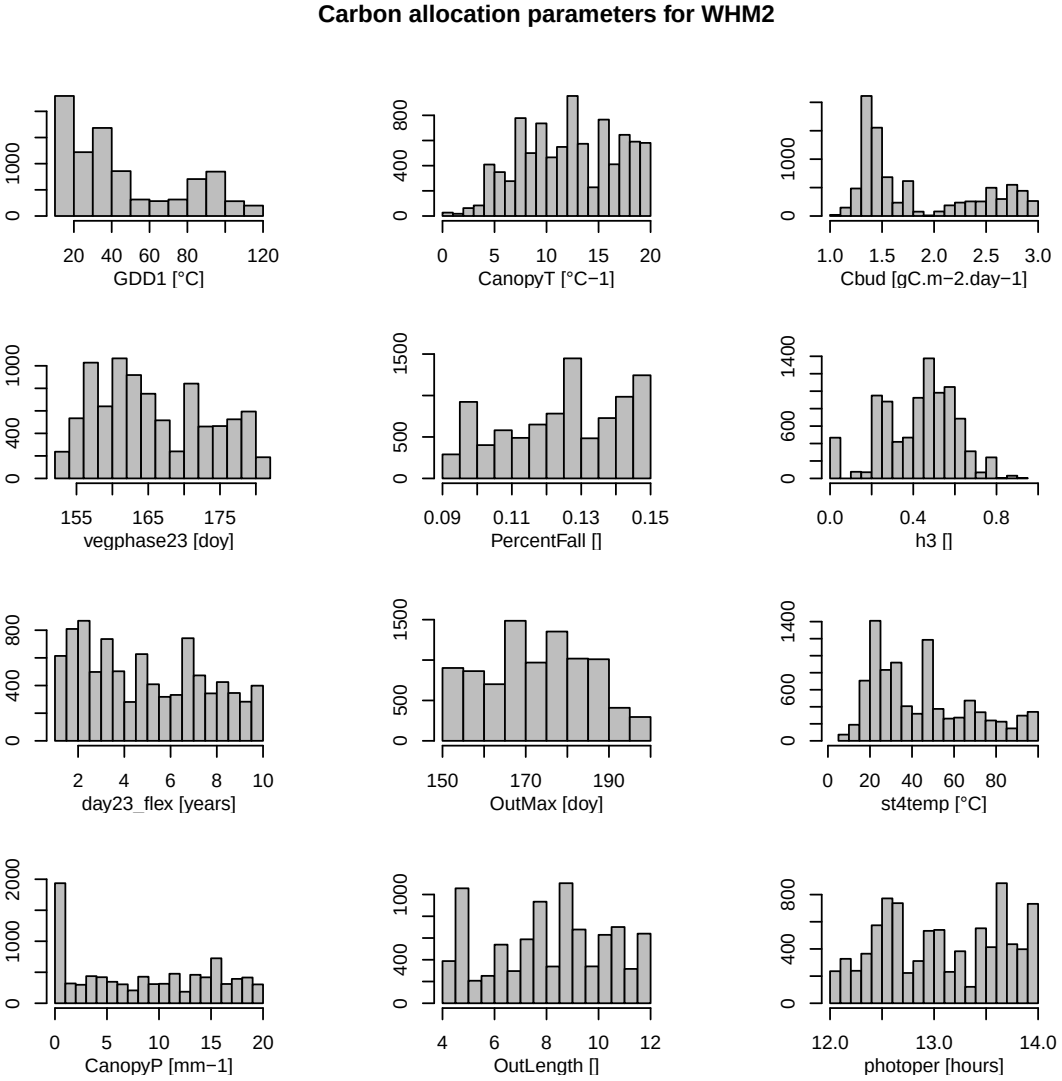


Figure S19. As in Fig. S1 at WHM2 site.

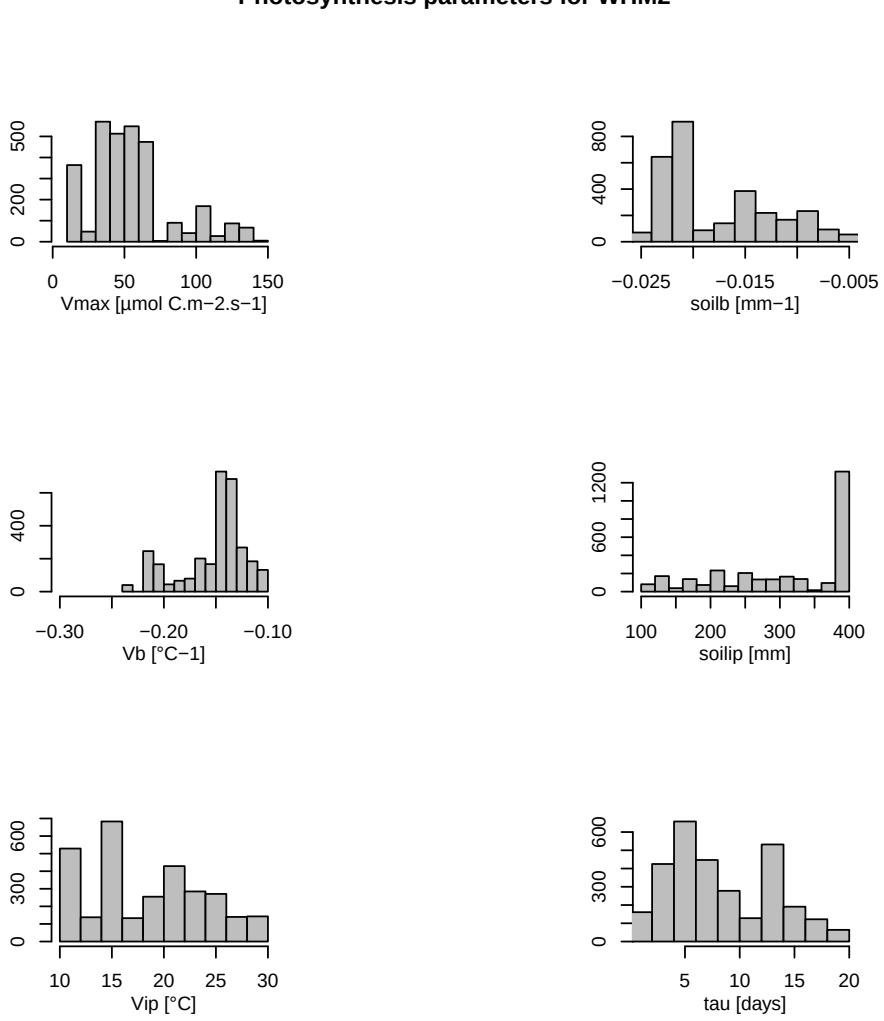


Figure S20. As in Fig. S2 at WHM2 site.

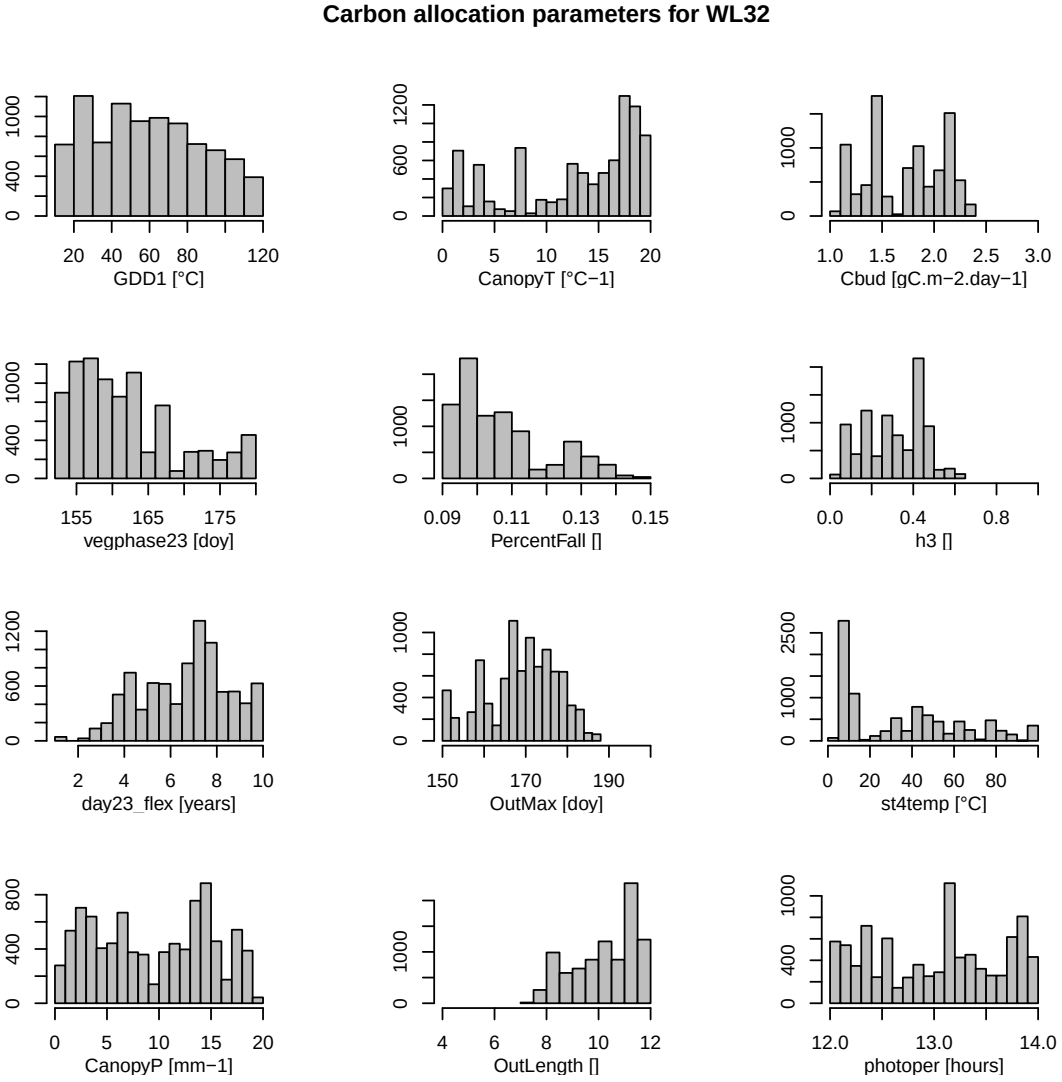


Figure S21. As in Fig. S1 at WL32 site.

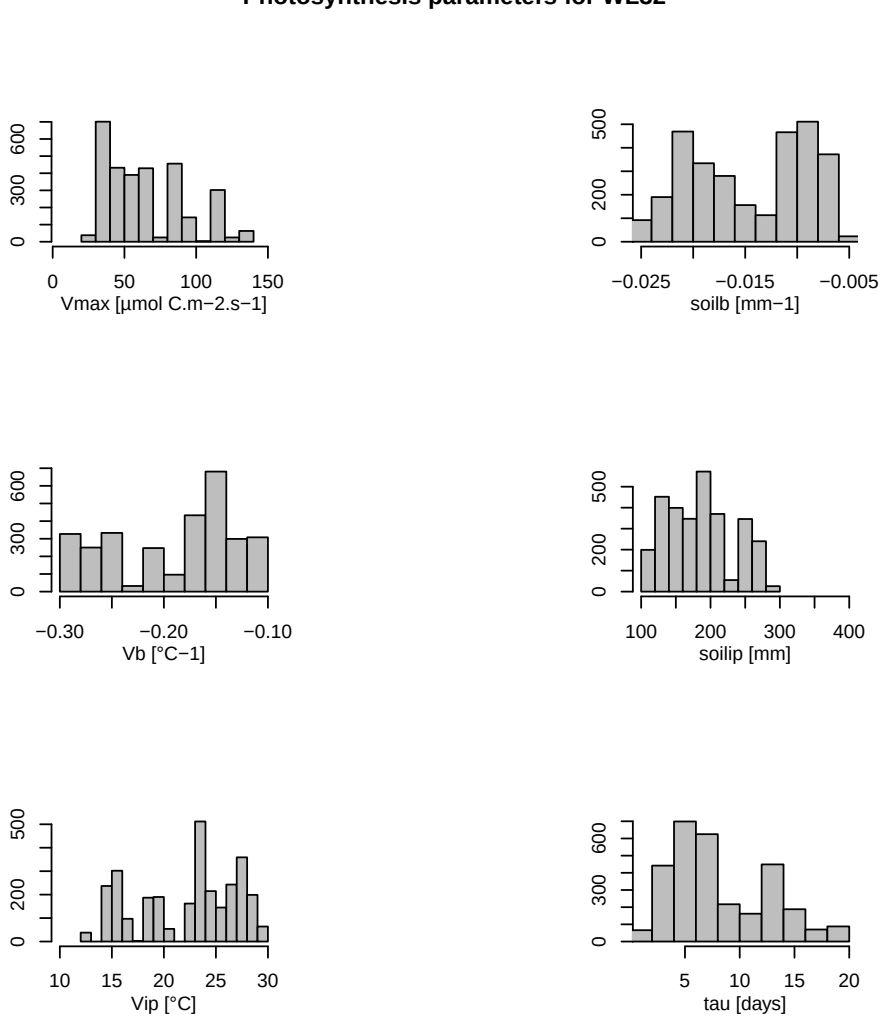


Figure S22. As in Fig. S2 at WL32 site.

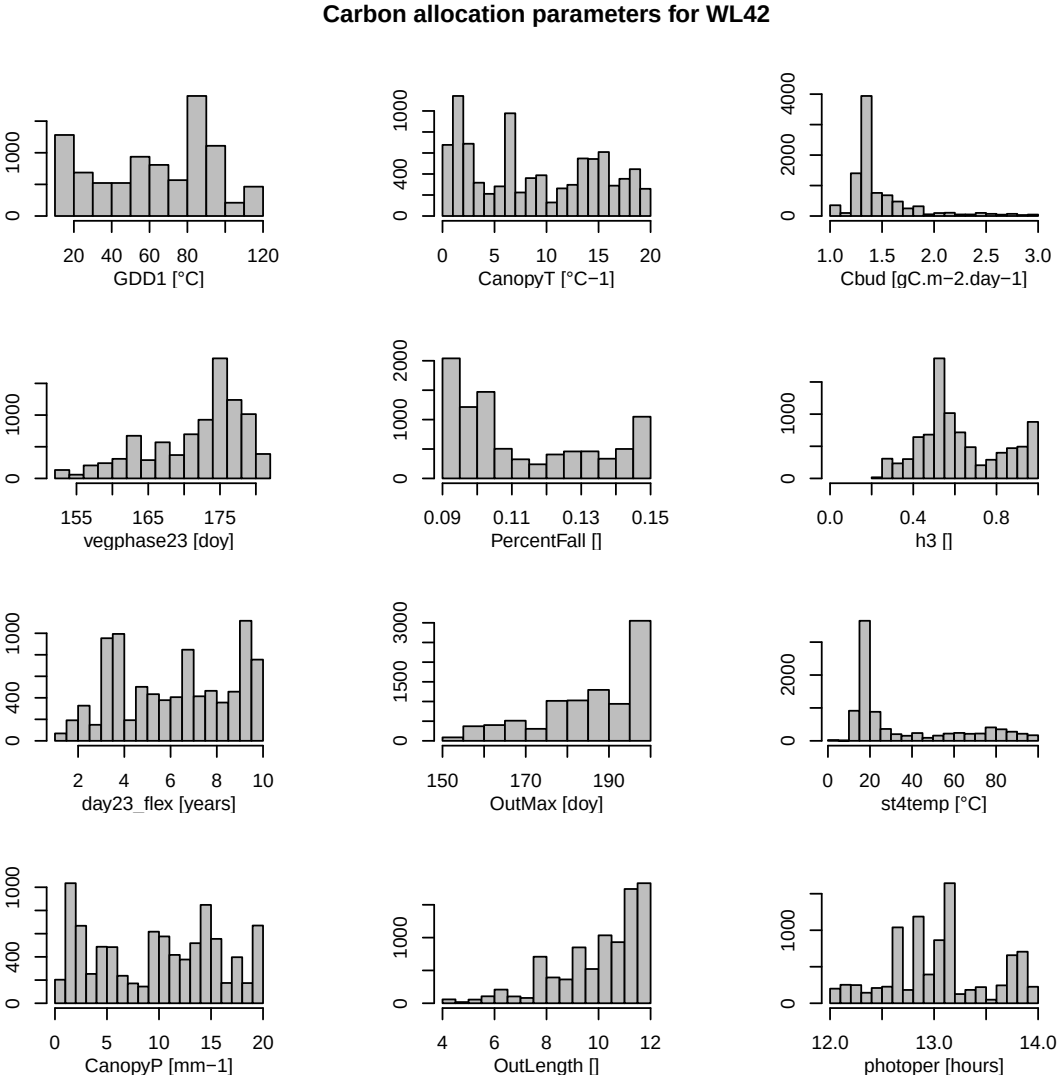


Figure S23. As in Fig. S1 at WL42 site.

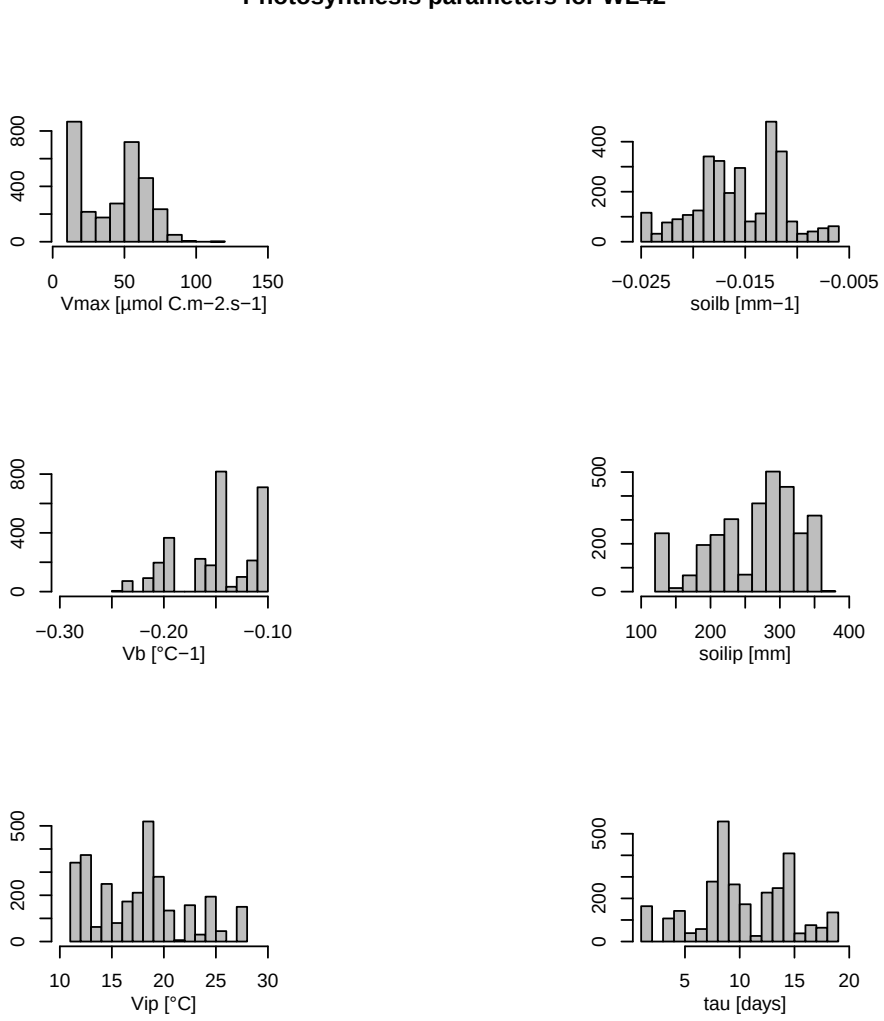


Figure S24. As in Fig. S2 at WL42 site.

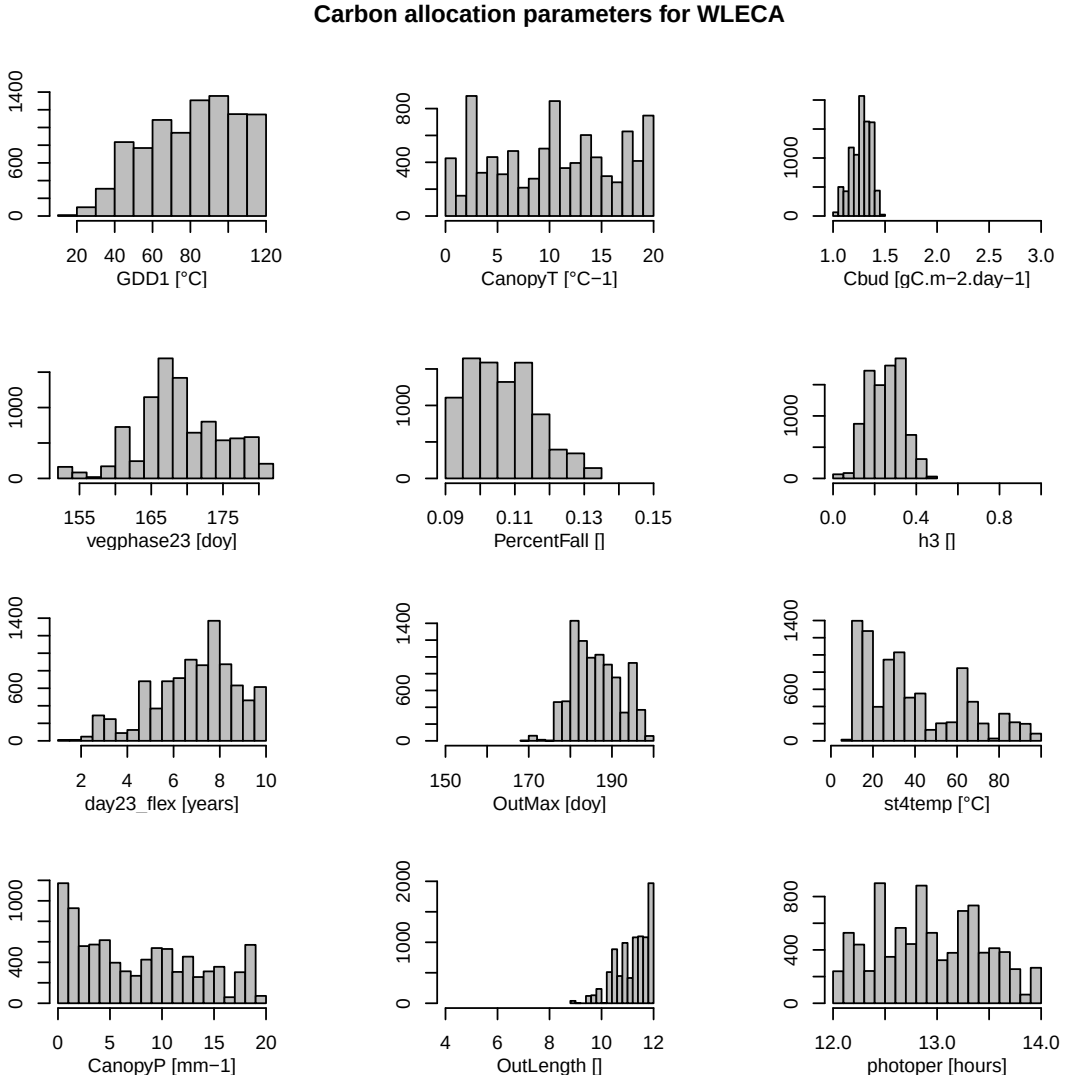


Figure S25. As in Fig. S1 at WLECA site.

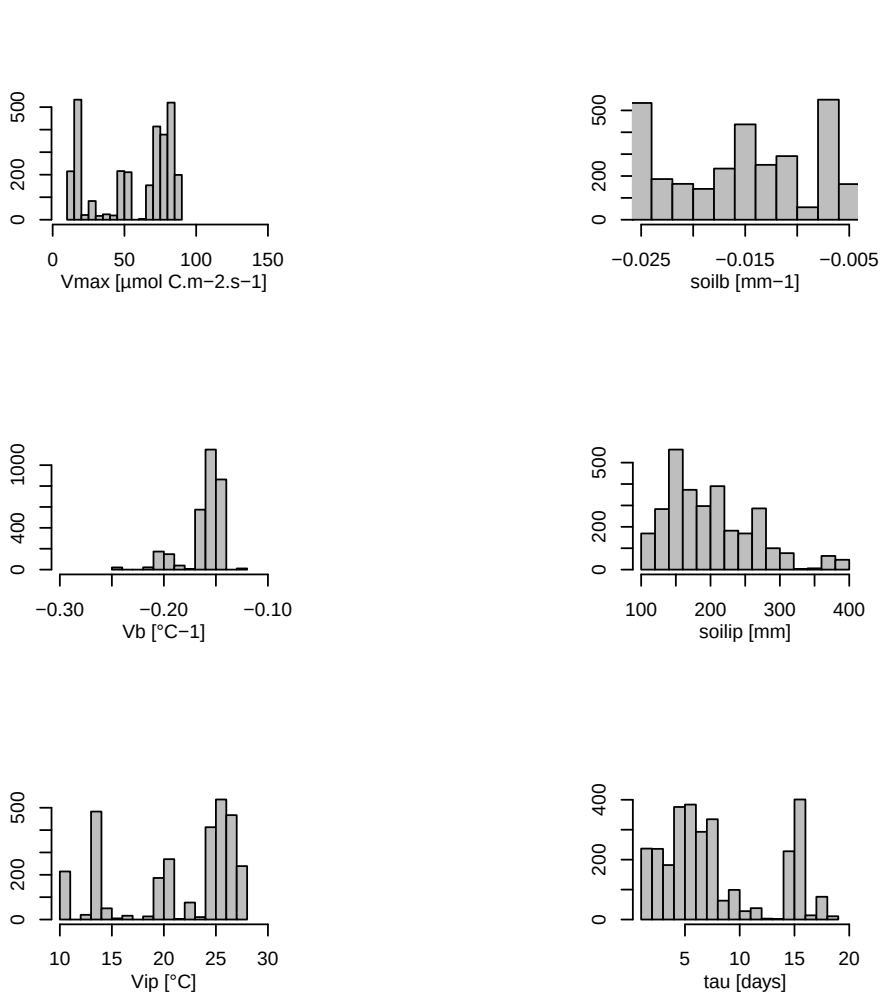


Figure S26. As in Fig. S2 at WLECA site.

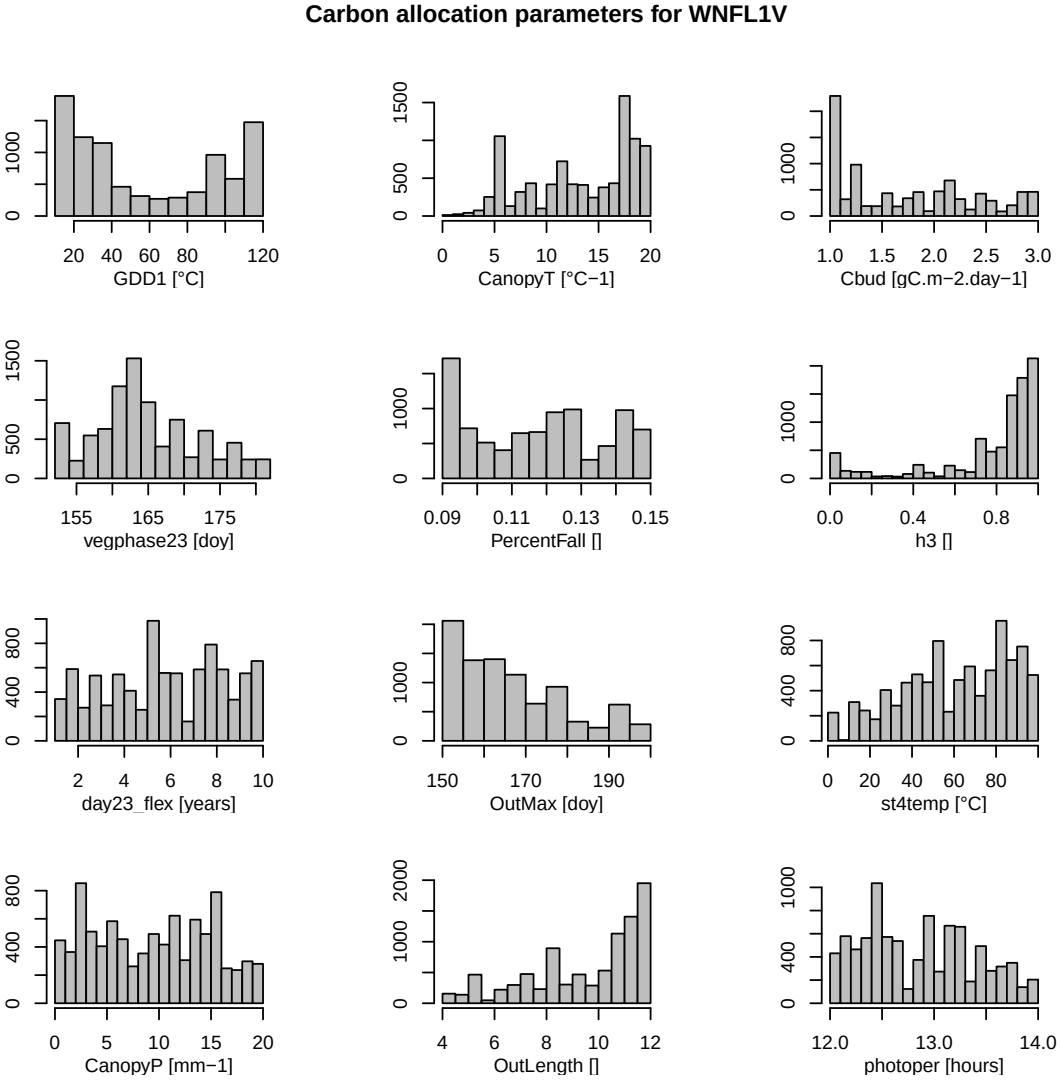


Figure S27. As in Fig. S1 at WNFL1V site.

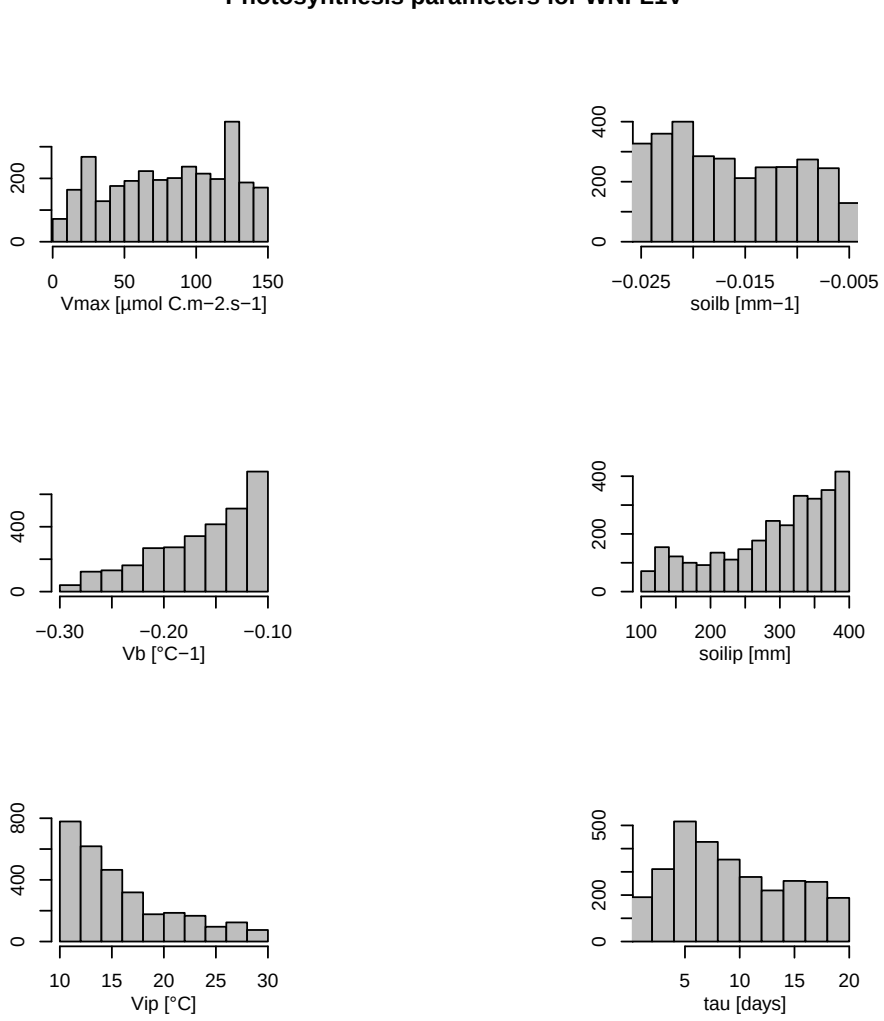


Figure S28. As in Fig. S2 at WNFL1V site.

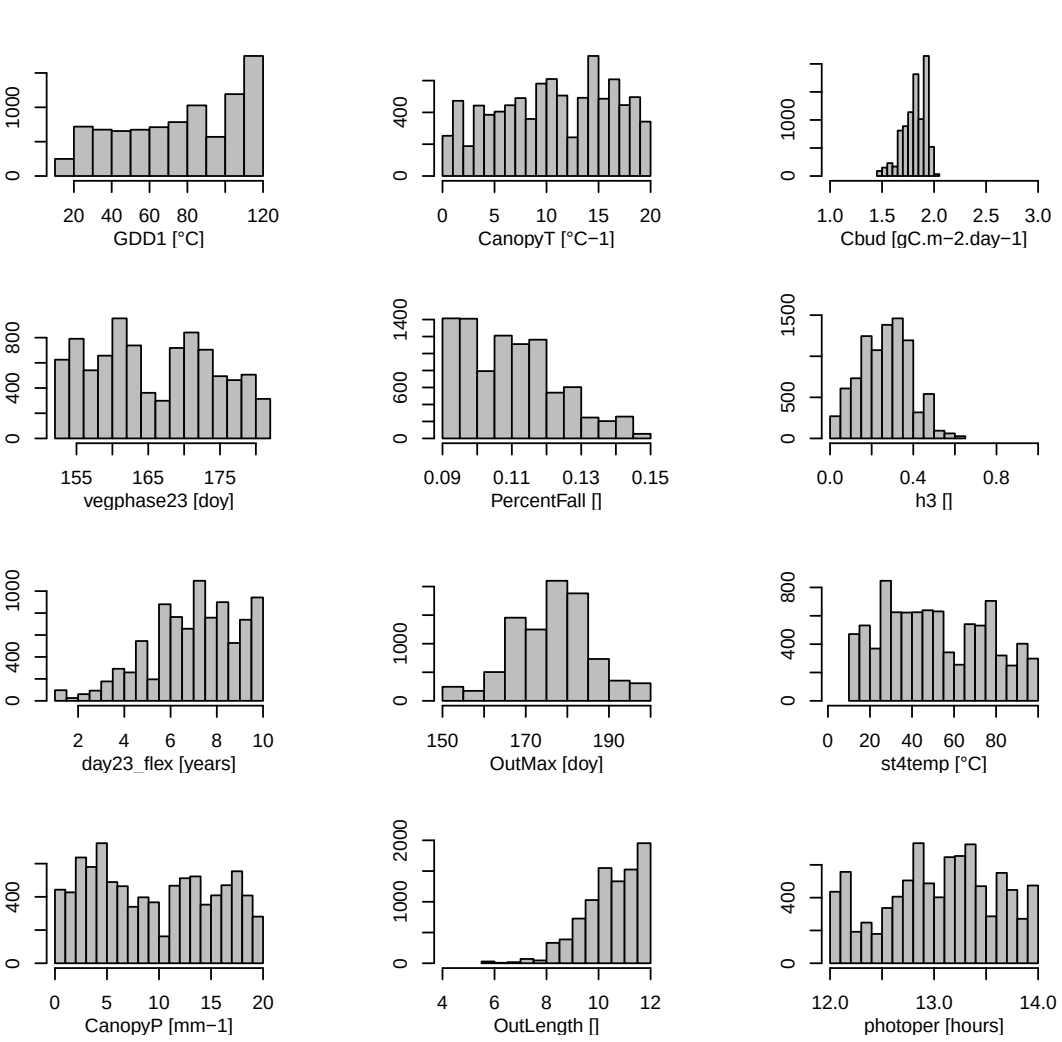


Figure S29. As in Fig. S1 at WNFLR1 site.

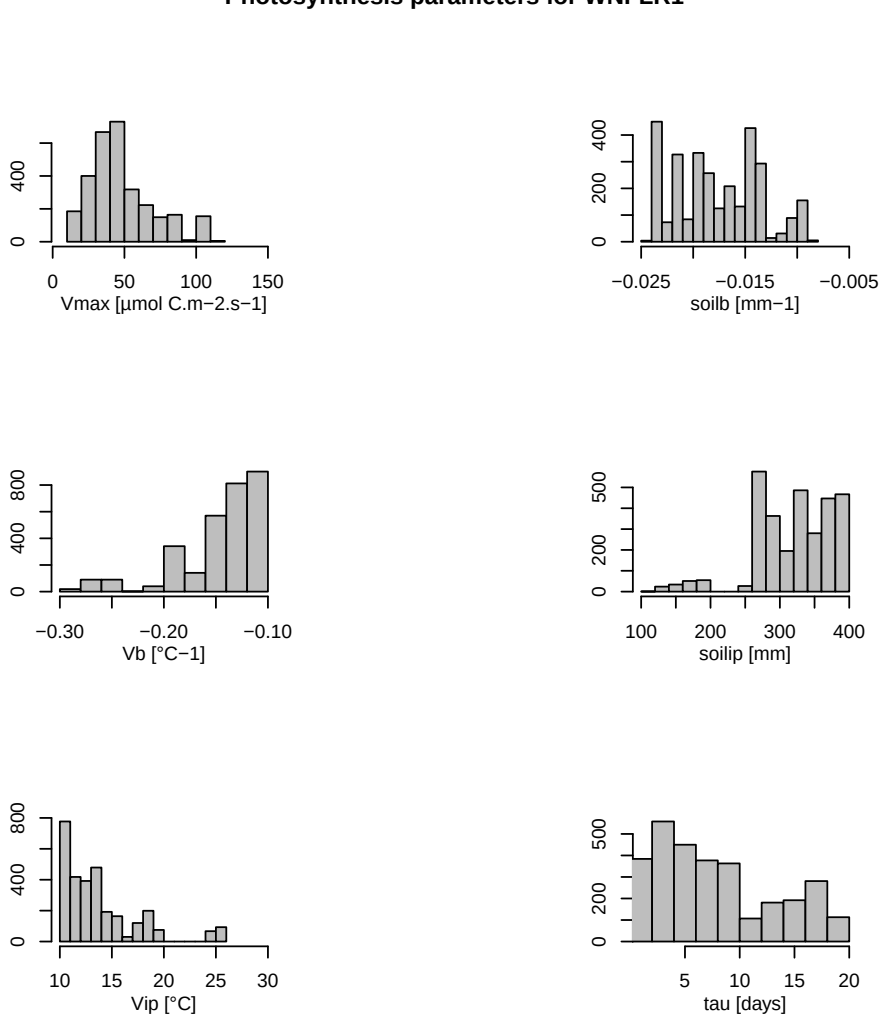


Figure S30. As in Fig. S2 at WNFLR1 site.

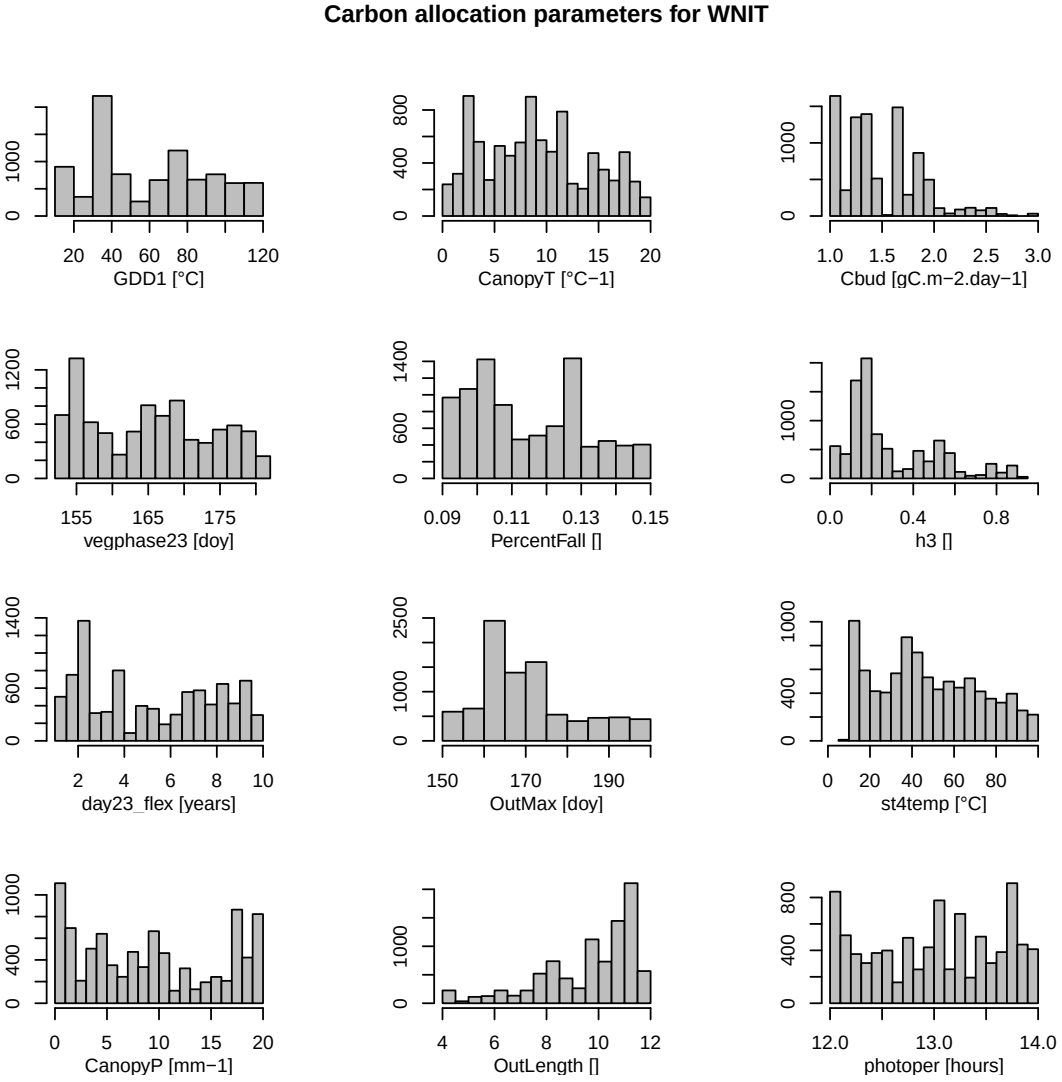


Figure S31. As in Fig. S1 at WNIT site.

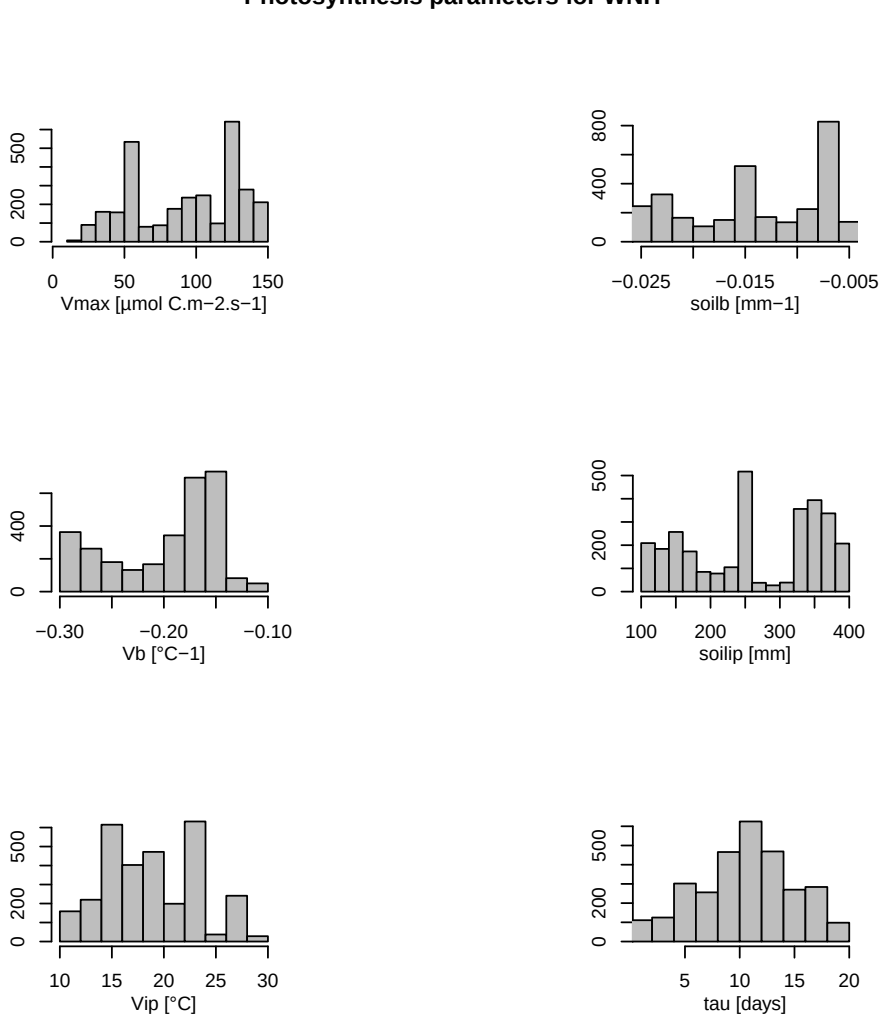


Figure S32. As in Fig. S2 at WNIT site.

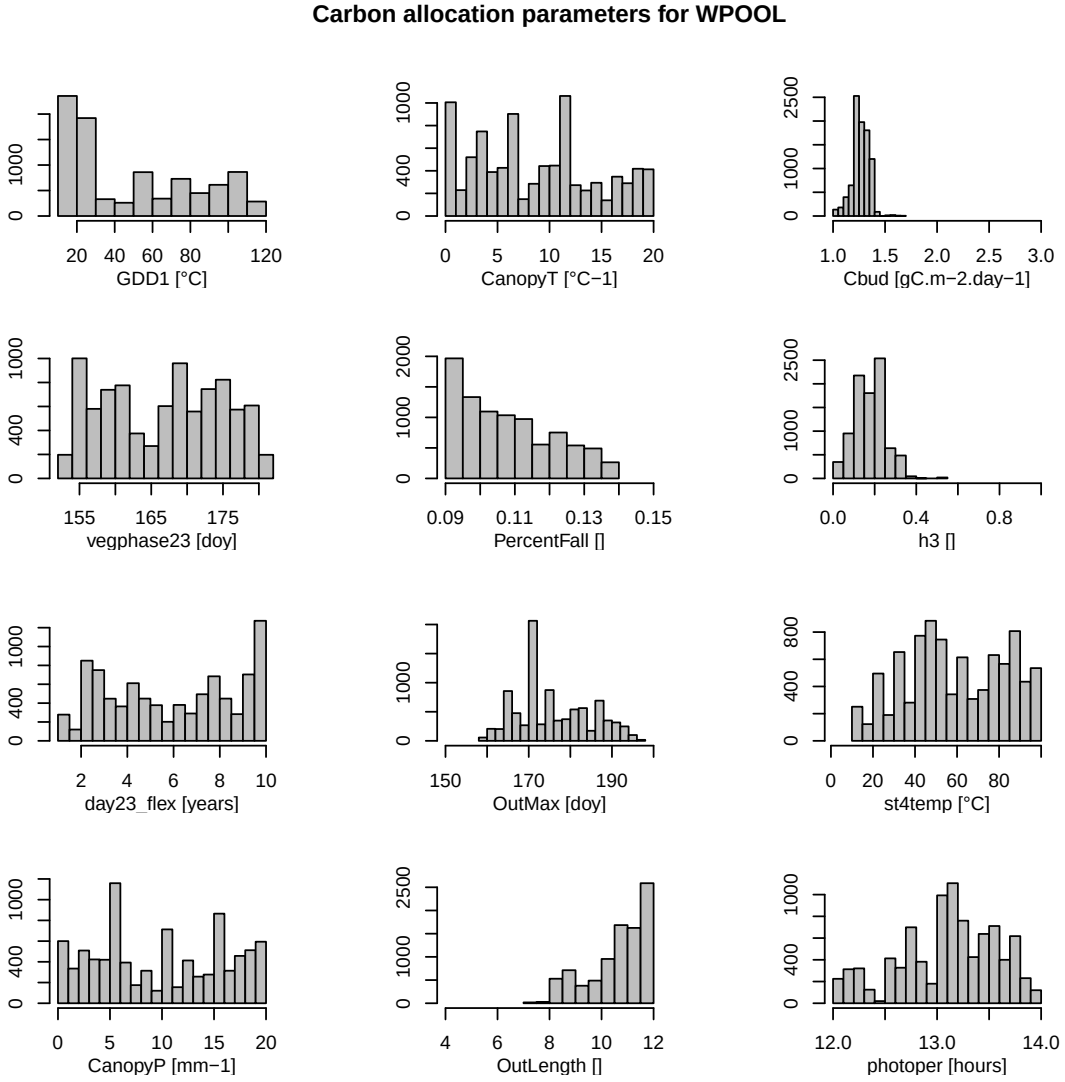


Figure S33. As in Fig. S1 at WPOOL site.

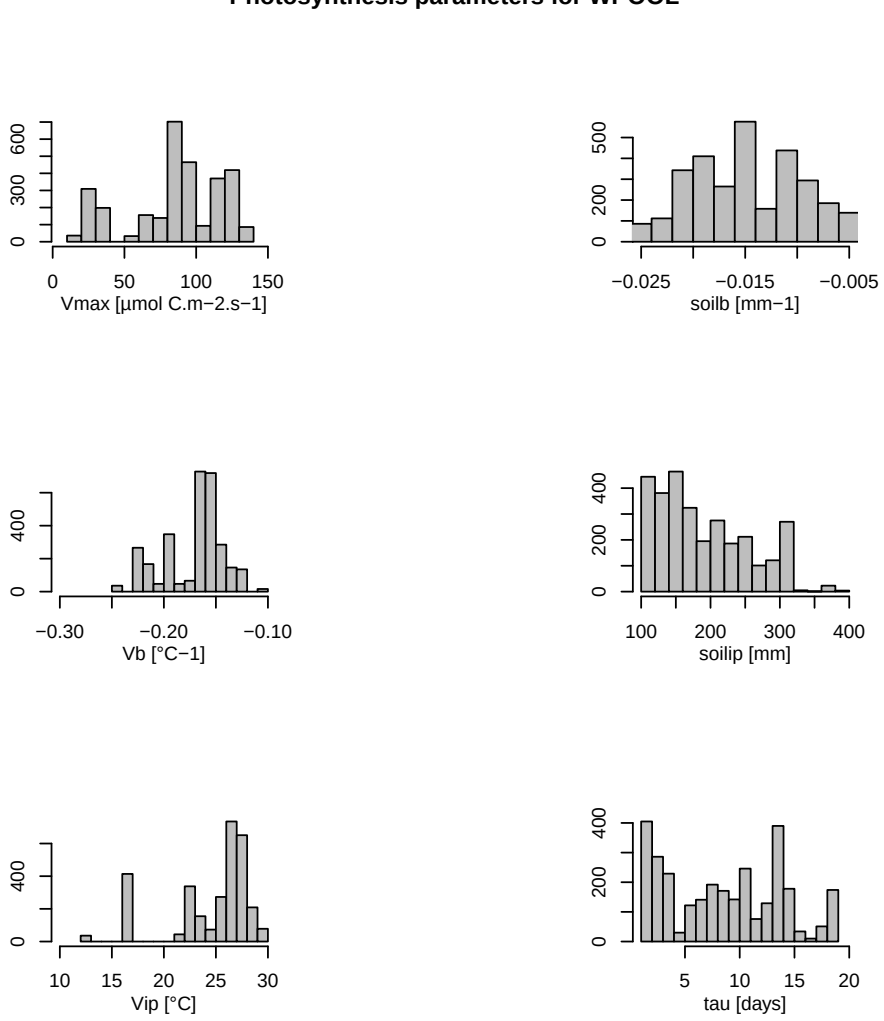


Figure S34. As in Fig. S2 at WPOOL site.

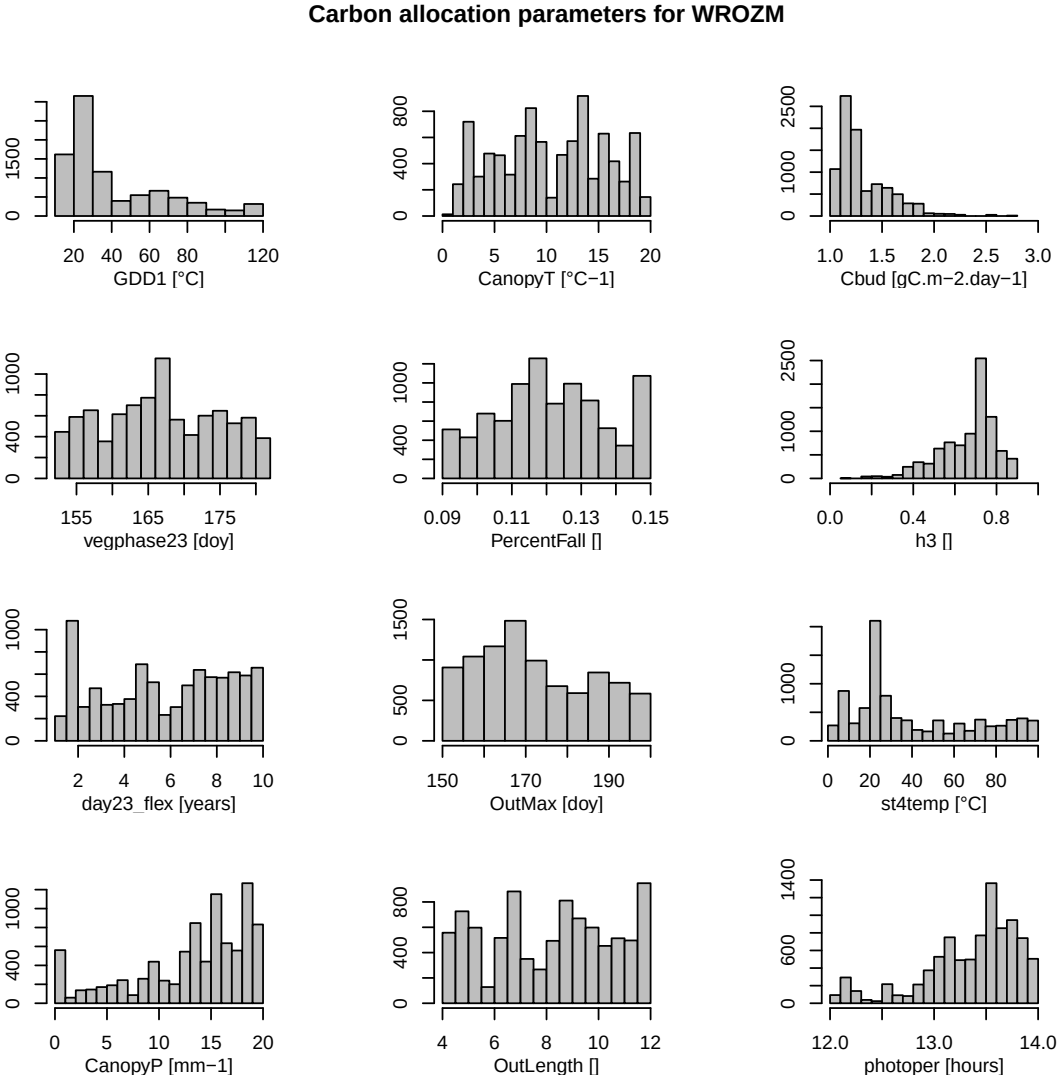


Figure S35. As in Fig. S1 at WROZM site.

Figure S36. As in Fig. S2 at WROZM site.

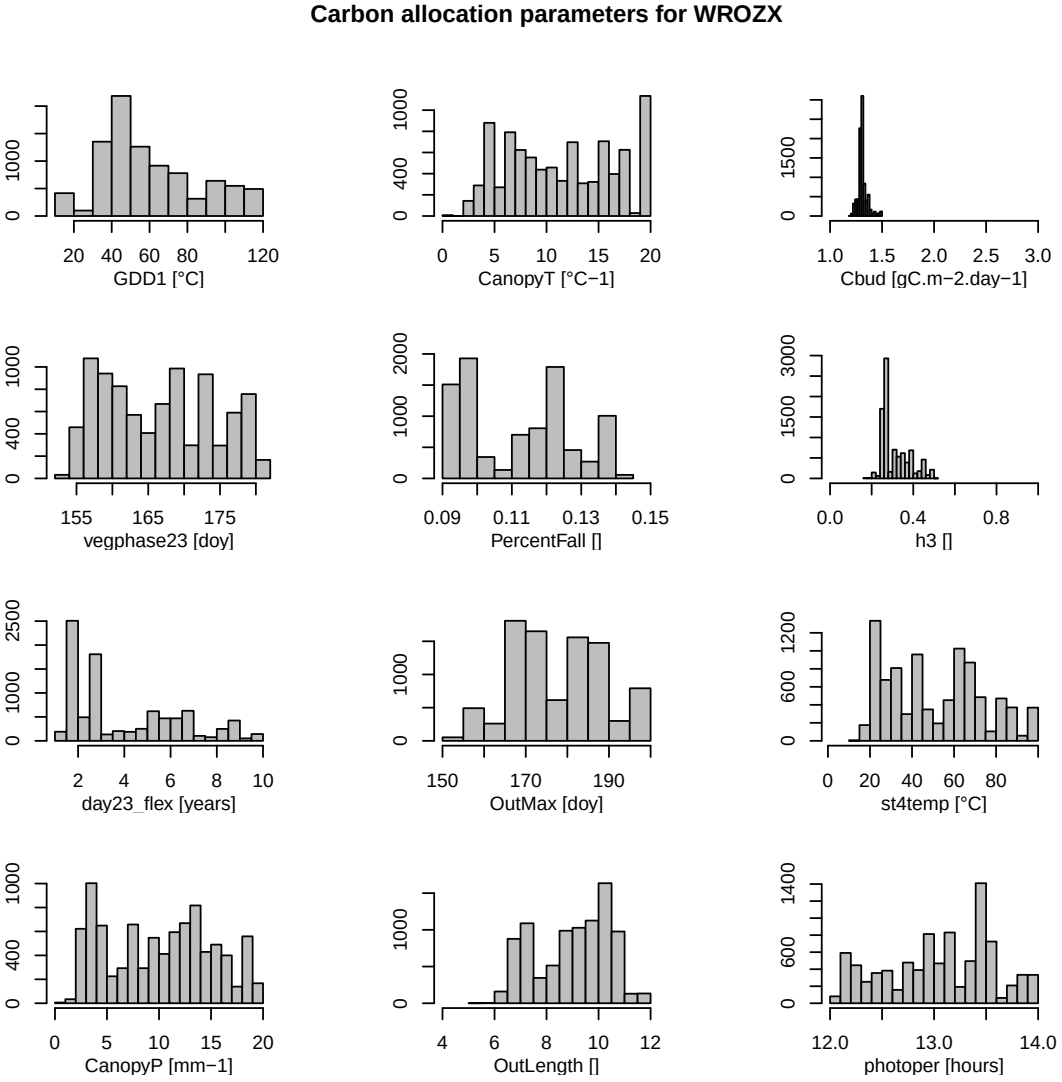


Figure S37. As in Fig. S1 at WROZX site.

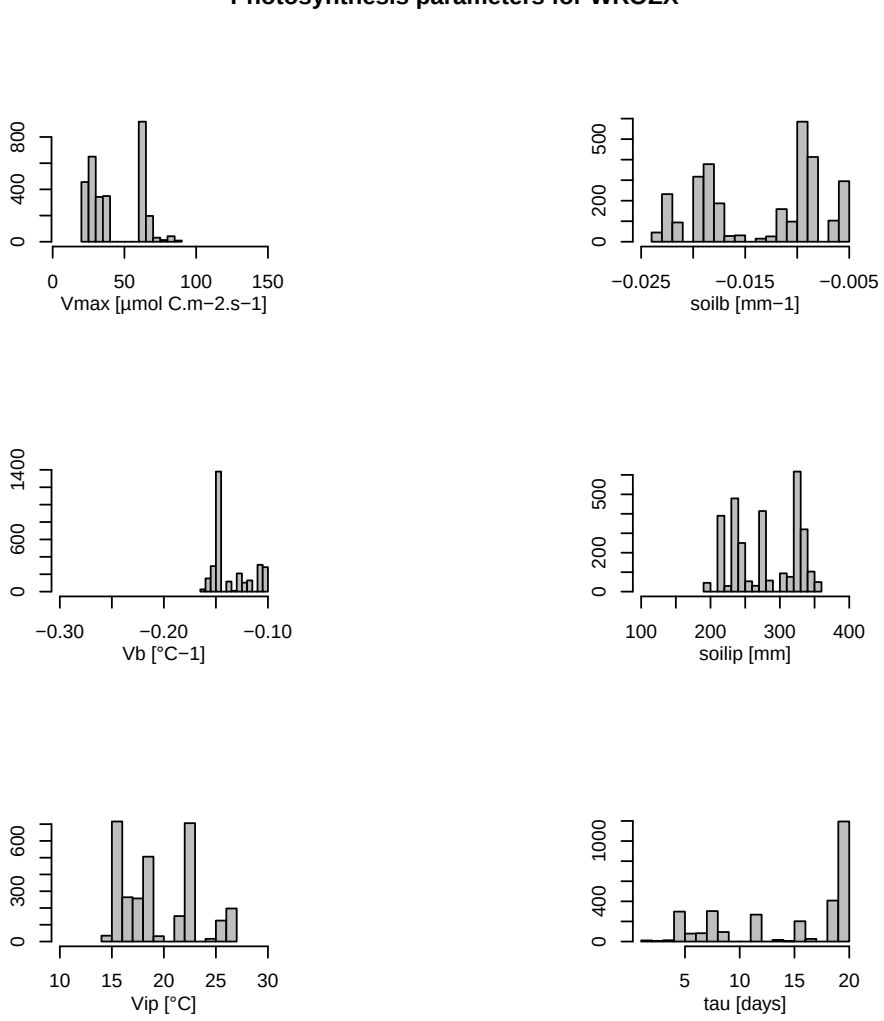


Figure S38. As in Fig. S2 at WROZX site.

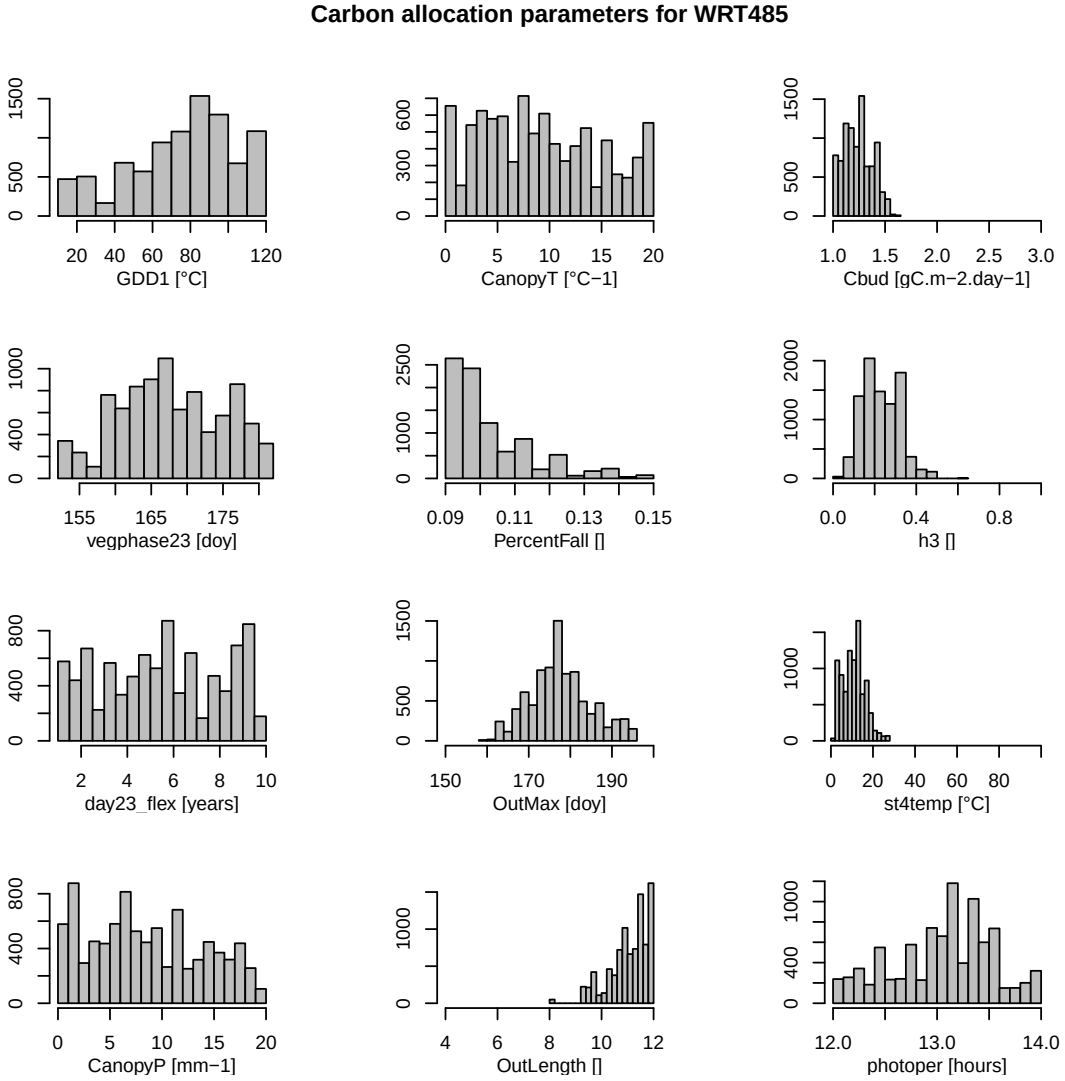


Figure S39. As in Fig. S1 at WRT485 site.

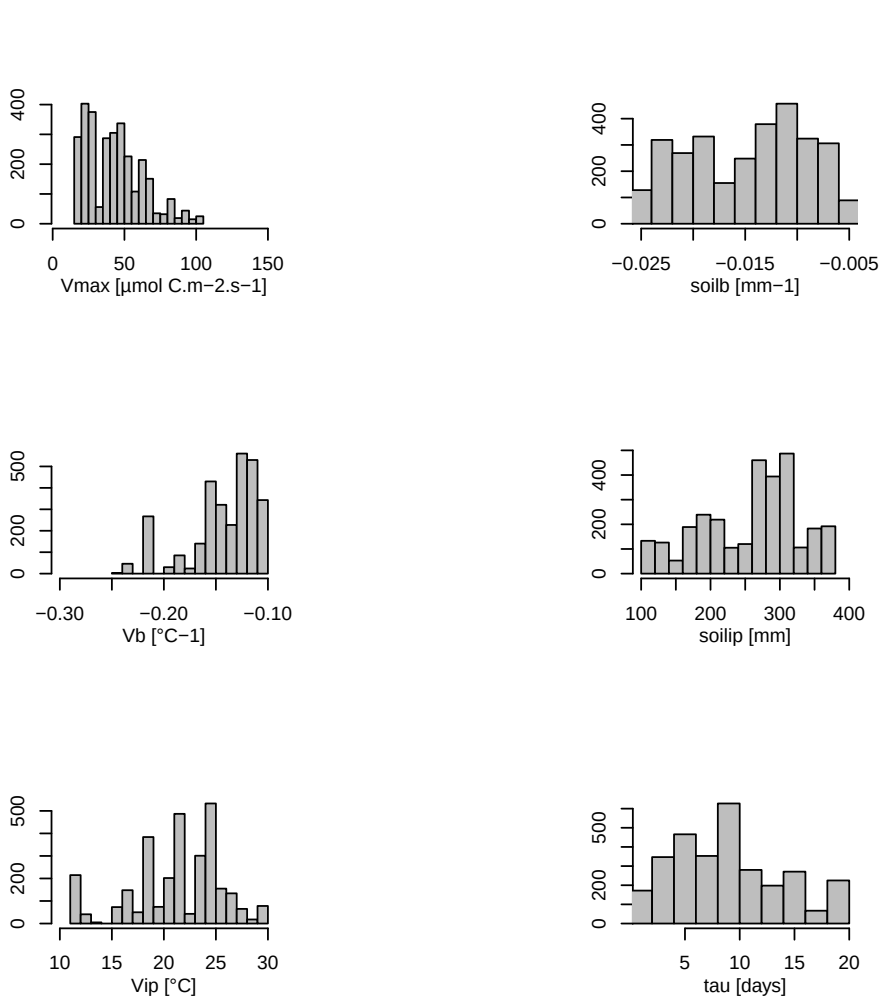


Figure S40. As in Fig. S2 at WRT485 site.

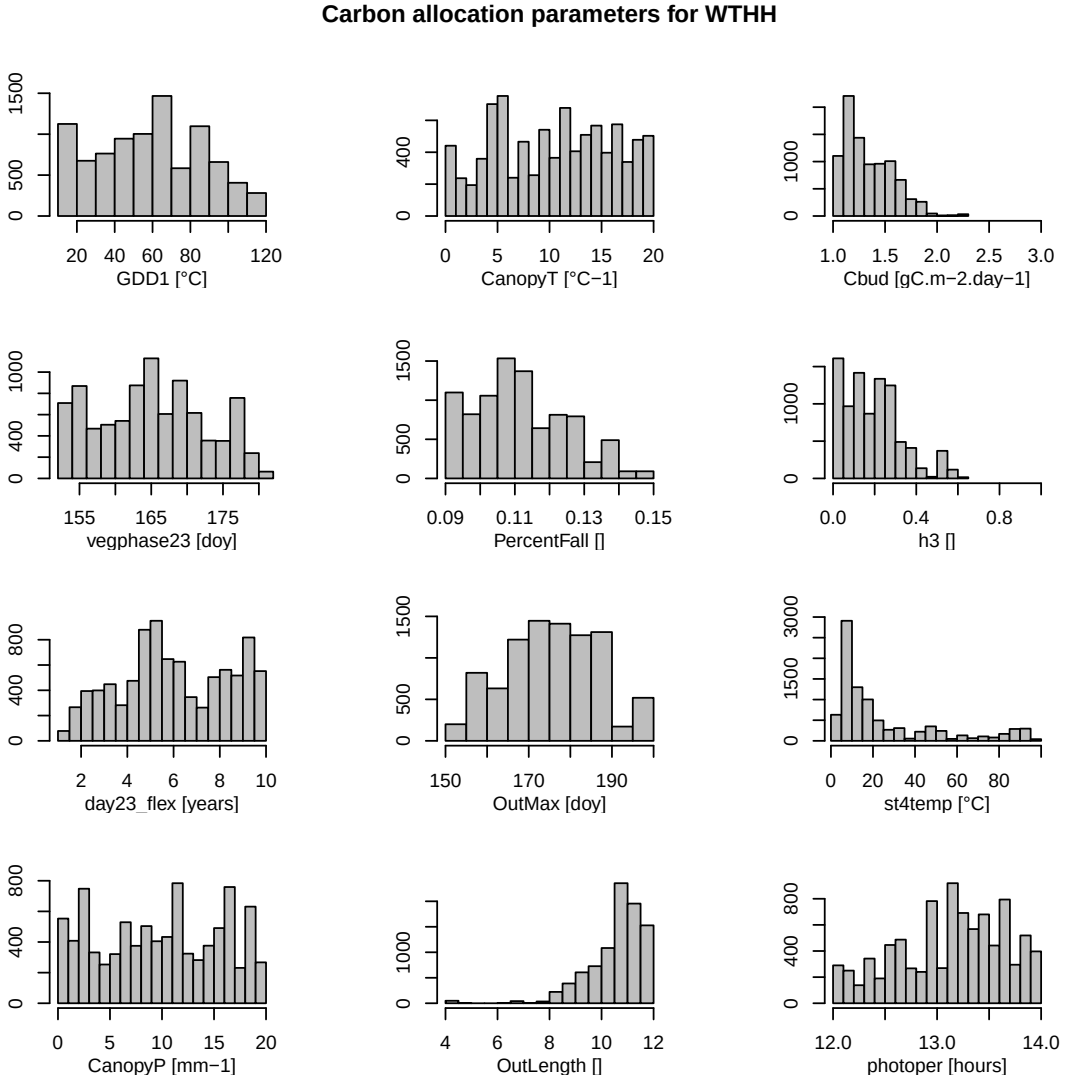


Figure S41. As in Fig. S1 at WTHH site.

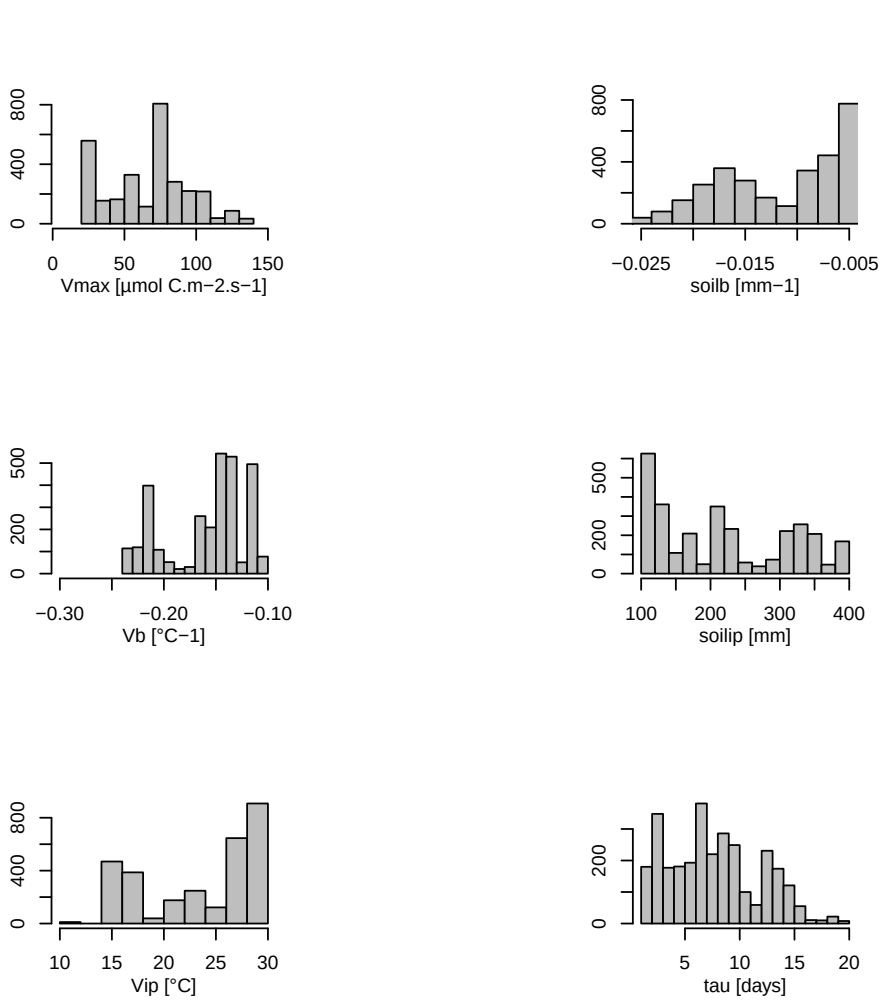


Figure S42. As in Fig. S2 at WTHH site.

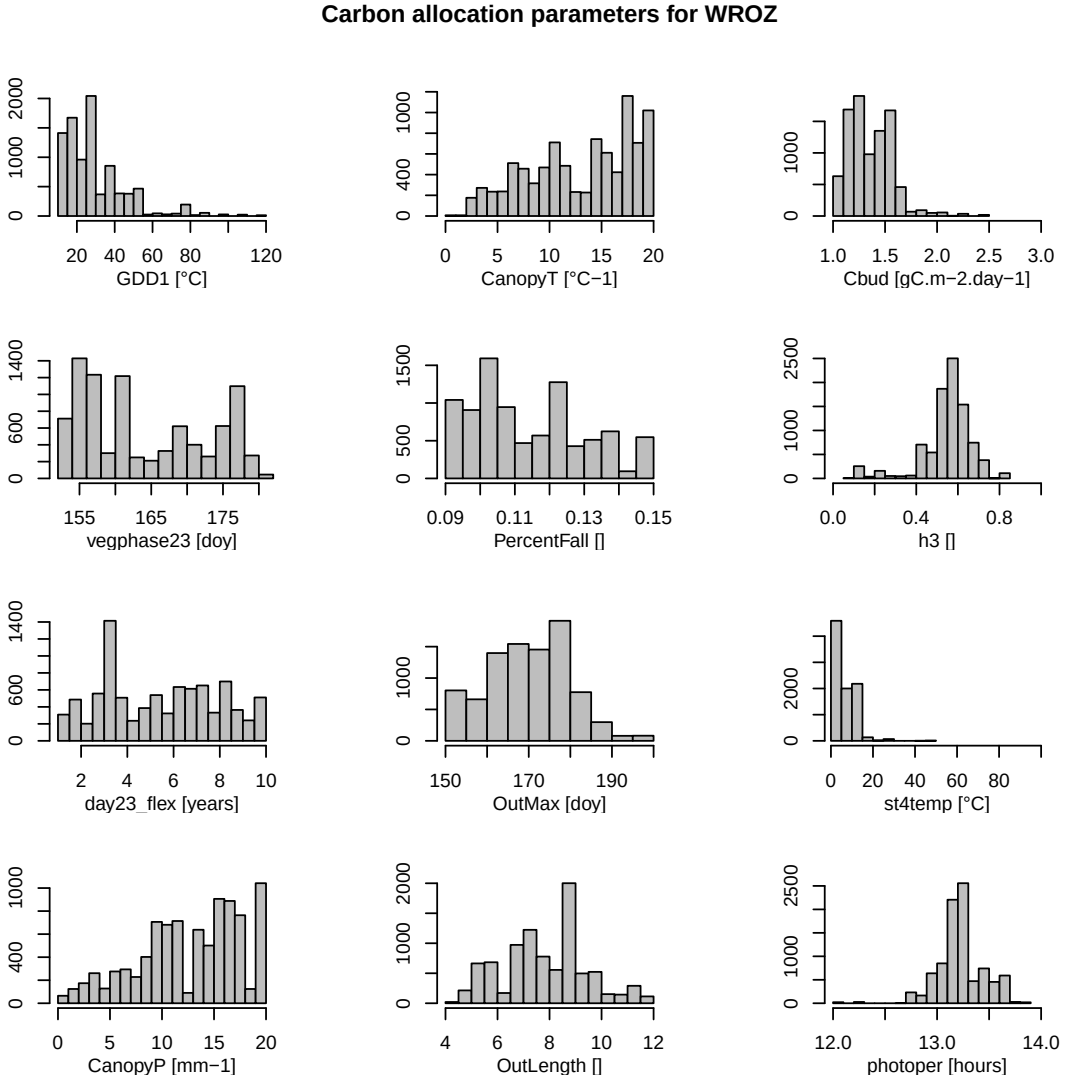


Figure S43. Posterior frequency distributions of carbon allocation parameters (Table S3) at WROZ site (NRCAN (5') climatic dataset) (Fig. 1b, Table 2) for the 1950-2000 calibration period.

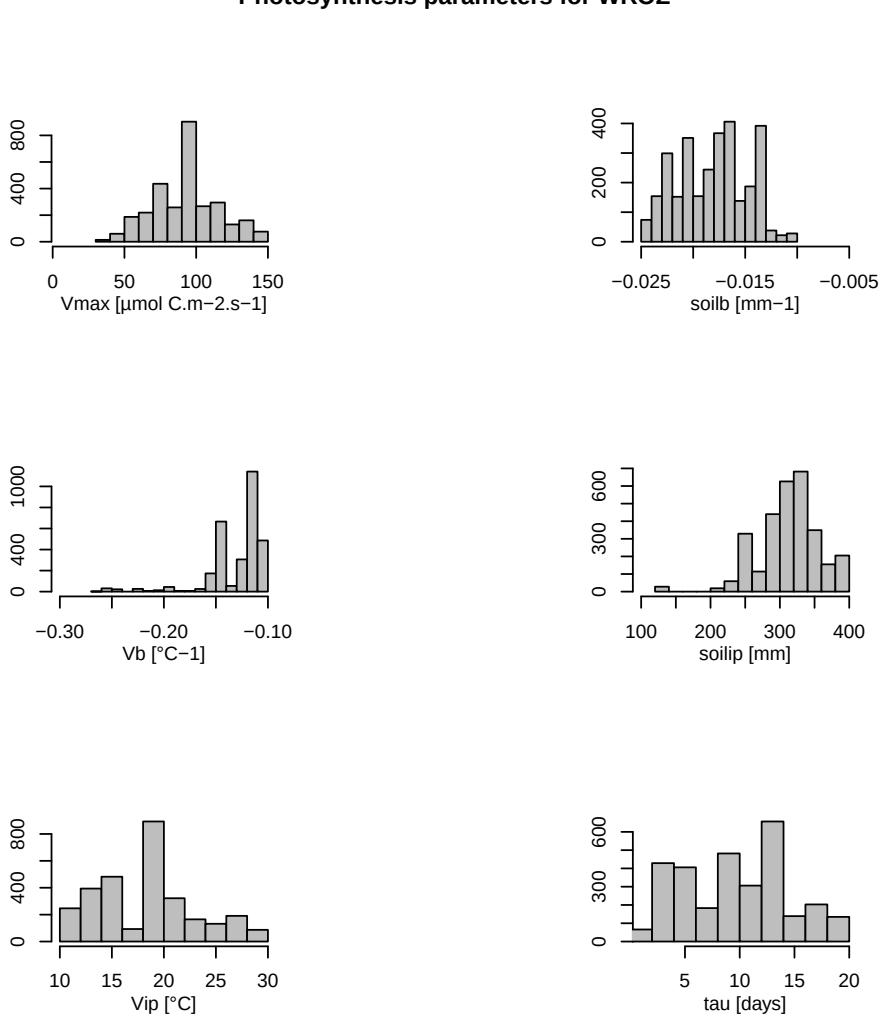


Figure S44. Posterior frequency distributions of photosynthesis parameters (Table S3) at WROZ site (NRCAN (5') climatic dataset) (Fig. 1b, Table 2) for the 1950-2000 calibration period.

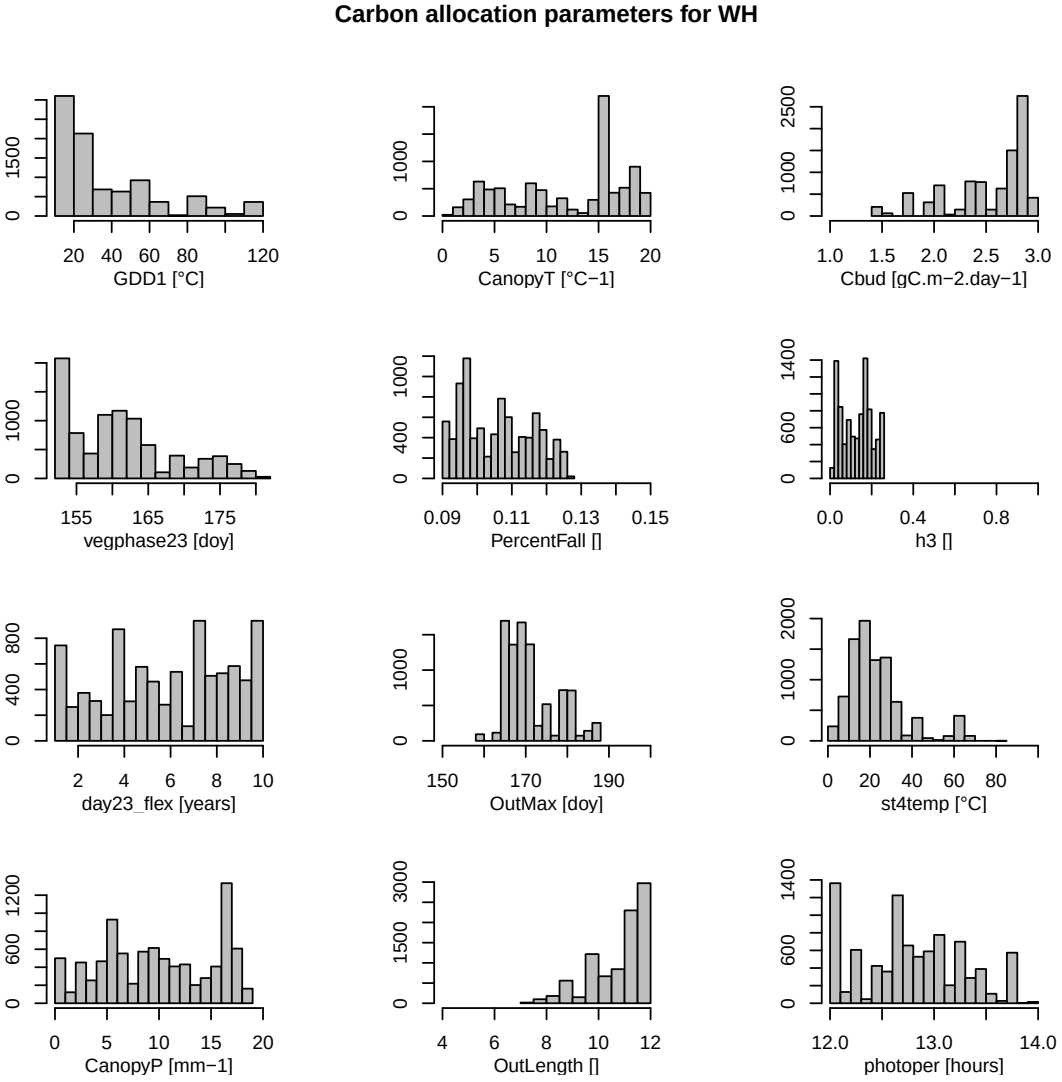


Figure S45. As in Fig. S43 at WH site.

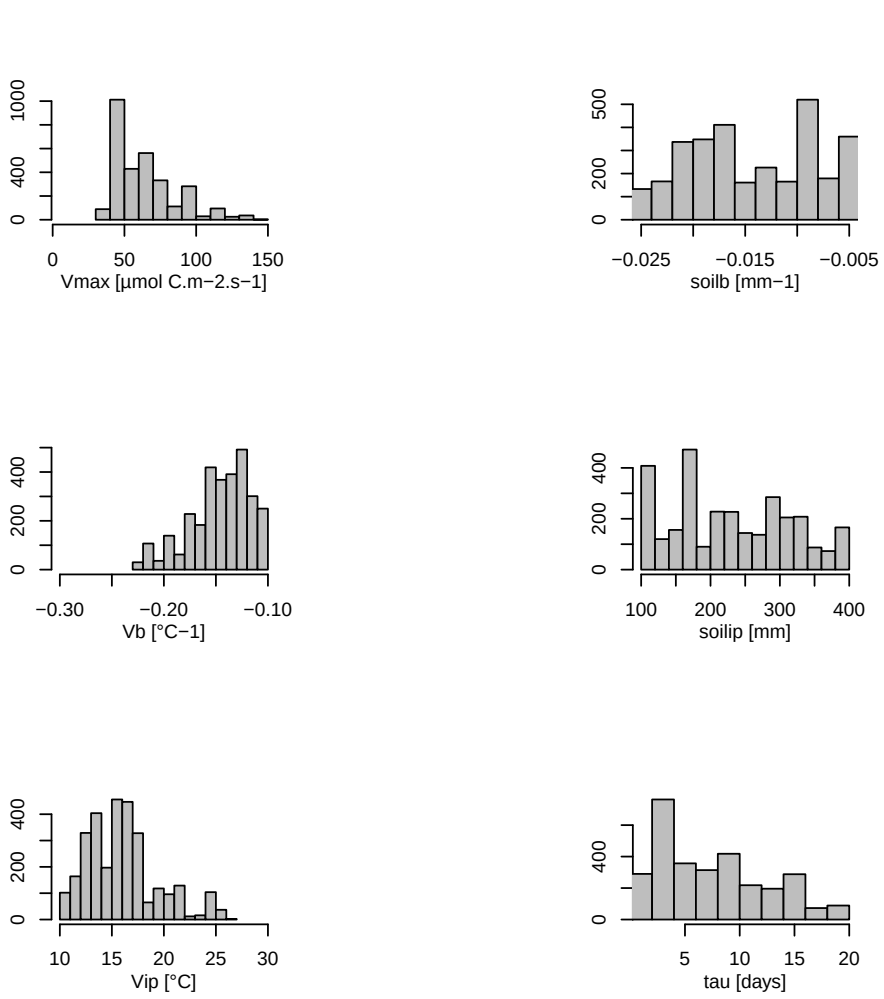


Figure S46. As in Fig. S44 at WH site.

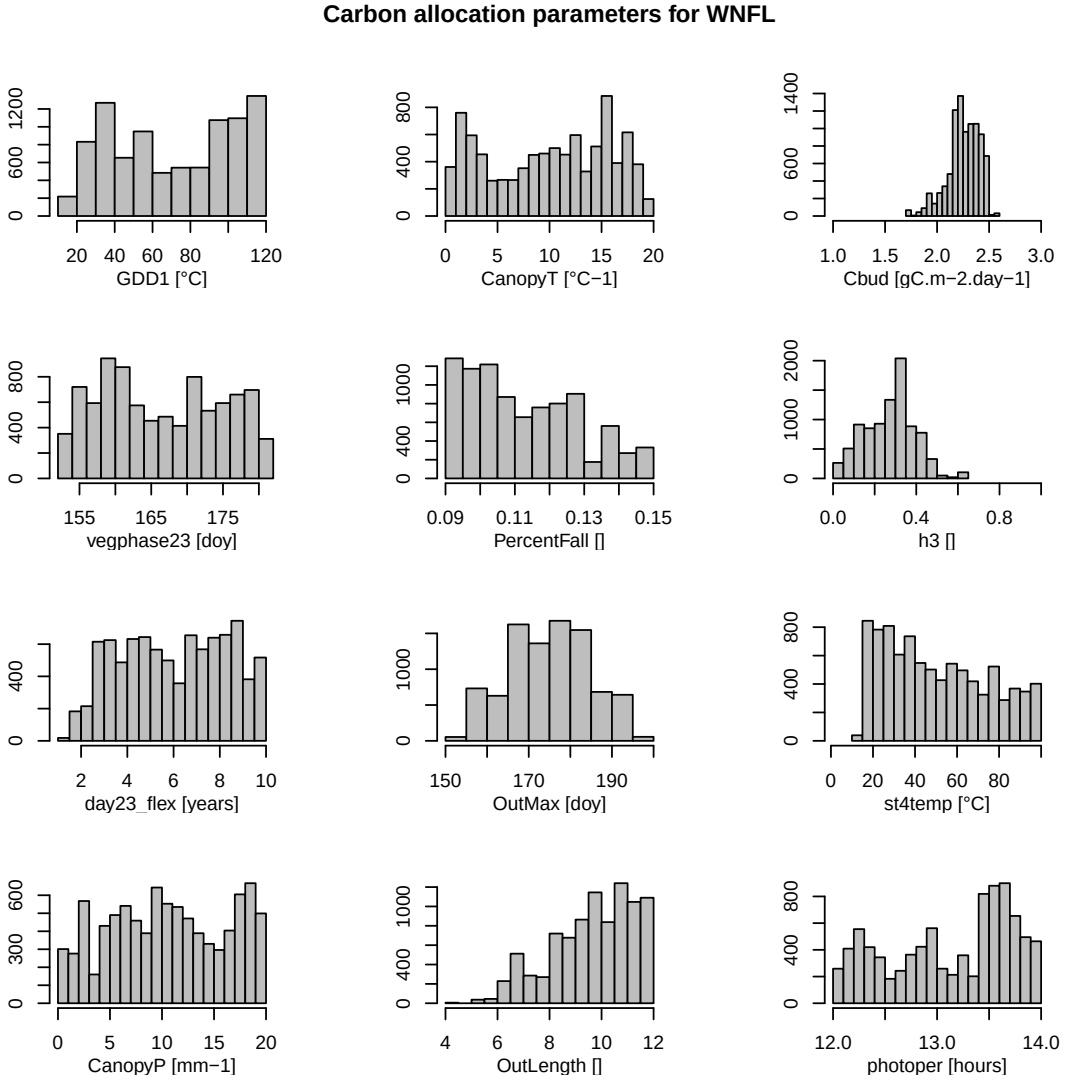


Figure S47. As in Fig. S43 at WNFL site.

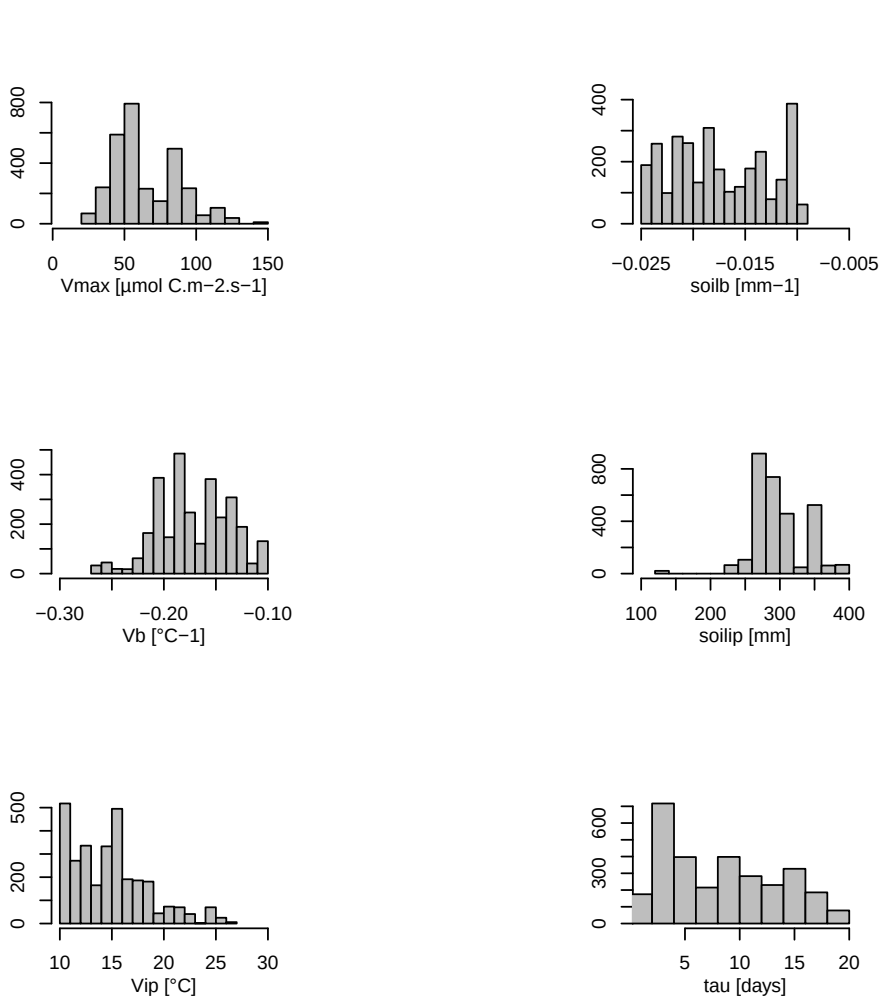


Figure S48. As in Fig. S44 at WNFL site.

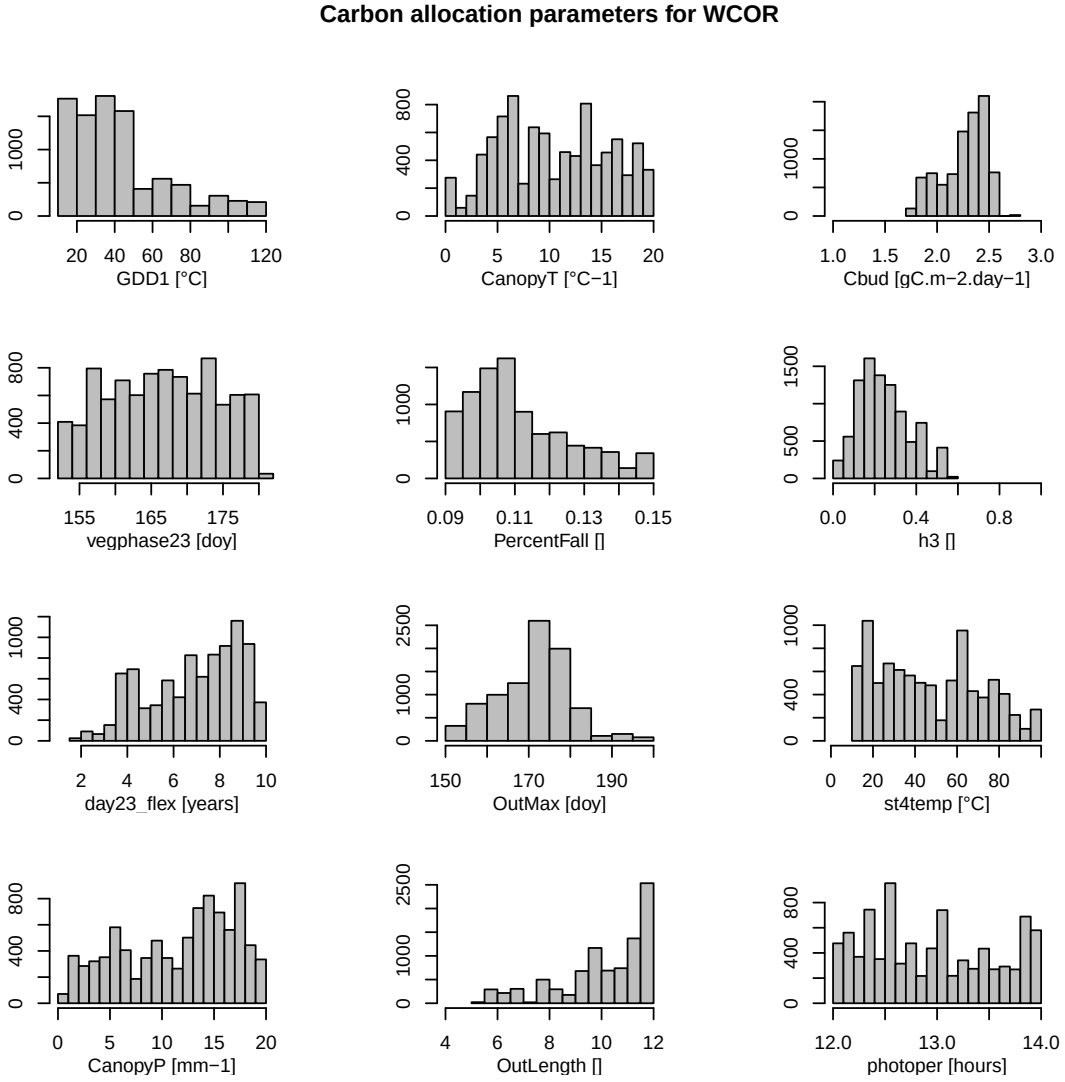


Figure S49. As in Fig. S43 at WCOR site.

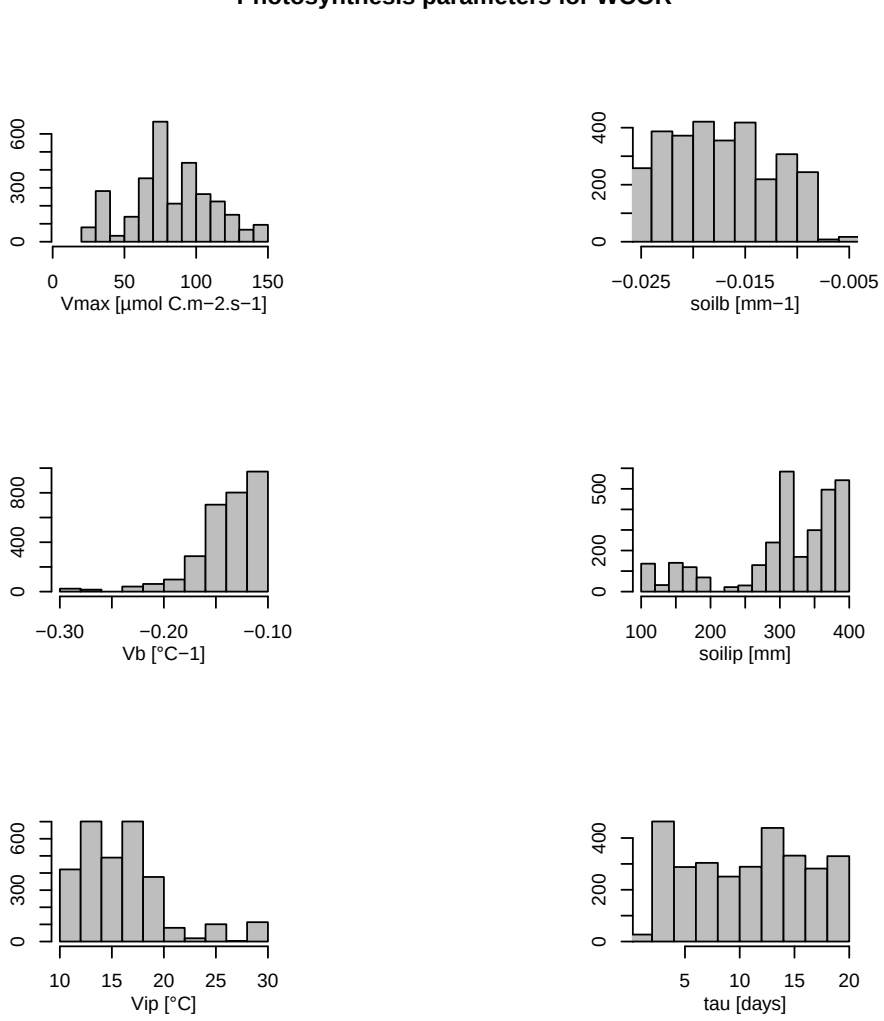


Figure S50. As in Fig. S44 at WCOR site.

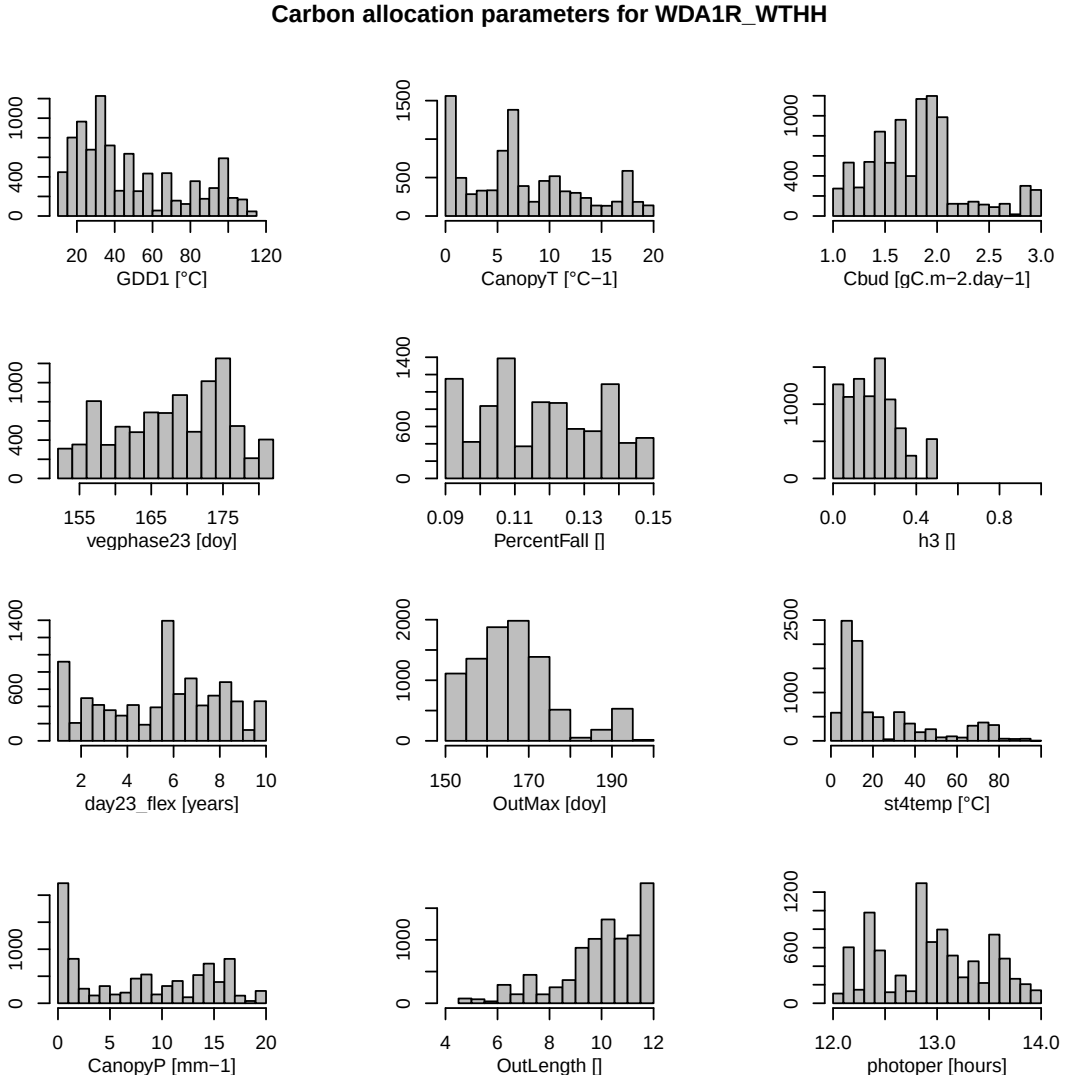


Figure S51. As in Fig. S43 at WDA1R_WTHH site.

Figure S52. As in Fig. S44 at WDA1R_WTHH site.

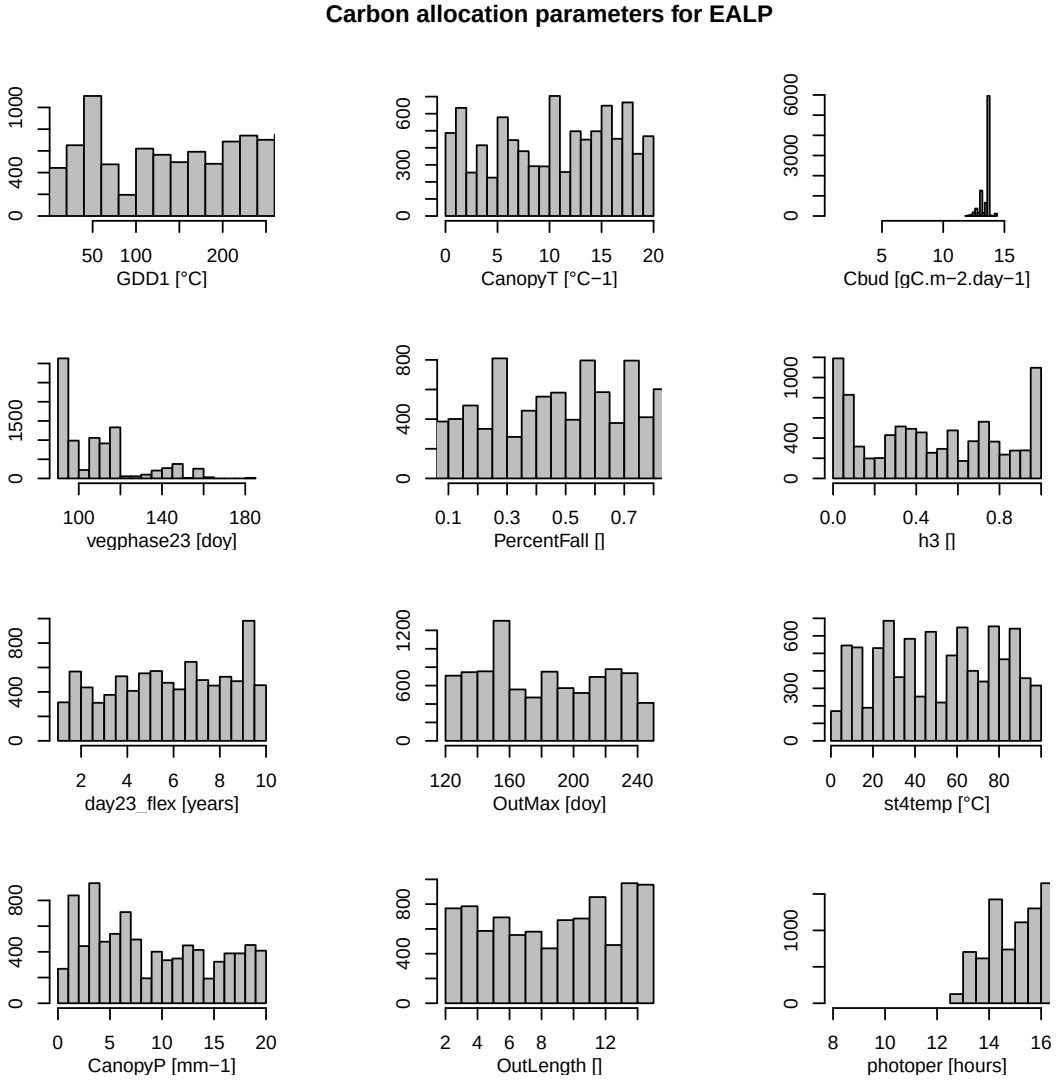


Figure S53. Posterior frequency distributions of carbon allocation parameters (Table S3) at EALP site (GHCN climate data) (Fig. 2, Table 2) for the 1950-2000 calibration period.

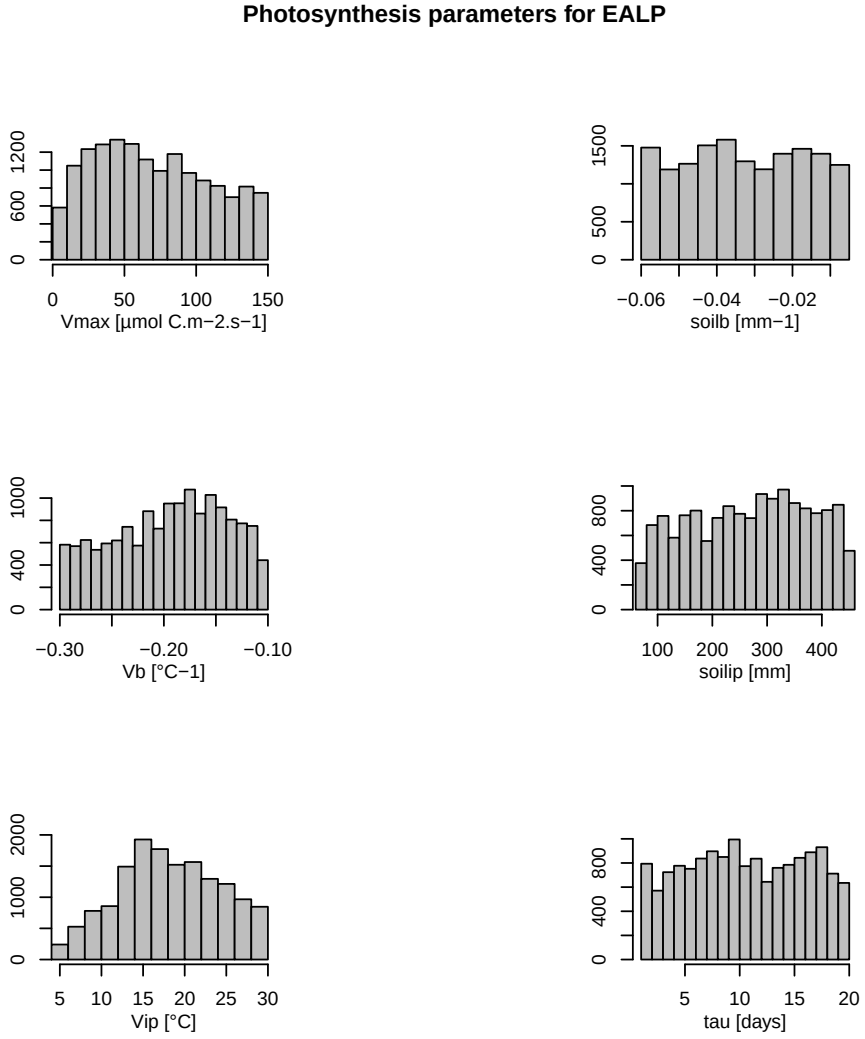


Figure S54. Posterior frequency distributions of photosynthesis parameters (Table S3) at EALP site (GHCN climate data) (Fig. 2, Table 2) for the 1950-2000 calibration period.

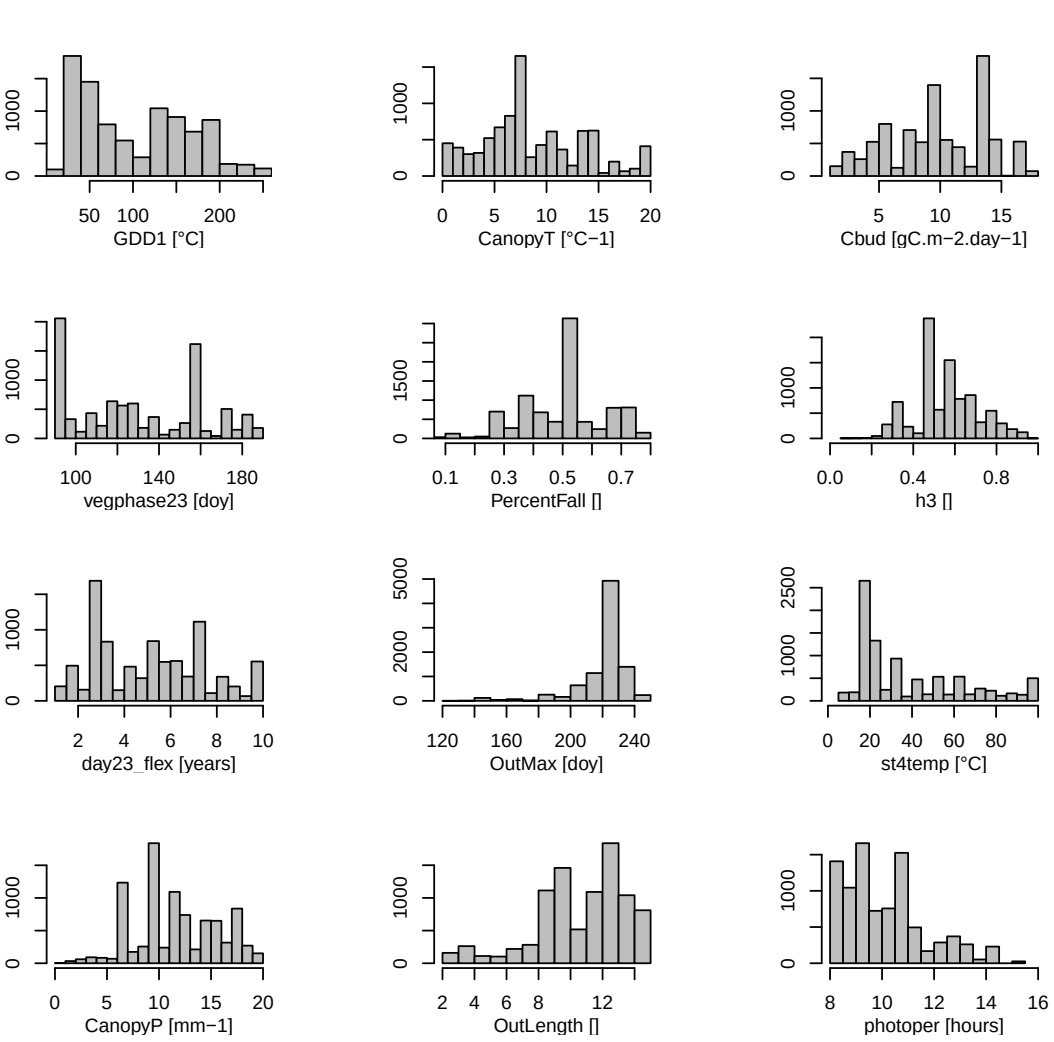


Figure S55. As in Fig. S53 at SWIT179 site.

Figure S56. As in Fig. S54 at SWIT179 site.

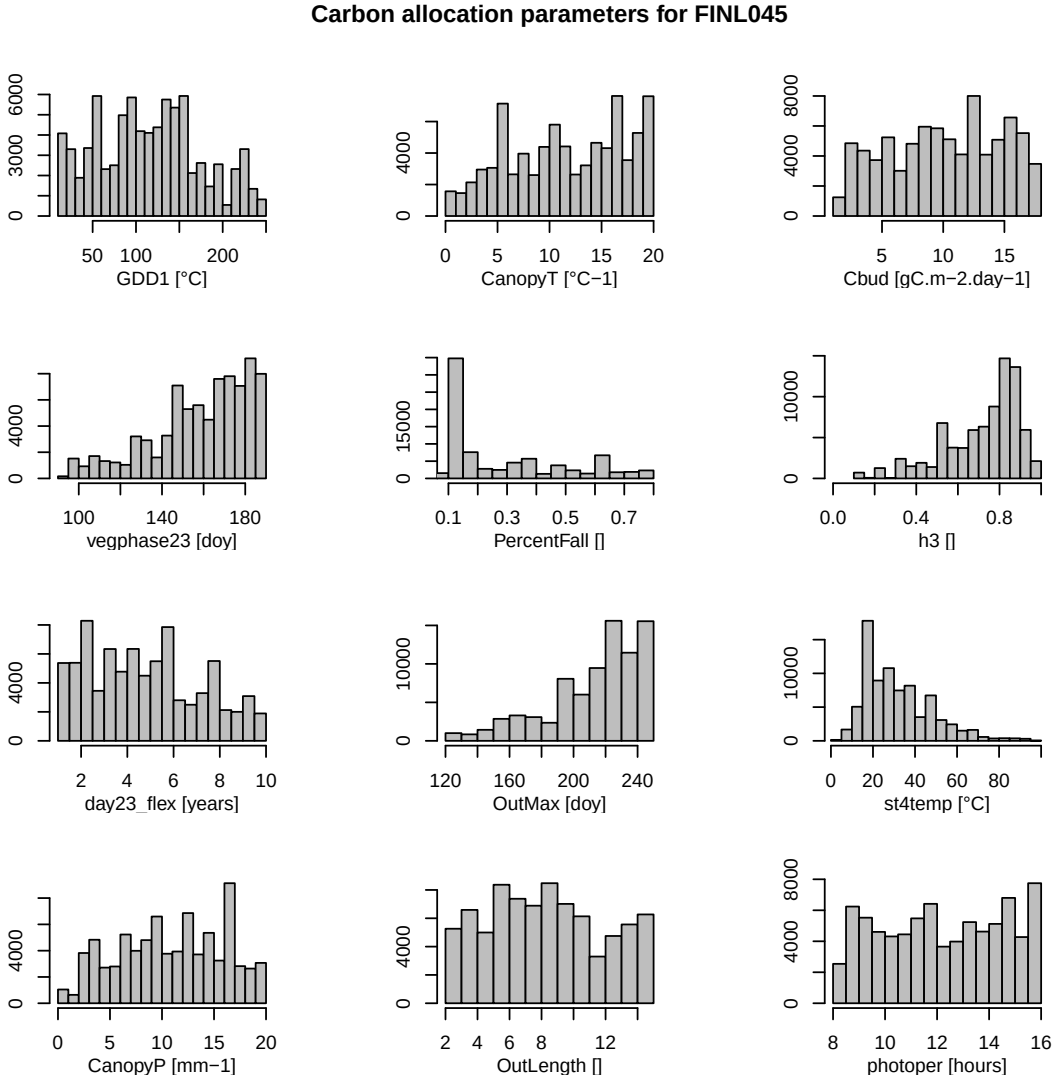


Figure S57. As in Fig. S53 at FINL045 site.

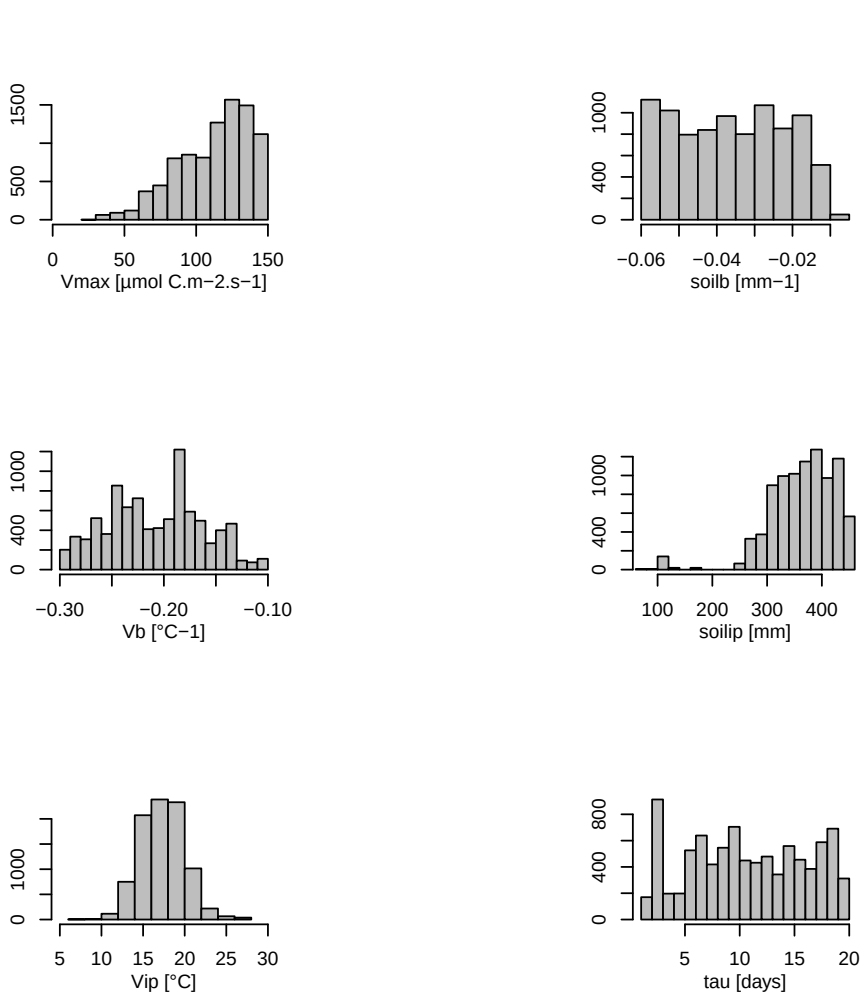


Figure S58. As in Fig. S54 at FINL045 site.

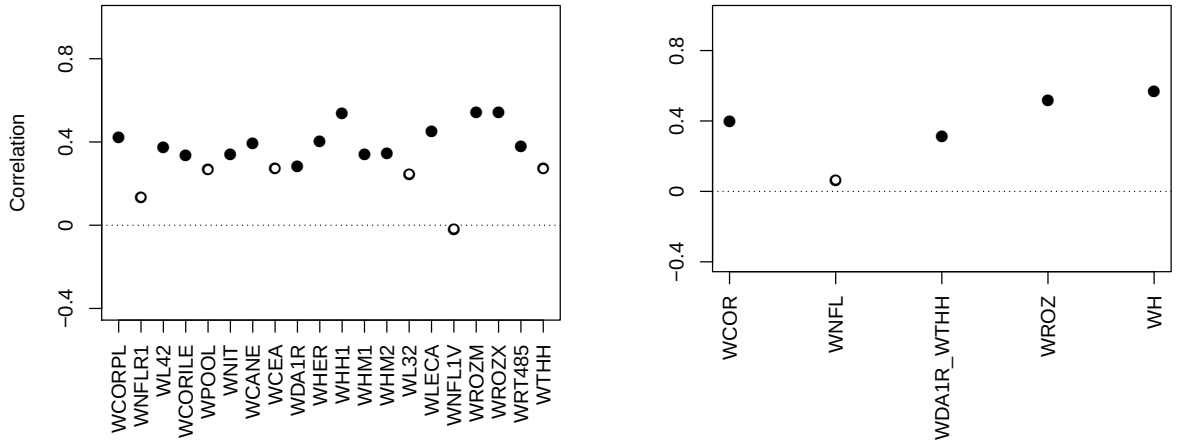


Figure S59. Pearson correlation coefficients between tree growth observations and simulations at the Eastern Canadian taiga sites (Fig. 1) with MAIDEN using NRCAN (5') as climatic inputs (Table 2) for the 1950-2000 period with *QC_taiga* calibrated parameters from Gennaretti et al. (2017). Individual (left) and aggregated sites (right). The long-term decadal trends have been removed in observations and simulations. White inner circles stand for non-significant correlations (p-value > 0.05). Plain circles stand for significant correlations (p-value < 0.05).

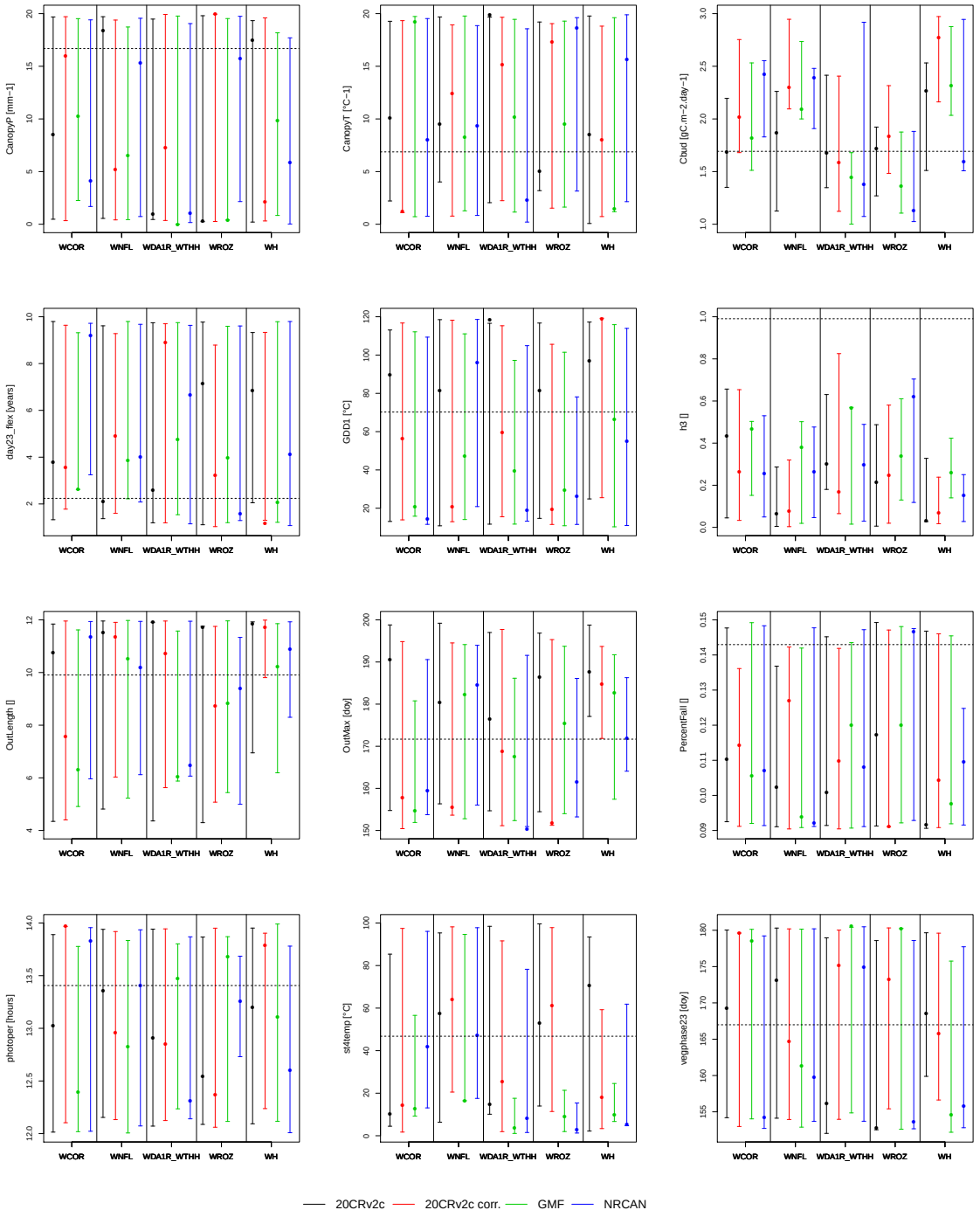


Figure S60. Selected carbon allocation parameters value (Table S3) based on the calibration procedure detailed in Sect. 2.3.1 and 95% confidence interval of each parameter (computed based on all iterations of the third step of the calibration process, with a five iterations thinning and a burn-in period of 3000 iterations, see Sect. 2.3.1) for the five aggregated Eastern Canadian sites (Fig. 1b) and for all climatic datasets (Table 2) over the 1950-2000 time period. Dashed line corresponds to the parameter value at *QC_taiga* site from Gennaretti et al. (2017).

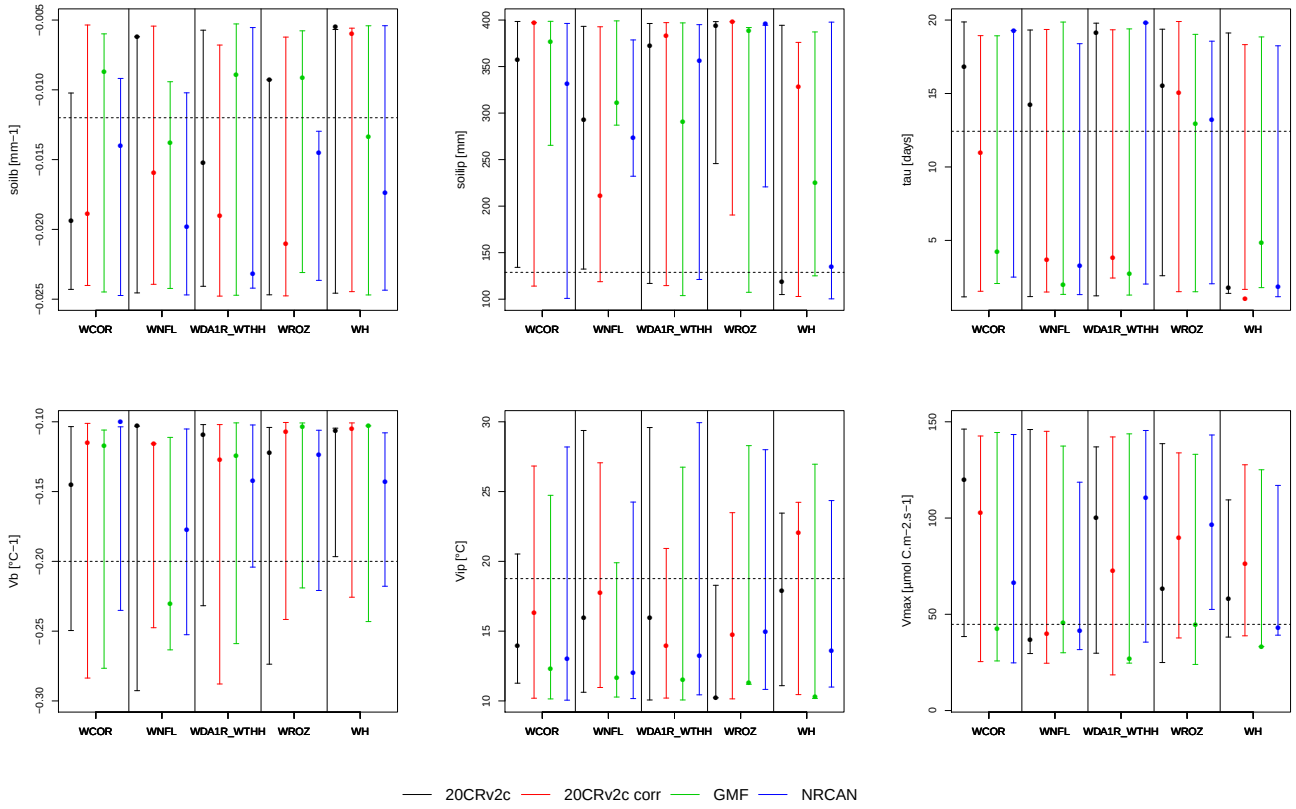


Figure S61. Selected photosynthesis parameters value (Table S3) based on the calibration procedure detailed in Sect. 2.3.1 and 95% confidence interval of each parameter (computed based on all iterations of the second step of the calibration process, with a five iterations thinning and a burn-in period of 1000 iterations, see Sect. 2.3.1) for the five aggregated Eastern Canadian sites (Fig. 1b) and for all climatic datasets (Table 2) over the 1950-2000 time period. Dashed line corresponds to the parameter value at *QC_taiga* site from Gennaretti et al. (2017).

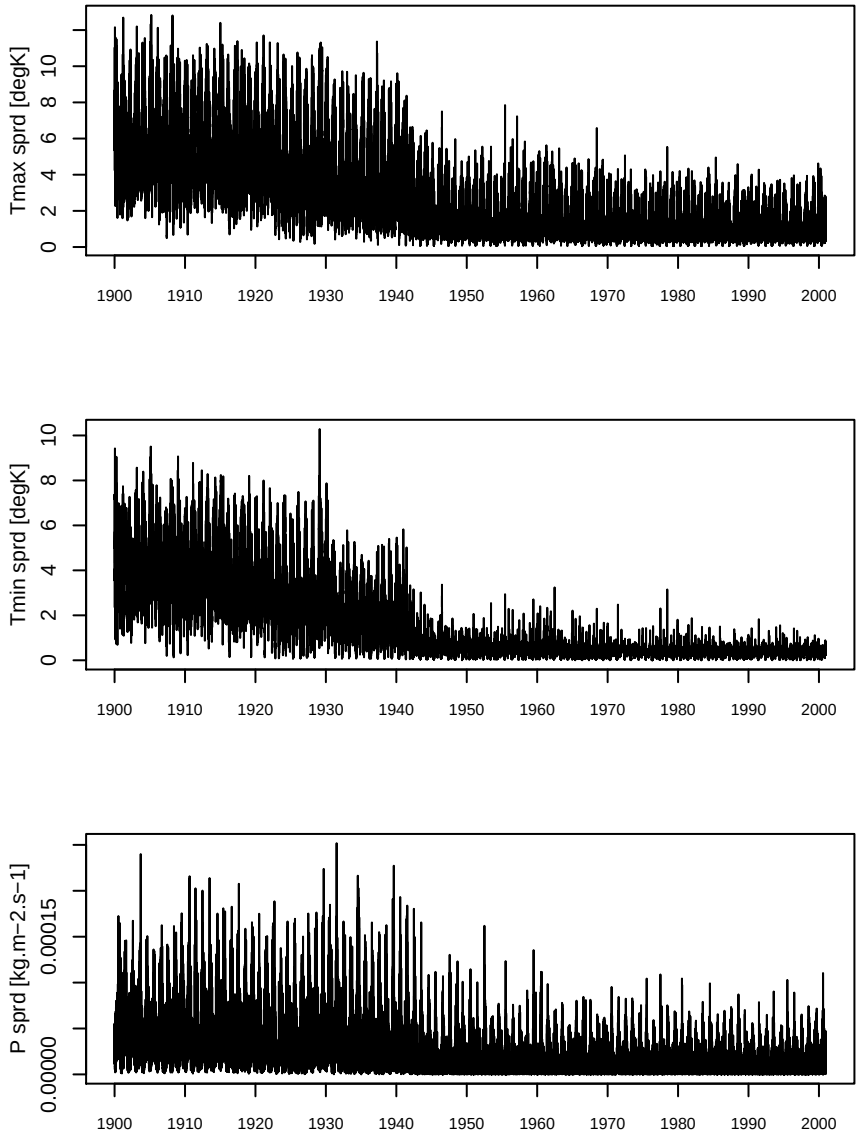
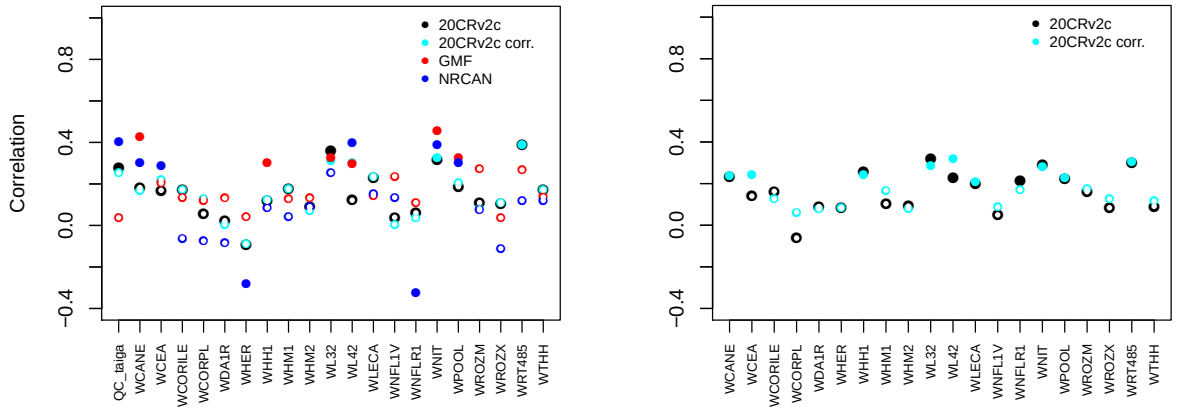


Figure S62. WL42 (Fig. 1a). Ensemble spread of maximum temperature (Tmax sprd), minimum temperature (Tmin sprd) and precipitations (P sprd) for the NOAA-CIRES 20th Century Reanalysis V2c (Table 2) for the 1900-2000 time period.



(a) 1950-2000 **(b)** 1900-2000

Figure S63. Pearson correlation coefficients between tree growth observations and simulations at the Eastern Canadian taiga sites (Fig. 1a) with VS-Lite using the different climatic datasets described in Table 2 for the 1950-2000 (a) and 1900-2000 (b) calibration periods. White inner circles stand for non-significant correlations (p-value > 0.05).