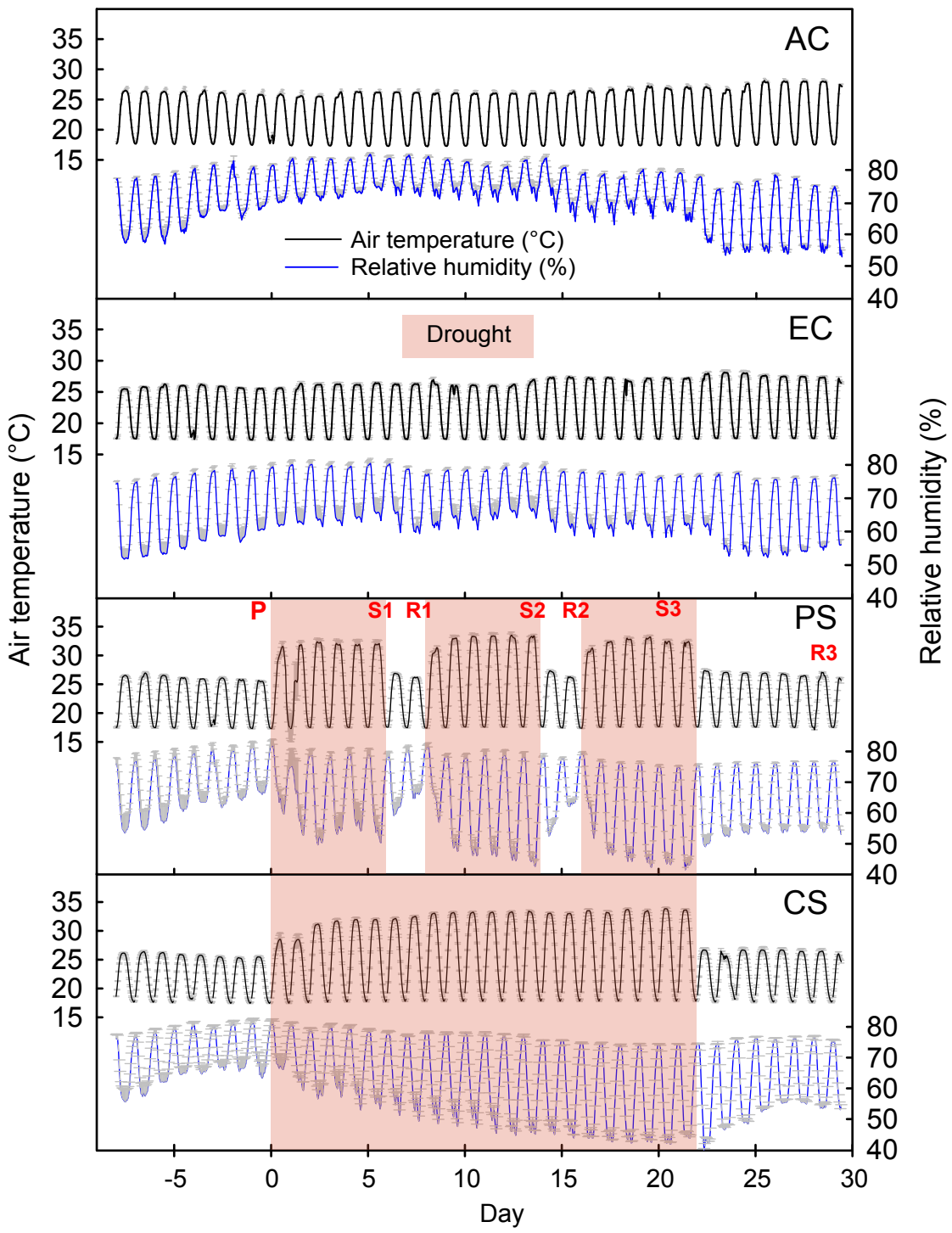
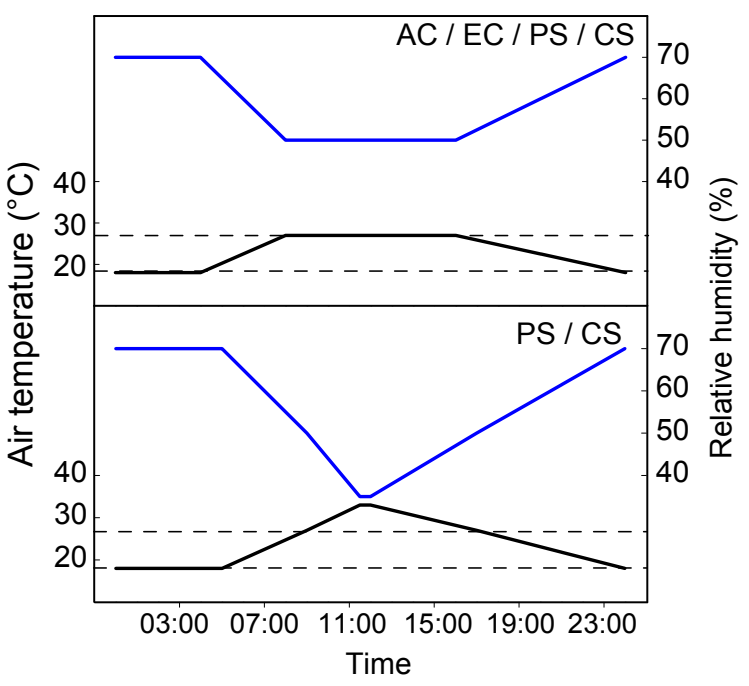
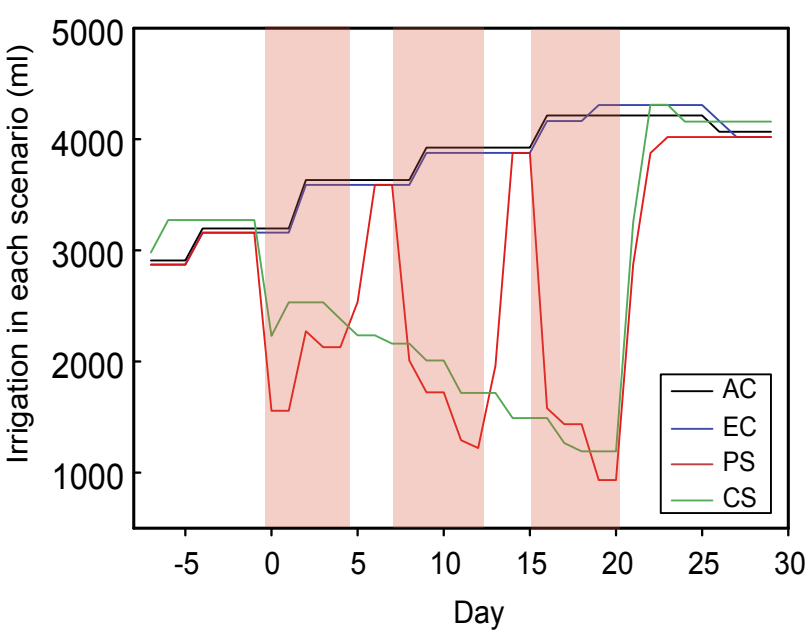
A



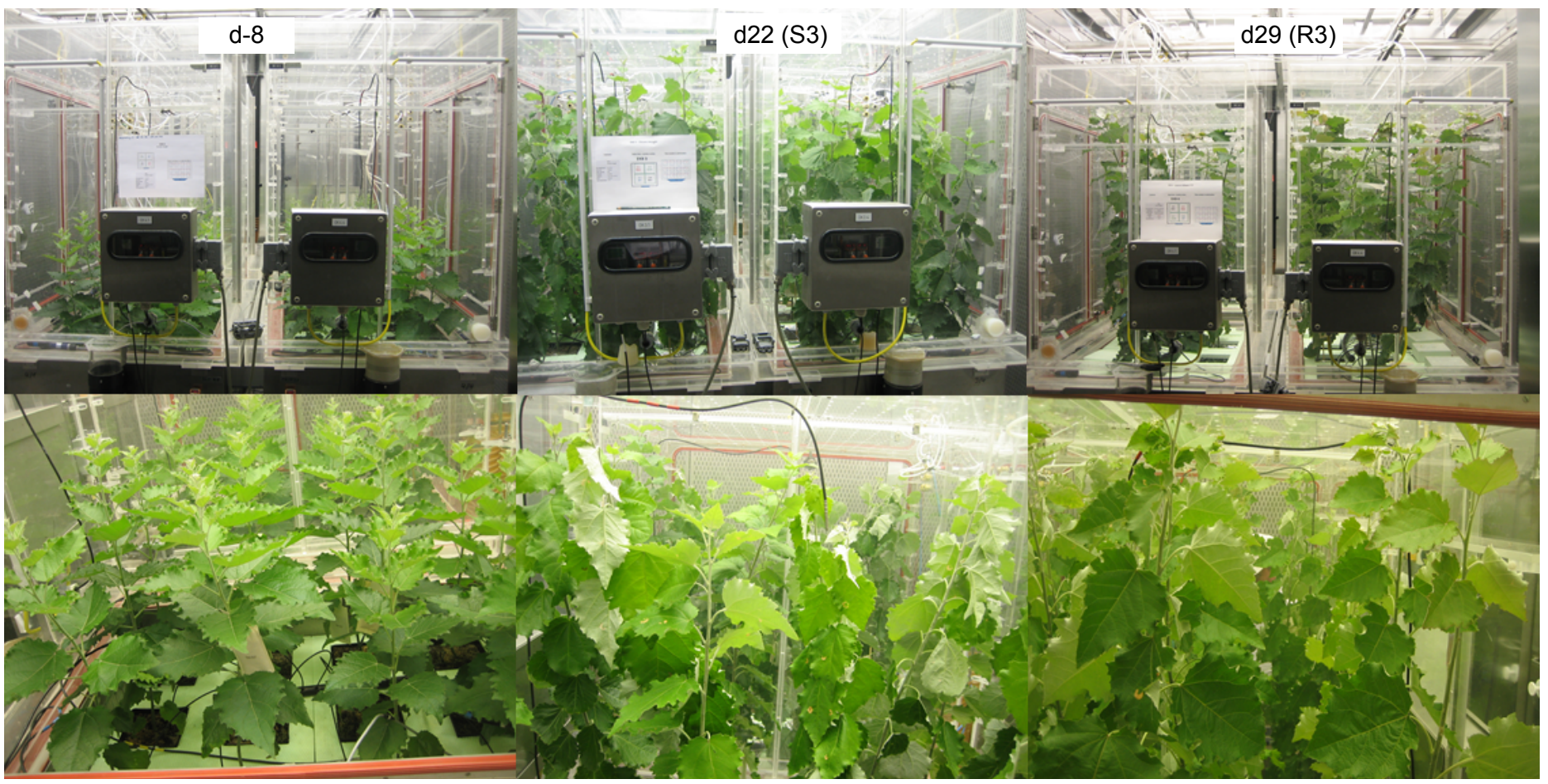
B



C



D



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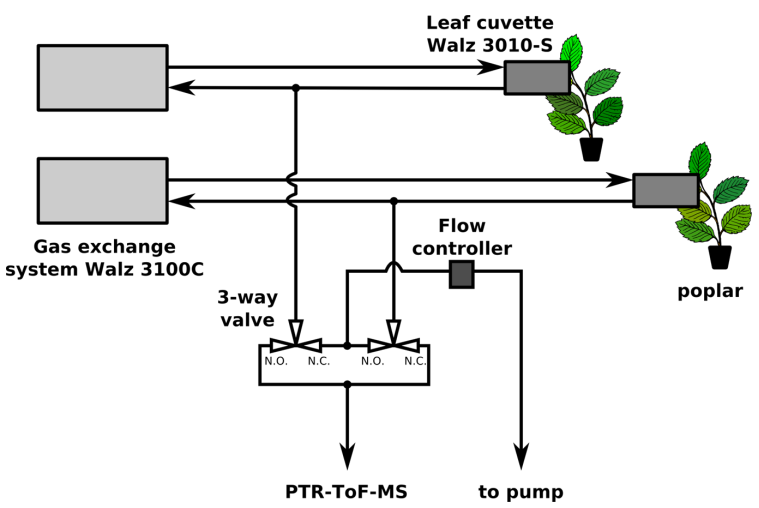

Figure S1. Time courses of air temperature, relative humidity, irrigation and plant appearance in the four scenarios. A, Diurnal course of air temperature and relative humidity during the experiment. The given values are the means of 4 sub-chambers (± SE). B, Theoretical values of daily air temperature and relative humidity when maximum air temperature was set to 27 °C (pre-stress and recovery, above) and to 33 °C during stress in PS and CS (below). Dashed lines indicate mean night temperature (18 °C) and light hour air temperature under unstressed conditions (27 °C). C, Irrigation profile of the experiment. Water amount (in ml) is given to the pots by automated drip irrigation systems. Values represent means of the 4 sub-chambers (representing each genotype) within each scenario (AC, EC, PS, CS). D, Front view of 2 sub-chambers (scenario PS) with12 Grey poplar plants arranged within 1 sub-chamber. E, Schematic of the setup used for the leaf-level gas exchange and VOC emission measurements. The PTR-ToF-MS was sampling from the leaf cuvette back-stream line and could be switched to sample from either gas exchange system. AC = control ambient [CO_2], EC = control elevated [CO_2], PS = periodic stress, CS = chronic stress.

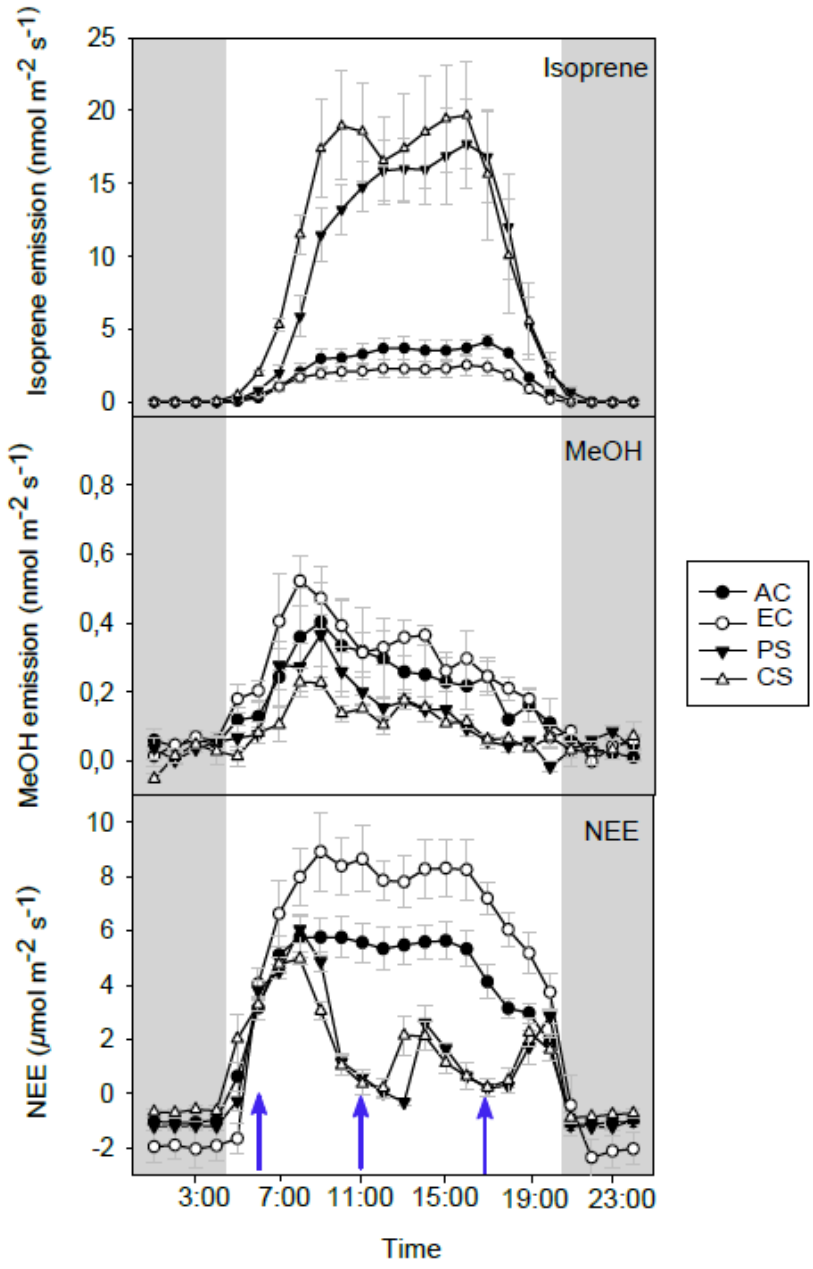

Figure S2. Representative day (d20) showing the CL isoprene emission (NIE), MeOH emission and net ecosystem exchange (NEE). Blue arrows indicate time points of irrigation in the 4 scenarios (6:00; 12:00; 18:00, MEZ). Amount of water in AC and EC was higher than in PS and CS. Values for each scenario and treatments are given as mean of 4 sub-chambers (± SE). Dark hours are highlighted in grey. AC = control ambient [CO_2], EC = control elevated [CO_2], PS = periodic stress, CS = chronic stress.

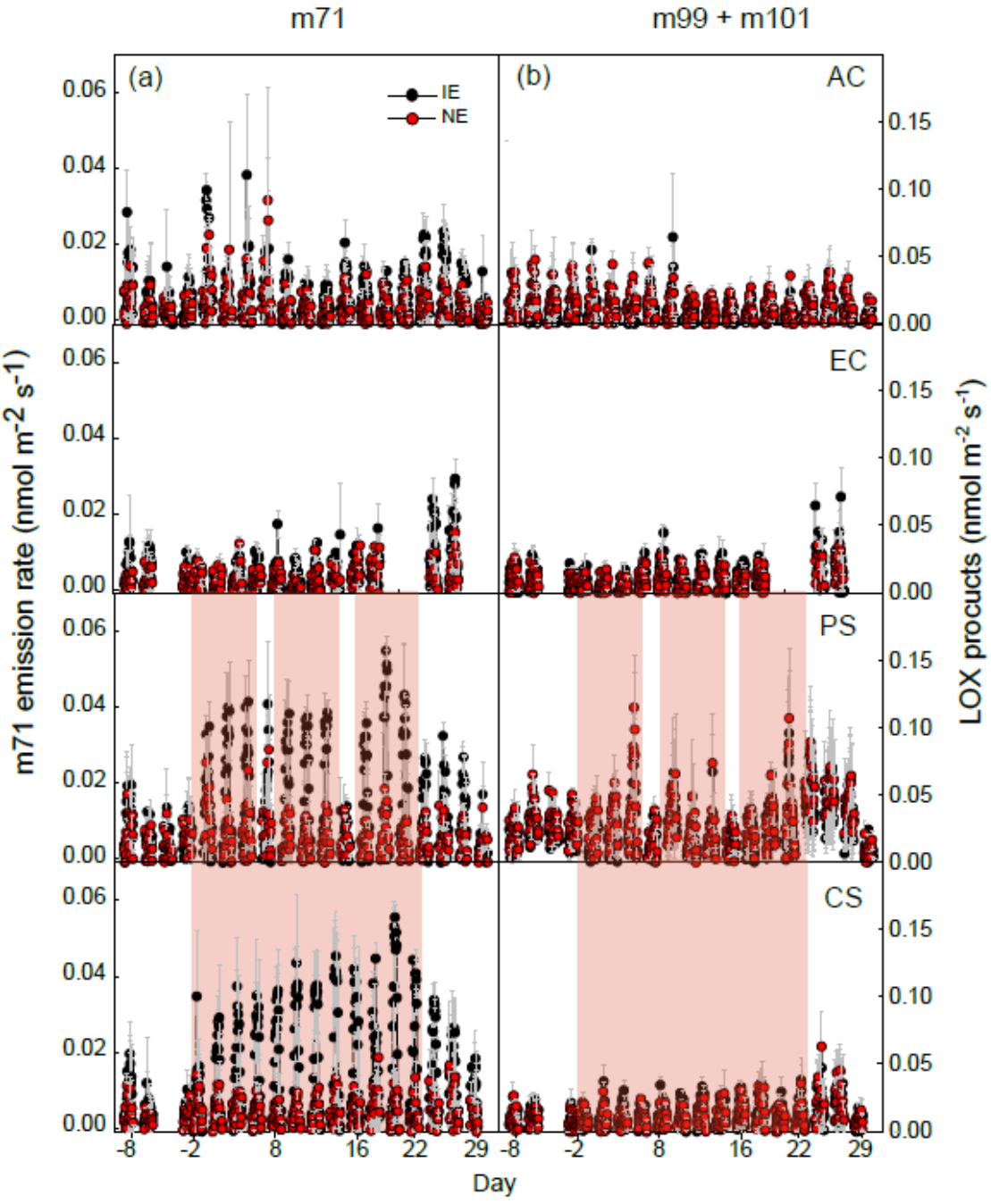

Figure S3. Time course of (a) m71 and (b) LOX products (i.e. m99 + m101) emission rates of IE (black circles) and NE (red circles) poplar genotypes in the four scenarios (AC, EC, PS, CS). Measurements were performed on the CL. Periods of HDS are highlighted in red. Values represent means of n = 4 ± SE.

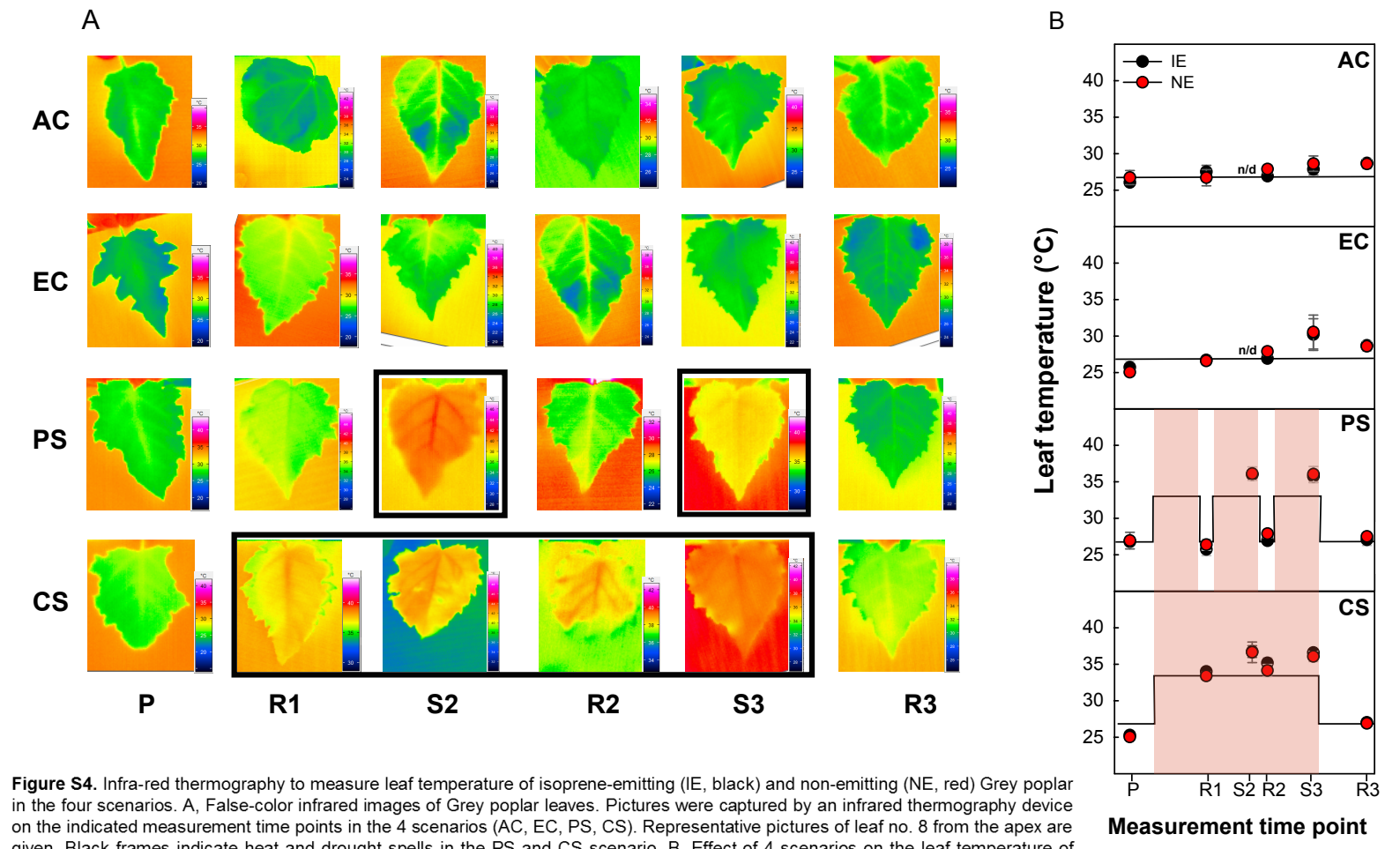

Figure S4. Infra-red thermography to measure leaf temperature of isoprene-emitting (IE, black) and non-emitting (NE, red) Grey poplar in the four scenarios. A, False-color infrared images of Grey poplar leaves. Pictures were captured by an infrared thermography device on the indicated measurement time points in the 4 scenarios (AC, EC, PS, CS). Representative pictures of leaf no. 8 from the apex are given. Black frames indicate heat and drought spells in the PS and CS scenario. B, Effect of 4 scenarios on the leaf temperature of isoprene-emitting (IE, black circles) and non-emitting (NE, red circles) poplar genotypes. Values represent means (± SE) of measurements performed in four sub-chambers; dashed lines denote the maximum air temperature during the light hours in the different scenarios. Thermal images were obtained using a thermographic digital camera (VarioCAM basic, Jenoptic Laser, Jena, Germany); pictures were taken from the adaxial side on the 8th leaf from the top at the time points P, R1, S2, R2, S3 and R3. Digital thermograms were analyzed with the IRBIS Plus software package (v. 2.2 Infratec, Dresden, Germany).

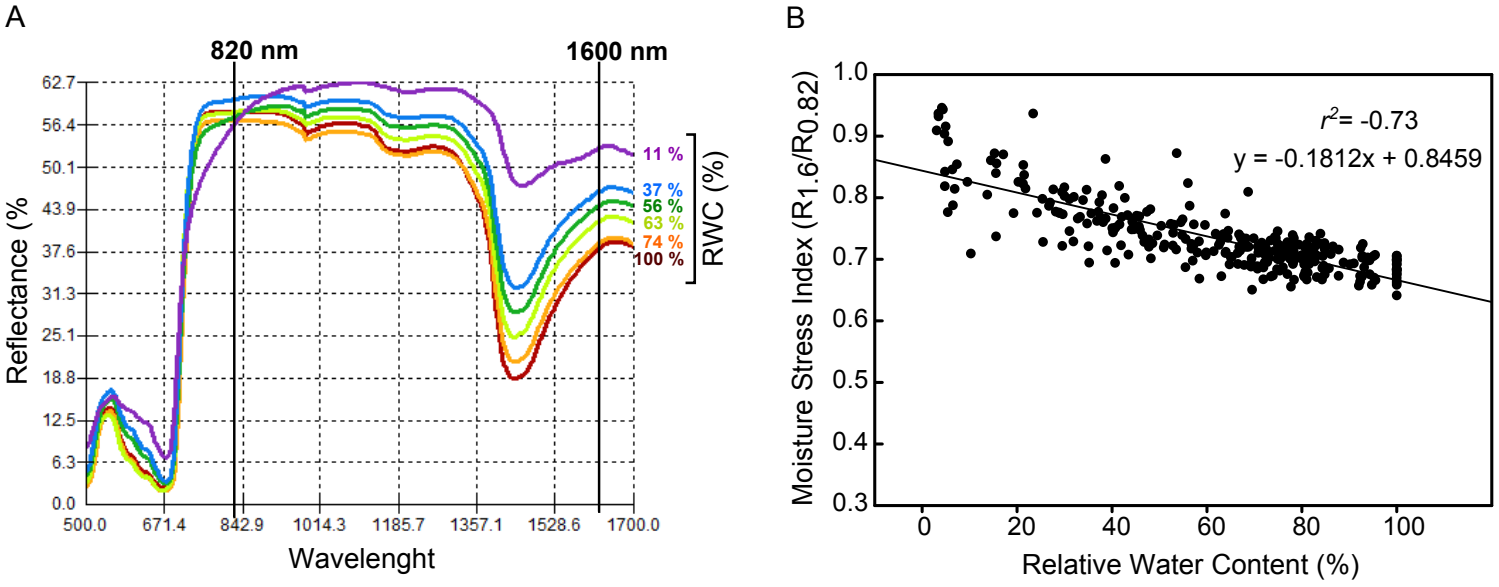

Figure S5. Drying experiment to assess the Moisture Stress Index and the Relative Water Context of Grey poplar leaves. A, Representative spectra of a leaf of Grey poplar during drying. Corresponding relative water contents (RWC) are given. Leaf reflectance was measured by near infrared spectrometry device, RWC was calculated based on the hourly leaf weight according the following equation: (FreshWeight-DryWeight)/(FreshWeight$_0$-DryWeight). Wavelengths of 820 nm and 1600 nm (vertical lines) were used for calculation of the Moisture Stress Index (MSI = Reflectance$_{1600}$/Reflectance$_{820}$). B, Relationship of the MSI to the RWC of drying leaves of Grey poplar. Five plants of each isoprene-emitting and non-emitting poplar genotype were examined hourly by NIR reflectance. Regression equation and coefficient of correlation are given.

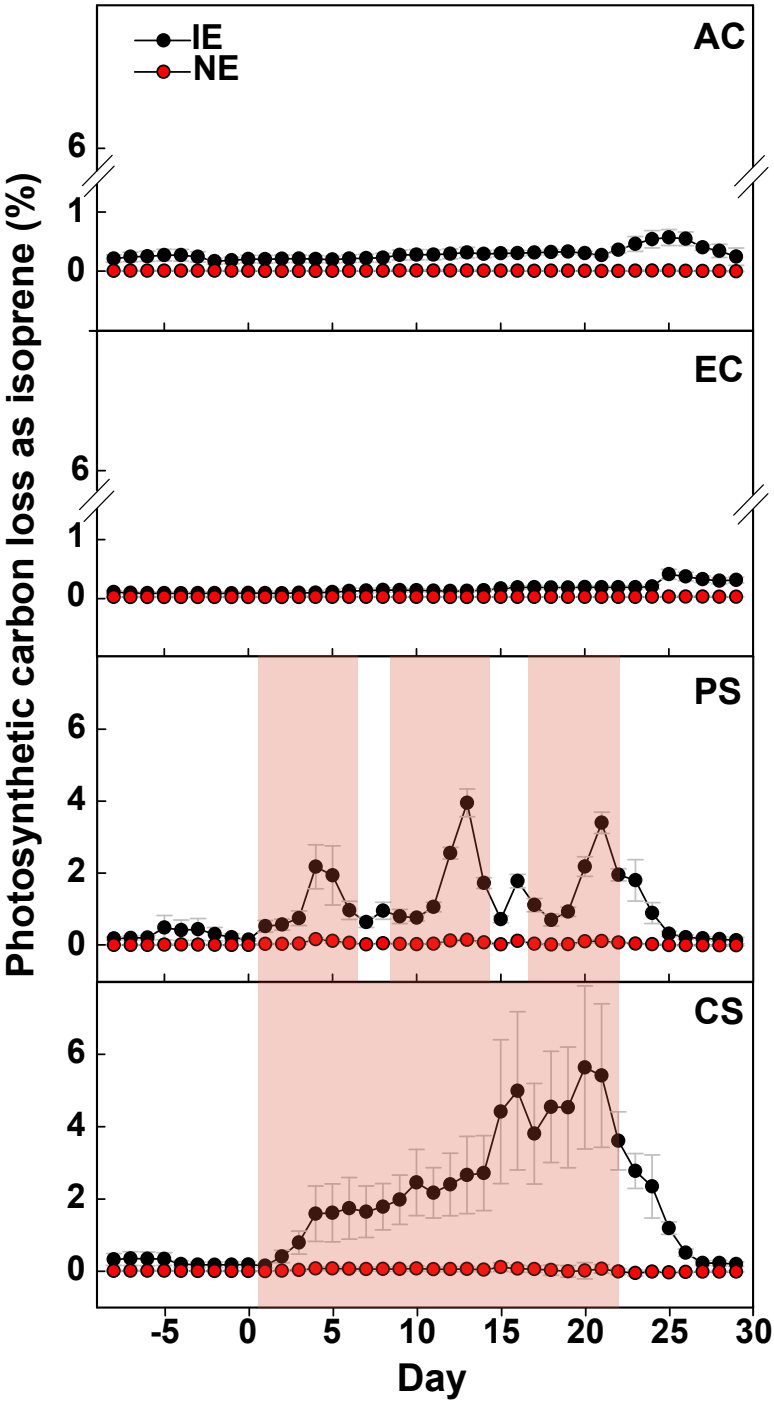

Figure S6. Time course showing the daily percentage of the photosynthetic carbon loss as isoprene in the four scenarios. Calculations are based on canopy CO_2 (NEE) and canopy isoprene emission. Values for each scenario are given as mean of n = 4 (± SE). The scenarios are: AC = control with ambient [CO_2], EC = control with elevated [CO_2], PS = periodic stress, CS = chronic stress. Periods of heat and drought are indicated in red.

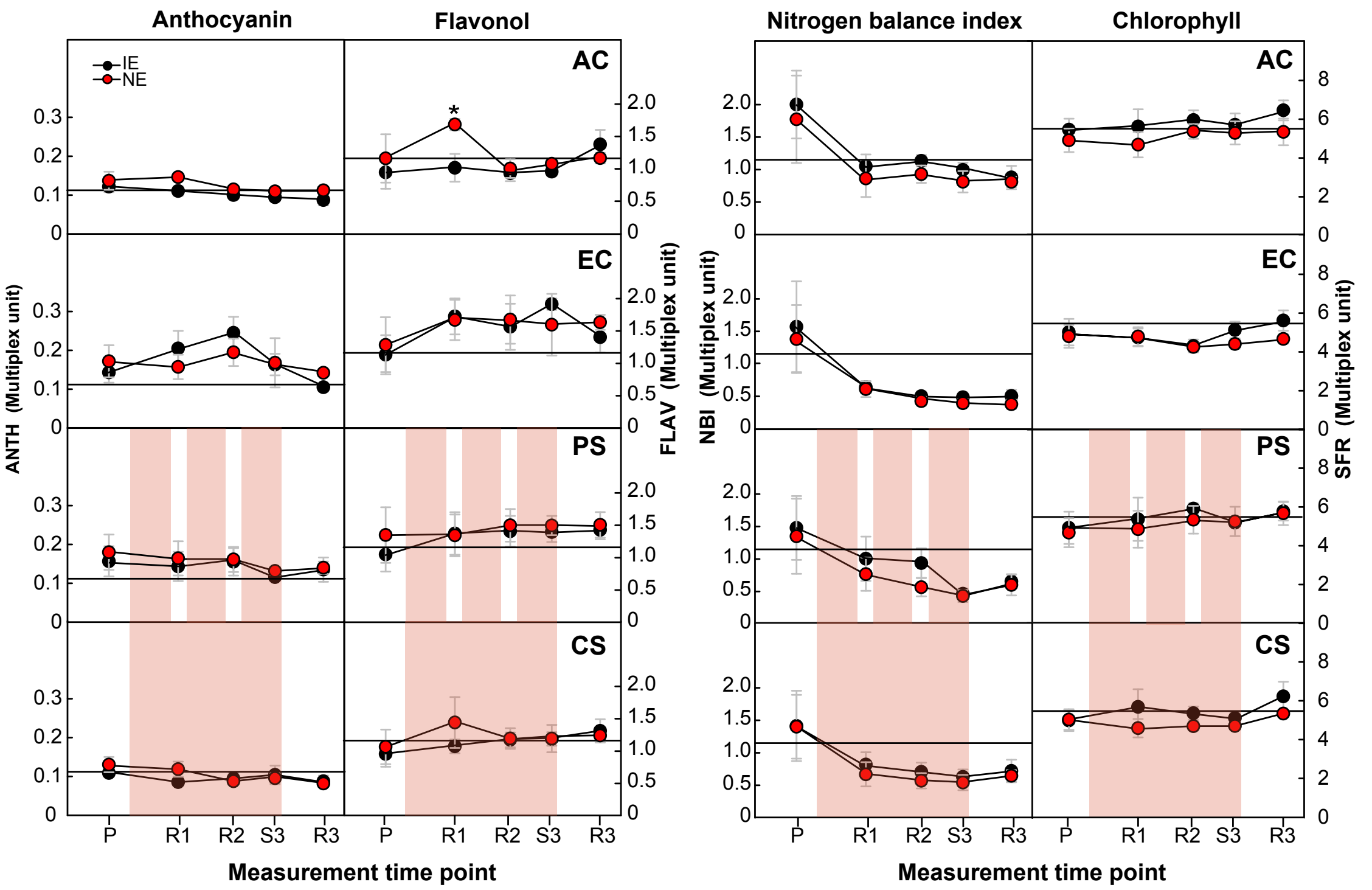

Figure S7. Effect of four scenarios on the anthocyanin index, flavonol index, nitrogen balance index (NBI®) and chlorophyll index of isoprene-emitting (IE, black circles) and non-emitting (NE, red circles) poplar genotypes. Measurement of the pigments was performed weekly by Multiplex® optical sensor (Force-A, Orsay, France). Values represent means (± SE) of measurements performed in 4 sub-chambers; dashed lines indicate an arbitrary reference value. Asterisks indicate significant genotype differences within each scenario and time point ($P < 0.05$).
Multiplex® optical sensor: The fluorescence signals are measured in the red (RF) and far-red (FRF) spectral regions excited under ultraviolet (UV), green (G) or red (R) radiation (in the following equations the subscripted characters indicate the excitation radiation). The simple chlorophyll fluorescence ratio (SFR) of far-red emission (735 nm) divided by red emission (685 nm) is linked to the chlorophyll content of the sample (Lichtenthaler et al., 1986; Buschmann, 2007). The flavonol index (FLAV), calculated according to equation FLAV = $\log(FRF_R/FRF_{UV})$, is proportional to the flavonol content of the leaf (Cerovic et al., 2002). Other fluorescence-based indices like the anthocyanin index ANTH = $\log(FRF_R/FRF_G)$ and the nitrogen balance index NBI = FRF_{UV}/RF_G are also described in literature (Meyer et al., 2006; Agati et al., 2007). Multiplex® measurements were performed in situ under ambient light conditions on the time points pre-stress (P), recovery phase 1 (R1), recovery phase 2 (R2), stress cycle 3 (S3), and recovery phase 3 (R3) on 6 plants per genotype and scenario. A constant distance between sensor and leaves was kept at all measurements using a grid in front of the sensor.

Supplemental Tables

Table S1. Results of two-way ANOVAs and Bonferroni post-hoc tests for all measured parameters. Significant differences are marked in red when $P < 0.05$.

		Main effect genotypes				Main scenario effect (IE + NE)						Scenario effect											
												IE						NE					
	Time points	AC	EC	PS	CS	AC vs EC	AC vs PS	AC vs CS	EC vs PS	EC vs CS	PS vs CS	AC vs EC	AC vs PS	AC vs CS	EC vs PS	EC vs CS	PS vs CS	AC vs EC	AC vs PS	AC vs CS	EC vs PS	EC vs CS	PS vs CS
		Canopy-level																					
Net ecosystem exchange (NEE)	all time points	0.191	0.320	0.089	0.009	0.001	0.412	0.001	0.010	< 0.001	< 0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.348	0.961	0.205	0.372	1.000	0.172	1.000	0.532	1.000	0.164	1.000	0.988	1.000	1.000	1.000	1.000	1.000	0.517	1.000	0.544	1.000	0.052
	S1	0.338	0.566	0.700	0.542	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	0.045	0.051	0.004	0.005	1.000	1.000	0.008	< 0.001	0.088	0.009	1.000
	R1	0.531	0.499	0.967	0.605	0.768	0.018	< 0.001	1.000	< 0.001	< 0.001	0.515	0.088	0.019	1.000	< 0.001	< 0.001	1.000	0.441	< 0.001	1.000	0.001	< 0.001
	S2	0.567	0.899	0.425	0.789	1.000	< 0.001	< 0.001	< 0.001	< 0.001	0.961	1.000	0.001	0.014	< 0.001	0.002	1.000	1.000	< 0.001	0.001	< 0.001	0.001	1.000
	R2	0.846	0.516	0.016	0.042	0.278	< 0.001	< 0.001	0.004	0.028	1.000	0.376	< 0.001	< 0.001	0.015	0.082	1.000	1.000	0.005	0.014	0.408	0.705	1.000
	S3	0.985	0.793	0.643	0.511	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	0.001	0.001	0.001	0.001	1.000	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000
	R3	0.846	0.516	0.016	0.042	0.278	< 0.001	< 0.001	0.004	0.028	1.000	0.376	< 0.001	< 0.001	0.015	0.082	1.000	1.000	0.005	0.014	0.408	0.705	1.000
Evapotranspiration	all time points	0.001	0.023	< 0.001	< 0.001	< 0.001	0.466	< 0.001	< 0.001	< 0.001	< 0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.710	< 0.001	0.523	0.011	< 0.001	0.001	0.573	< 0.001	< 0.001	0.186	< 0.001	0.167	0.142	< 0.001	< 0.001	1.000	1.000	0.009	1.000	1.000	1.000	0.012
	S1	< 0.001	< 0.001	< 0.001	0.021	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.240	< 0.001	0.005	< 0.001	< 0.001	< 0.001	< 0.001	1.000	< 0.001	0.092	< 0.001	0.023	0.157
	R1	0.001	< 0.001	< 0.001	0.118	0.002	0.594	< 0.001	0.139	< 0.001	< 0.001	< 0.001	0.528	< 0.001	0.007	< 0.001	< 0.001	1.000	1.000	0.222	1.000	0.187	0.042
	S2	0.012	< 0.001	< 0.001	0.736	0.006	< 0.001	< 0.001	< 0.001	< 0.001	1.000	0.004	0.001	< 0.001	< 0.001	< 0.001	0.726	1.000	< 0.001	0.059	< 0.001	0.005	0.021
	R2	0.525	0.007	0.031	0.836	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001	0.034	0.180	< 0.001	1.000	< 0.001	< 0.001	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001
	S3	0.979	0.012	0.020	0.857	0.267	< 0.001	< 0.001	< 0.001	< 0.001	1.000	0.025	0.013	< 0.001	< 0.001	< 0.001	0.706	1.000	< 0.001	< 0.001	< 0.001	0.002	1.000
	R3	0.901	0.077	0.550	0.138	0.295	< 0.001	< 0.001	0.001	0.900	0.017	0.112	< 0.001	0.002	0.288	1.000	0.544	1.000	< 0.001	0.141	0.003	0.908	0.063
Water use efficiency (WUE), canopy	all time points	< 0.001	0.003	< 0.001	< 0.001	0.099	1.000	1.000	0.007	0.001	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.133	0.112	0.360	0.465	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S1	0.010	0.059	< 0.001	< 0.001	1.000	0.131	< 0.001	0.004	< 0.001	0.041	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001	1.000	0.003	1.000	< 0.001	1.000	< 0.001
	R1	0.016	0.080	0.405	0.014	1.000	1.000	1.000	1.000	0.423	0.500	1.000	1.000	0.016	1.000	0.005	0.026	1.000	0.924	0.390	1.000	1.000	1.000
	S2	0.041	0.210	< 0.001	0.258	1.000	< 0.001	1.000	< 0.001	1.000	< 0.001	1.000	1.000	0.377	1.000	0.216	0.237	1.000	< 0.001	1.000	< 0.001	1.000	< 0.001
	R2	0.062	0.608	0.970	0.546	1.000	0.863	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.801	0.312	0.368	1.000	1.000	1.000
	S3	0.248	0.612	0.904	0.556	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.652	1.000	1.000	1.000
	R3	0.742	0.729	0.843	0.895	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Electron transport rate (ETR) leaf4	all time points	0.677	0.918	0.017	0.344	1.000	0.793	1.000	0.177	1.000	0.063	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.967	0.496	0.984	0.735	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S1	n/d	n/d	0.686	0.755	n/d	n/d	n/d	n/d	n/d	0.496	.	.	.	.	.	0.902	.	.	.	.	.	0.402
	R1	0.927	0.967	0.955	0.842	1.000	0.554	1.000	0.149	1.000	0.380	1.000	1.000	1.000	1.000	0.677	1.000	1.000	1.000	1.000	0.656	1.000	0.892

	S2	n/d	n/d	0.019	0.399	n/d	n/d	n/d	n/d	n/d	0.001	.	.	.	.	.	0.122	.	.	.	.	.	0.003
	R2	0.739	0.422	0.202	0.160	1.000	1.000	1.000	1.000	1.000	1.000	0.779	1.000	0.580	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S3	0.770	0.951	0.051	0.126	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.936	1.000	1.000	1.000	1.000
	R3	0.307	0.898	0.759	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
ETR leaf8	all time points	0.231	0.451	< 0.001	0.001	0.164	< 0.001	0.647	0.044	1.000	0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.735	0.894	0.742	0.629	1.000	1.000	0.374	1.000	1.000	0.850	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.504	1.000	1.000	0.893
	S1	.	.	0.024	0.758	n/d	n/d	n/d	n/d	n/d	0.566	.	.	.	.	.	0.565	.	.	.	.	.	0.167
	R1	0.984	0.742	0.735	0.622	1.000	1.000	1.000	1.000	1.000	0.334	1.000	1.000	1.000	1.000	1.000	0.462	1.000	1.000	1.000	1.000	1.000	1.000
	S2	.	.	< 0.001	0.003	n/d	n/d	n/d	n/d	n/d	< 0.001	.	.	.	.	.	0.074	.	.	.	.	.	< 0.001
	R2	0.593	0.926	0.291	0.007	1.000	0.536	0.265	1.000	0.815	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.024	0.072	1.000	0.109	1.000
	S3	0.255	0.412	0.014	0.005	0.004	< 0.001	0.001	0.016	1.000	0.048	0.054	0.001	0.353	1.000	1.000	0.242	0.128	< 0.001	0.003	0.020	0.023	0.515
	R3	0.518	0.758	0.681	0.934	0.256	1.000	1.000	0.227	0.544	1.000	0.649	1.000	1.000	0.763	1.000	1.000	1.000	1.000	1.000	0.982	0.982	1.000
ETR leaf12	all time points	0.453	0.746	< 0.001	0.010	1.000	< 0.001	0.113	< 0.001	0.234	0.014	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.969	0.938	0.897	0.796	0.439	1.000	0.743	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S1	n/d	n/d	0.387	0.959	n/d	n/d	n/d	n/d	n/d	0.482	n/d	n/d	n/d	n/d	n/d	0.969	n/d	n/d	n/d	n/d	n/d	0.339
	R1	0.928	0.990	0.642	0.938	1.000	1.000	1.000	0.374	1.000	1.000	1.000	1.000	1.000	0.715	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S2	n/d	n/d	< 0.001	0.038	n/d	n/d	n/d	n/d	n/d	< 0.001	n/d	n/d	n/d	n/d	n/d	0.006	n/d	n/d	n/d	n/d	n/d	< 0.001
	R2	0.866	0.948	0.333	0.023	1.000	0.252	0.122	0.338	0.169	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.396	0.044	0.374	0.041	1.000
	S3	0.623	0.806	0.001	0.020	0.119	< 0.001	< 0.001	< 0.001	0.009	1.000	0.263	0.004	0.018	0.872	1.000	1.000	1.000	< 0.001	< 0.001	< 0.001	0.003	1.000
	R3	0.251	0.727	0.172	0.679	1.000	1.000	1.000	1.000	1.000	1.000	0.894	1.000	1.000	0.831	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Isoprene emission, canopy	all time points	< 0.001	0.033	< 0.001	0.000	0.057	< 0.001	< 0.001	< 0.001	< 0.001	0.002	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.112	0.703	0.155	0.159	0.853	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S1	0.126	0.577	< 0.001	< 0.001	1.000	0.084	0.100	0.073	0.078	1.000	1.000	0.008	0.004	0.007	0.003	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.117	0.473	0.051	< 0.001	1.000	1.000	< 0.001	1.000	0.001	0.001	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001	1.000	1.000	1.000	1.000	1.000	1.000
	S2	0.063	0.503	< 0.001	< 0.001	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R2	0.065	0.394	0.001	< 0.001	1.000	1.000	< 0.001	1.000	< 0.001	0.002	1.000	0.782	< 0.001	0.419	< 0.001	< 0.001	1.000	1.000	1.000	1.000	1.000	1.000
	S3	0.058	0.412	< 0.001	< 0.001	1.000	0.002	< 0.001	0.004	< 0.001	1.000	1.000	< 0.001	< 0.001	< 0.001	< 0.001	0.366	1.000	1.000	1.000	1.000	1.000	1.000
	R3	0.009	0.094	0.006	0.003	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Methanol emission, canopy	all time points	0.048	0.037	0.284	0.466	0.077	< 0.001	< 0.001	< 0.001	< 0.001	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.040	0.898	0.135	0.885	1.000	1.000	1.000	1.000	0.241	0.351	0.591	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.437	1.000	0.674	0.188
	S1	0.420	0.789	0.624	0.684	1.000	0.096	0.204	1.000	1.000	1.000	1.000	0.719	1.000	1.000	1.000	1.000	1.000	0.372	0.214	1.000	1.000	1.000
	R1	0.351	0.355	0.595	0.873	1.000	0.798	0.038	0.247	0.014	1.000	0.810	1.000	0.961	0.172	0.053	1.000	1.000	1.000	0.080	1.000	0.532	1.000
	S2	0.493	0.396	0.798	0.515	0.414	0.022	0.067	< 0.001	0.001	1.000	0.243	0.378	1.000	0.003	0.019	1.000	1.000	0.135	0.084	0.105	0.070	1.000
	R2	0.809	0.305	0.876	0.697	1.000	0.140	0.014	0.022	0.002	1.000	0.871	0.701	0.372	0.040	0.019	1.000	1.000	0.591	0.079	0.919	0.210	1.000
	S3	0.957	0.167	0.789	0.920	0.127	0.143	0.286	< 0.001	0.001	1.000	0.088	0.523	1.000	0.001	0.003	1.000	1.000	0.802	0.831	0.250	0.259	1.000
	R3	0.624	0.077	0.715	0.939	0.010	1.000	1.000	0.009	0.011	1.000	0.004	1.000	1.000	0.011	0.009	1.000	1.000	1.000	1.000	0.960	1.000	1.000
Relative water content (RWC) leaf4	all time points	0.406	0.445	0.972	0.888	0.030	0.123	1.000	1.000	0.009	0.027	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.926	1.000	0.577	0.642	0.022	1.000	0.082	0.201	1.000	0.795	0.212	1.000	0.696	0.497	1.000	1.000	0.253	1.000	0.317	1.000	1.000	1.000
	S1	n/d	n/d	0.931	0.853	n/d	n/d	n/d	n/d	n/d	0.659	n/d	n/d	n/d	n/d	n/d	0.731	n/d	n/d	n/d	n/d	n/d	0.780
	R1	0.391	0.895	0.710	0.404	1.000	1.000	0.477	1.000	1.000	0.260	1.000	1.000	1.000	1.000	1.000	0.577	1.000	1.000	1.000	1.000	1.000	1.000
	S2	n/d	n/d	0.780	0.853	n/d	n/d	n/d	n/d	n/d	0.043	n/d	n/d	n/d	n/d	n/d	0.228	n/d	n/d	n/d	n/d	n/d	0.096
	R2	0.458	0.238	0.853	0.642	1.000	0.082	0.137	1.000	0.016	< 0.001	0.423	0.256	1.000	1.000	0.053	0.016	1.000	0.833	0.163	1.000	0.581	0.002
	S3	0.710	0.358	0.516	0.458	0.656	1.000	1.000	1.000	0.066	0.351	0.423	1.000	1.000	1.000	0.253	1.000	1.000	1.000	0.990	1.000	0.677	0.990
	R3	0.780	0.793	0.458	0.780	0.895	0.001	0.000	0.420	0.004	0.260	1.000	0.016	0.001	0.497	0.080	1.000	1.000	0.062	< 0.001	1.000	0.098	0.317

RWC leaf 8	all time points	0.269	0.948	0.848	0.032	0.002	< 0.001	0.386	0.044	0.095	< 0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.919	0.772	0.682	0.414	1.000	1.000	0.588	1.000	0.758	0.898	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.760	1.000	0.686	1.000
	S1	n/d	n/d	1.000	0.759	n/d	n/d	n/d	n/d	n/d	0.188	n/d	n/d	n/d	n/d	n/d	0.298	n/d	n/d	n/d	n/d	n/d	0.414
	R1	0.479	0.470	0.838	0.262	1.000	0.005	1.000	0.117	1.000	0.005	1.000	0.026	1.000	1.000	1.000	0.016	1.000	0.313	1.000	0.280	1.000	0.503
	S2	n/d	n/d	1.000	1.000	n/d	n/d	n/d	n/d	n/d	0.010	n/d	n/d	n/d	n/d	n/d	0.067	n/d	n/d	n/d	n/d	n/d	0.067
	R2	0.474	0.772	0.540	0.609	0.073	< 0.001	1.000	0.086	0.027	1.000	0.339	< 0.001	1.000	0.580	0.231	1.000	0.580	< 0.001	1.000	0.408	0.280	< 0.001
	S3	0.838	0.664	0.682	0.682	0.045	0.007	1.000	1.000	0.002	< 0.001	0.231	0.255	1.000	1.000	0.019	0.011	0.488	0.052	1.000	1.000	0.189	0.011
	R3	0.262	0.312	0.084	0.012	0.053	< 0.001	< 0.001	< 0.001	0.027	0.371	0.488	< 0.001	< 0.001	< 0.001	0.686	0.004	0.280	< 0.001	< 0.001	0.408	0.080	1.000
RWC leaf 12	all time points	0.280	0.306	0.071	0.351	0.001	< 0.001	0.015	0.435	0.769	< 0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.938	0.827	0.487	0.487	1.000	1.000	0.618	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.863	1.000	1.000	1.000
	S1	n/d	n/d	0.617	0.817	n/d	n/d	n/d	n/d	n/d	0.916	n/d	n/d	n/d	n/d	n/d	0.775	n/d	n/d	n/d	n/d	n/d	0.643
	R1	0.373	0.051	0.106	0.589	1.000	0.980	1.000	1.000	1.000	0.767	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.639
	S2	n/d	n/d	0.643	0.817	n/d	n/d	n/d	n/d	n/d	0.035	n/d	n/d	n/d	n/d	n/d	0.166	n/d	n/d	n/d	n/d	n/d	0.106
	R2	0.589	0.743	0.248	1.000	0.502	< 0.001	1.000	0.146	1.000	0.003	0.616	0.011	1.000	1.000	1.000	0.331	1.000	0.001	1.000	0.147	1.000	0.015
	S3	0.643	0.743	0.757	0.699	0.104	0.006	1.000	1.000	0.341	0.036	0.234	0.087	1.000	1.000	1.000	0.639	1.000	0.131	1.000	1.000	1.000	0.131
	R3	0.699	0.445	0.938	0.106	0.116	< 0.001	< 0.001	0.006	1.000	0.016	1.000	< 0.001	0.192	0.038	1.000	0.023	0.314	< 0.001	0.005	0.314	1.000	0.995
Relative leaf expansion rate (RLER)	S3	0.997	n/d	0.881	0.608	n/d	0.001	< 0.001	n/d	n/d	1.000	n/d	0.017	0.003	n/d	n/d	1.000	n/d	0.024	0.010	n/d	n/d	1.000
Area per leaf	S3	0.495	n/d	0.436	0.896	n/d	0.002	0.002	n/d	n/d	1.000	n/d	0.030	0.014	n/d	n/d	1.000	n/d	0.024	0.048	n/d	n/d	1.000
Cell number	S3	0.368	n/d	0.877	0.371	n/d	0.072	0.270	n/d	n/d	1.000	n/d	0.142	0.747	n/d	n/d	1.000	n/d	0.565	0.578	n/d	n/d	1.000
Cell size	S3	0.672	n/d	0.586	0.366	n/d	0.002	< 0.001	n/d	n/d	1.000	n/d	0.027	0.002	n/d	n/d	0.643	n/d	0.021	0.032	n/d	n/d	1.000
Carbon sum	all time points	0.579	0.634	0.391	0.344	0.790	1.000	0.021	0.086	0.002	0.268	0.664	1.000	0.675	0.499	0.041	0.941	1.000	0.819	0.044	0.369	0.024	0.804
Anthocyanin index (ANTH)	all time points	0.216	0.780	0.632	0.690	< 0.001	0.047	1.000	0.336	< 0.001	0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.676	0.426	0.516	0.552	1.000	0.775	1.000	1.000	0.837	0.035	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.419	0.308	0.565	0.357	0.621	1.000	1.000	1.000	0.050	0.265	0.102	1.000	1.000	0.703	0.016	0.657	1.000	1.000	1.000	1.000	1.000	1.000
	R2	0.693	0.283	0.867	0.850	0.001	0.287	1.000	0.227	< 0.001	0.056	0.008	0.774	1.000	0.263	0.005	0.560	0.244	1.000	1.000	1.000	0.040	0.257
	S3	0.675	0.920	0.685	0.804	0.192	1.000	1.000	0.354	0.157	1.000	0.470	1.000	1.000	1.000	0.775	1.000	1.000	1.000	1.000	0.754	0.602	1.000
	R3	0.491	0.339	0.894	0.889	1.000	0.840	1.000	1.000	1.000	0.345	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.735	0.820
Flavonol index (FLAV)	all time points	0.203	0.900	0.834	0.591	0.002	0.163	1.000	0.490	0.015	0.848	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.538	0.668	0.393	0.752	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.049	0.902	0.933	0.295	0.354	1.000	1.000	1.000	0.722	1.000	0.133	0.652	1.000	1.000	0.504	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R2	0.839	0.807	0.792	0.955	0.156	0.347	1.000	1.000	0.739	1.000	0.886	1.000	1.000	1.000	1.000	1.000	0.489	1.000	1.000	1.000	1.000	1.000
	S3	0.731	0.483	0.471	0.981	0.071	1.000	1.000	0.554	0.286	1.000	0.080	1.000	1.000	1.000	0.326	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R3	0.549	0.543	0.825	0.860	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Nitrogen balance index (NBI)	all time points	0.348	0.512	0.320	0.614	0.066	0.119	0.107	1.000	1.000	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.585	0.647	0.756	0.974	1.000	0.645	0.616	1.000	1.000	1.000	1.000	1.000	0.948	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.650	0.942	0.566	0.715	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R2	0.619	0.851	0.370	0.738	0.343	1.000	1.000	1.000	1.000	1.000	0.797	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S3	0.658	0.658	0.746	0.829	1.000	0.574	1.000	0.575	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R3	0.872	0.758	0.896	0.857	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Chlorophyll index (SFR)	all time points	0.049	0.331	0.176	0.123	0.078	1.000	1.000	0.888	0.761	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.529	0.802	0.771	0.955	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.284	0.954	0.556	0.209	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

	R2	0.502	0.950	0.510	0.444	0.167	1.000	1.000	0.172	1.000	1.000	0.375	1.000	1.000	0.388	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S3	0.634	0.407	0.185	0.639	1.000	0.938	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.770	1.000	1.000	1.000	1.000
	R3	0.203	0.276	0.908	0.308	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Temperature (leaf)	all time points	0.659	0.864	0.553	0.559	1.000	0.830	< 0.001	1.000	< 0.001	< 0.001	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.710	0.713	0.933	0.888	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R1	0.531	0.926	0.615	0.638	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001	1.000	1.000	< 0.001	1.000	< 0.001	< 0.001
	S2	n/d	n/d	0.931	0.955	.	.	.	.	.	0.615	.	.	.	.	.	0.669	.	.	.	.	.	0.776
	R2	0.592	0.731	0.680	0.572	1.000	0.657	< 0.001	0.051	< 0.001	< 0.001	1.000	1.000	< 0.001	0.332	0.003	< 0.001	1.000	1.000	0.006	0.385	0.044	< 0.001
	S3	0.548	0.793	n/d.	n/d.	0.022	.	.	.	.	.	0.072	.	.	.	.	.	0.141	.	.	.	.	.
	R3	0.929	0.662	0.724	0.918	1.000	0.805	0.396	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Stem water potential (mid-day)	all time points	0.240	0.384	0.656	0.447	0.329	0.011	< 0.001	1.000	< 0.001	0.002	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.250	0.844	0.650	0.473	1.000	< 0.001	< 0.001	0.006	< 0.001	0.002	1.000	0.002	< 0.001	0.044	< 0.001	0.034	0.808	< 0.001	< 0.001	0.194	< 0.001	0.068
	R3	0.606	0.221	0.860	0.720	0.839	1.000	1.000	0.050	1.000	0.729	1.000	1.000	1.000	1.000	1.000	1.000	0.350	1.000	1.000	0.065	0.651	1.000
Leaf-level																							
Transpiration (E)	all time points	0.002	0.971	< 0.001	< 0.001	0.855	0.001	0.011	0.058	0.450	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.055	0.804	0.975	0.695	0.049	< 0.001	< 0.001	0.001	< 0.001	1.000	0.043	< 0.001	< 0.001	0.023	0.019	1.000	1.000	0.002	< 0.001	0.041	0.012	1.000
	R3	0.263	0.184	0.390	0.079	1.000	1.000	0.077	1.000	0.352	0.699	1.000	1.000	0.216	1.000	0.708	0.706	1.000	1.000	0.845	1.000	1.000	1.000
Net assimilation (A)	all time points	0.027	0.016	0.186	0.028	0.649	1.000	1.000	0.219	0.098	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.050	0.099	0.531	0.418	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	0.001	< 0.001	0.002	0.001	1.000	1.000	0.047	0.008	0.046	0.008	1.000
	R3	0.225	0.071	0.212	0.021	0.089	0.001	< 0.001	0.657	0.373	1.000	0.248	0.029	0.003	1.000	0.674	1.000	0.872	0.032	0.081	0.932	1.000	1.000
Water-use efficiency (WUE)	all time points	0.784	0.710	0.123	0.220	0.033	< 0.001	< 0.001	< 0.001	0.001	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.749	0.532	0.063	0.241	0.074	< 0.001	< 0.001	< 0.001	< 0.001	1.000	0.150	< 0.001	< 0.001	0.002	0.001	1.000	1.000	0.001	< 0.001	0.071	0.005	1.000
	R3	0.946	0.921	0.755	0.571	0.827	0.016	0.290	0.634	1.000	1.000	1.000	0.115	0.517	1.000	1.000	1.000	1.000	0.280	1.000	1.000	1.000	1.000
Stomatal conductance (g_s)	all time points	0.033	0.270	0.773	0.116	0.812	0.002	0.023	0.164	0.804	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.048	0.815	0.981	0.734	0.042	< 0.001	< 0.001	0.002	0.001	1.000	0.035	< 0.001	< 0.001	0.045	0.038	1.000	1.000	0.004	0.001	0.077	0.028	1.000
	R3	0.291	0.186	0.701	0.061	1.000	1.000	0.068	1.000	0.333	1.000	1.000	1.000	0.160	1.000	0.600	0.529	1.000	1.000	0.948	1.000	1.000	1.000
Intracellular [CO_2] (c_i)	all time points	0.847	0.905	0.346	0.985	< 0.001	1.000	1.000	< 0.001	0.002	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.875	0.726	0.299	0.576	0.099	0.341	0.119	< 0.001	< 0.001	1.000	0.837	0.318	0.840	0.006	0.025	1.000	0.299	1.000	0.376	0.045	0.002	1.000
	R3	0.909	0.856	0.769	0.558	< 0.001	0.104	0.002	0.410	1.000	1.000	0.020	0.783	0.138	0.756	1.000	1.000	0.024	0.343	0.022	1.000	1.000	1.000
c_i/c_a	all time points	0.495	0.171	< 0.001	< 0.001	1.000	0.002	0.011	< 0.001	< 0.001	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.979	0.735	0.253	0.757	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	< 0.001	0.001	0.001	0.002	1.000	1.000	0.015	< 0.001	0.013	< 0.001	1.000
	R3	0.715	0.576	0.564	0.677	0.395	1.000	0.987	0.331	1.000	0.851	0.956	1.000	1.000	0.334	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Transpiration dark (E_d)	all time points	0.593	0.798	0.429	0.221	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.378	0.606	0.769	0.938	0.865	< 0.001	< 0.001	0.023	0.031	1.000	0.515	0.002	0.004	0.280	0.424	1.000	1.000	0.072	0.068	0.168	0.159	1.000
	R3	0.898	0.876	0.409	0.073	0.536	0.001	< 0.001	0.181	< 0.001	0.022	1.000	0.107	< 0.001	< 0.001	< 0.001	0.006	1.000	0.016	0.001	0.261	0.033	1.000
Respiration dark (R_d)	all time points	0.509	0.309	0.456	0.830	0.843	0.361	0.001	1.000	0.061	0.175	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.060	0.987	0.352	0.920	1.000	1.000	1.000	1.000	1.000	0.607	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.185	1.000	1.000	1.000	0.695
	R3	0.329	0.148	0.051	0.839	0.112	0.002	< 0.001	0.991	0.032	0.830	0.333	1.000	0.008	1.000	0.957	0.210	0.876	0.001	0.001	0.053	0.058	1.000

Isoprene emission, leaf-level	all time points	< 0.001	0.000	< 0.001	< 0.001	0.039	1.000	1.000	0.064	0.855	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	< 0.001	0.001	< 0.001	< 0.001	0.466	1.000	1.000	0.155	1.000	1.000	0.114	1.000	1.000	0.018	0.950	0.581	1.000	1.000	1.000	1.000	1.000	1.000
	R3	< 0.001	0.002	< 0.001	< 0.001	0.199	1.000	1.000	0.906	1.000	1.000	0.476	1.000	1.000	0.316	0.772	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Photosynthetic carbon lost as isoprene (C%)	all time points	< 0.001	0.044	< 0.001	< 0.001	1.000	0.418	0.318	0.013	0.009	1.000	.	.	.	.	.	.	.	.	.	.	.	.
	S3	0.020	0.124	< 0.001	< 0.001	1.000	0.010	0.002	0.001	< 0.001	1.000	1.000	< 0.001	< 0.001	< 0.001	< 0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	R3	0.004	0.180	0.042	0.091	1.000	1.000	1.000	1.000	1.000	1.000	0.560	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Net ecosystem productivity	all time points	0.191	0.630	0.687	0.056	0.126	1.000	0.062	1.000	0.010	0.002	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.137	0.840	0.030	0.569	1.000	0.141	1.000	1.000	0.644	0.006	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.299	0.414	0.637	0.823	0.002
	S3	0.482	0.740	0.711	0.518	1.000	0.002	< 0.001	< 0.001	< 0.001	0.103	1.000	0.216	0.002	0.019	< 0.001	0.696	1.000	0.012	< 0.001	0.023	< 0.001	0.395
	R3	0.943	0.482	0.013	0.035	0.188	< 0.001	< 0.001	0.049	0.183	1.000	0.302	< 0.001	< 0.001	0.076	0.276	1.000	1.000	0.026	0.052	1.000	1.000	1.000
Net isoprene loss	all time points	0.000	0.059	< 0.001	0.000	1.000	0.153	0.003	0.022	0.001	0.930	.	.	.	.	.	.	.	.	.	.	.	.
	P	0.042	0.559	0.030	0.026	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	S3	0.022	0.381	0.000	< 0.001	1.000	0.002	< 0.001	0.002	< 0.001	0.964	1.000	< 0.001	< 0.001	< 0.001	< 0.001	0.215	1.000	1.000	1.000	1.000	1.000	1.000
	R3	0.002	0.068	0.003	< 0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.460	1.000	0.314	0.295	1.000	1.000	1.000	1.000	1.000	1.000

Table S2. Calculated angles of different stress phases of cumulative net C gain. Phases are: P = pre-stress, S1 = stress cycle 1, R1 = recovery phase 1, S2 = stress cycle 2, R2 = recovery phase 2, S3 = stress cycle 3, R3 = recovery phase 3. In CS scenario, the phases are named as follows: P = pre-stress, S_{IN} = stress initial, S_{SEV} = stress severe, R = recovery. The scenarios are: AC = control with ambient [CO_2], EC = control with elevated [CO_2], PS = periodic stress, CS = chronic stress. IE = isoprene-emitting, NE = non-emitting.

AC			**EC**			**PS**			**CS**		
	IE	**NE**		**IE**	**NE**		**IE**	**NE**		**IE**	**NE**
P	27.5°	30.0°	P	29.0°	29.0°	P	38.0°	38.0°	P	38.0°	37.5°
						S1	20.0°	21.0°	S_{IN}	25.0°	22.0°
						R1	39.0°	39.0°	S_{SEV}	15.5°	12.0°
						S2	9.0°	10.0°	R	43.5°	42.0°
						R2	39.5°	37.0°			
						R3	16.0°	14.0°			
						R3	42.5°	36.0°			