

Table S1. Growth chamber experiment : measured $\delta^{18}\text{O}$, $\delta^{17}\text{O}$ and ^{17}O -excess of irrigation water (IW), soil water, leaf water (LW) and phytoliths. Av : average ; n : number of replicates ; SD : standard deviation calculated on the replicates; n.v. : no value.

Sample	Irrigation water						Soil water						Leaf water						Phytoliths										
	$\delta^{18}\text{O}$		$\delta^{17}\text{O}$		n	^{17}O -excess	$\delta^{18}\text{O}$		$\delta^{17}\text{O}$		n	^{17}O -excess	$\delta^{18}\text{O}$		$\delta^{17}\text{O}$		n	^{17}O -excess	$\delta^{18}\text{O}$		$\delta^{17}\text{O}$		n	^{17}O -excess					
	% ‰	SD	% ‰	SD			% ‰	per meg	% ‰	SD			% ‰	SD	% ‰	SD			% ‰	SD	% ‰	SD			% ‰	SD	% ‰	SD	% ‰
P1-40-29-04-16	-5.546	0.017	-2.912	0.013	3	-5.562	20	-2.562	0.026	-1.389	0.029	3	-2.565	36	10.733	0.106	5.519	0.082	2	10.676	-133	45.454	0.212	23.361	0.152	2	44.451	-378	41
P10-40-10-05-16	-5.594	18.139	-2.933	16.016	3	-5.610	25	-2.697	0.022	-1.416	0.015	3	-2.701	9	7.590	3.870	1	7.561	-130	41.947	0.348	21.590	0.199	2	41.091	-336	15		
P1-40-20-05-16	-5.580	0.019	-2.917	0.019	3	-5.596	33	-3.658	0.013	-1.913	0.013	3	-3.665	20	10.807	5.554	1	10.749	-137	41.150	0.592	21.161	0.291	2	40.326	-352	18		
P1-40-03-06-16	n.v.		n.v.			n.v.	n.v.	n.v.		n.v.		n.v.	n.v.		8.530	4.360	1	8.494	-135	41.758		21.451		1	40.909	-376			
Av.						-5.589	26						-2.977	21					9.370	-134						41.694	-360		
SD						0.025	6						0.600	14					1.596	3						1.867	20		
P10-60-29-04-16	-5.564	0.007	-2.929	0.008	3	-5.579	13	-2.504	0.067	-1.296	0.057	3	-2.507	27	9.581	0.015	4.942	0.008	2	9.535	-104	39.426	0.528	20.346	0.255	4	38.669	-275	23
P2-60-10-05-16	-5.563	0.001	-2.917	0.016	3	-5.579	24	-3.469	0.023	-1.814	0.019	3	-3.475	19	11.370		5.832		1	11.306	-154	37.883	0.340	19.579	0.184	4	37.183	-243	4
P10-60-20-05-16	-5.566	0.021	-2.920	0.027	3	-5.582	23	-3.260	0.028	-1.699	0.008	3	-3.266	23	6.453		3.323		1	6.432	-78	37.368	0.504	19.306	0.257	2	36.687	-249	4
P10-60-03-06-16	n.v.		n.v.			n.v.	n.v.	n.v.				3			2.488		1.241		1	2.485	-72	36.034		18.597		1	35.400	-265	
Av.						-5.580	20						-3.083	23					7.440	-102						36.985	-258		
SD						0.002	6						0.509	4					3.869	37						1.351	15		
P2-85-29-04-16	-5.594	0.014	-2.937	0.001	3	-5.610	21	-1.667	0.016	-0.920	0.010	3	-1.668	7	2.219	0.067	1.127	0.050	2	2.217	-44	30.718	0.385	15.920	0.212	3	30.255	-180	7
P1-85-10-05-16	-5.542	22.510	-2.898	22.807	3	-5.558	33	-2.901	0.010	-1.528	0.008	3	-2.905	5	2.402		1.238		1	2.399	-30	31.151	0.206	16.149	0.122	3	30.675	-176	1
P2-85-20-05-16	-5.561	0.014	-2.897	0.018	3	-5.577	43	-3.975	0.018	-2.082	0.010	3	-3.983	19	1.103		0.528		1	1.102	-54	30.218	0.070	15.642	0.036	2	29.770	-198	15
P2-85-03-06-16	n.v.		n.v.			n.v.	n.v.	n.v.				3			0.802		0.391		1	0.802	-32	30.134	0.252	15.552	0.090	2	29.689	-244	
Av.						-5.581	32						-2.852	9					1.630	-40						30.098	-199		
SD						0.026	11						1.158	8					0.796	11						0.459	31		
P3-100-10-05-16	-5.582	0.034	-2.930	0.028	3	-5.597	21	-2.607	0.010	-1.365	0.009	3	-2.611	13	9.125	1.955	4.707	0.986	2	9.084	-100	30.876	0.027	15.992	0.003	2	30.409	-190	17
P3-100-20-05-16	-5.572	10.963	-2.916	6.038	3	-5.588	29	-2.677	0.015	-1.409	0.007	3	-2.680	6	2.121		1.094		1	2.119	-25	29.901	0.148	15.497	0.071	3	29.463	-178	6
P3-100-03-06-16	n.v.		n.v.			n.v.	n.v.	n.v.		n.v.		n.v.	n.v.		-5.382		-2.844		1	-5.396	1	30.286		15.676		1	29.837	-199	
Av.						-5.593	25						-2.646	9					1.935	-41						29.903	-189		
SD						0.007	5						0.049	5					7.242	53						0.477	11		
Av.(a)						-5.586	26						-2.889	16															
SD (a)						0.006	5						0.188	8															

(a) Calculated on the raw values.

Table S2. Growth chamber experiment : predicted isotopic enrichment in ^{18}O from irrigation water to leaf water ($\Delta^{18}_{\text{LW-IW}}$) after Cernusak et al. (2016 ; Additional Supporting information). Refer to Cernusak et al. (1996) for symbol and calculations used in the table. Added calculations are displayed in grey columns: $\Delta^{17}_{\text{LW-IW}}$ and $^{17}\text{O-excess}_e$ were calculated using $^{17}\alpha_{\text{eq}} = ^{18}\alpha_{\text{eq}}^{0.529}$ and $^{17}\alpha_k = ^{18}\alpha_{\text{eq}}^{0.518}$, for the equilibrium fractionation and kinetic fractionation, respectively. $\theta_{\text{LW-IW}}$ was calculated as defined in the text. IW: irrigation water; LW : leaf water (LW).

Sample	Sampling details			Physiological data		Isotopic data					Calculations																	
	Air temp. °C	Leaf temp. °C	Air RH %	Stomatal cond. mol m ⁻² s ⁻¹	Boundary layer cond. mol m ⁻² s ⁻¹	Atm. vapor δ ¹⁸ O ‰	Atm. vapor δ ¹⁷ O ‰	IW δ ¹⁸ O ‰	IW δ ¹⁷ O ‰	LW δ ¹⁸ O ‰	LW δ ¹⁷ O ‰	air vapor pressure- e _a kPa	leaf vapor pressure- e _l kPa	w _a /w _l %	ε _k for δ ¹⁸ O ‰	ε _k for δ ¹⁷ O ‰	ε* for δ ¹⁸ O at leaf temp ‰	ε* for δ ¹⁷ O at leaf temp ‰	Δ _v for δ ¹⁸ O ‰	Δ _v for δ ¹⁷ O ‰	Predicted				Observed			
																					Δ ¹⁸ _{LW-IW} ‰	Δ ¹⁷ _{LW-IW} ‰	¹⁷ O-excess _e per meg	θ _{LW-IW} ‰	Δ ¹⁸ _{LW-IW} ‰	Δ ¹⁷ _{LW-IW} ‰	¹⁷ O-excess _e per meg	θ _{LW-IW} ‰
P1-40-29-04-16	25.0	25.0	41.0	0.031	2	-5.57	-2.92	-5.57	-2.92	10.73	5.52	1.30	3.18	0.41	27.861	14.337	9.386	4.954	0.000	0.000	25.978	13.455	-176	0.521	16.370	8.455	-154	0.518
P10-40-10-05-16	25.0	25.0	41.0	0.031	2	-5.57	-2.92	-5.57	-2.92	7.59	3.87	1.30	3.18	0.41	27.861	14.337	9.386	4.954	0.000	0.000	25.978	13.455	-176	0.521	13.259	6.823	-155	0.516
P1-40-20-05-16	25.0	25.0	41.0	0.031	2	-5.57	-2.92	-5.57	-2.92	10.81	5.55	1.30	3.18	0.41	27.861	14.337	9.386	4.954	0.000	0.000	25.978	13.455	-176	0.521	16.479	8.496	-170	0.518
P1-40-03-06-16	25.0	25.0	41.0	0.031	2	-5.57	-2.92	-5.57	-2.92	8.53	4.36	1.30	3.18	0.41	27.861	14.337	9.386	4.954	0.000	0.000	25.978	13.455	-176	0.521				
P10-60-29-04-16	25.0	25.0	60.0	0.052	2	-5.57	-2.92	-5.57	-2.92	9.58	4.94	1.91	3.18	0.60	27.773	14.291	9.386	4.954	0.000	0.000	20.599	10.699	-124	0.522	15.230	7.895	-117	0.519
P2-60-10-05-16	25.0	25.0	60.0	0.052	2	-5.57	-2.92	-5.57	-2.92	11.37	5.83	1.91	3.18	0.60	27.773	14.291	9.386	4.954	0.000	0.000	20.599	10.699	-124	0.522	17.028	8.775	-178	0.517
P10-60-20-05-16	25.0	25.0	60.0	0.052	2	-5.57	-2.92	-5.57	-2.92	6.45	3.32	1.91	3.18	0.60	27.773	14.291	9.386	4.954	0.000	0.000	20.599	10.699	-124	0.522	12.087	6.262	-101	0.519
P10-60-03-06-16	25.0	25.0	60.0	0.052	2	-5.57	-2.92	-5.57	-2.92	2.49	1.24	1.91	3.18	0.60	27.773	14.291	9.386	4.954	0.000	0.000	20.599	10.699	-124	0.522				
P2-85-29-04-16	25.0	25.0	80.0	0.073	2	-5.57	-2.92	-5.57	-2.92	2.22	1.13	2.54	3.18	0.80	27.681	14.245	9.386	4.954	0.000	0.000	14.974	7.817	-61	0.524	7.857	4.076	-65	0.519
P1-85-10-05-16	25.0	25.0	77.0	0.070	2	-5.57	-2.92	-5.57	-2.92	2.40	1.24	2.45	3.18	0.77	27.695	14.252	9.386	4.954	0.000	0.000	15.816	8.248	-71	0.523	7.989	4.148	-62	0.521
P2-85-20-05-16	25.0	25.0	81.0	0.074	2	-5.57	-2.92	-5.57	-2.92	1.10	0.53	2.58	3.18	0.81	27.677	14.242	9.386	4.954	0.000	0.000	14.694	7.674	-58	0.524	6.702	3.435	-97	0.516
P2-85-03-06-16	25.0	25.0	82.0	0.076	2	-5.57	-2.92	-5.57	-2.92	0.80	0.39	2.61	3.18	0.82	27.672	14.240	9.386	4.954	0.000	0.000	14.414	7.530	-54	0.524				
P3-100-10-05-16	25.0	25.0	100.0	0.095	2	-5.57	-2.92	-5.57	-2.92	9.13	4.71	3.18	3.18	1.00	27.592	14.199	9.386	4.954	0.000	0.000	9.386	4.954	9	0.529	14.789	7.659	-122	0.519
P3-100-20-05-16	25.0	25.0	100.0	0.095	2	-5.57	-2.92	-5.57	-2.92	2.12	1.09	3.18	3.18	1.00	27.592	14.199	9.386	4.954	0.000	0.000	9.386	4.954	9	0.529	7.736	4.023	-54	0.522
P3-100-03-06-16	25.0	25.0	100.0	0.095	2	-5.57	-2.92	-5.57	-2.92	-5.38	-2.84	3.18	3.18	1.00	27.592	14.199	9.386	4.954	0.000	0.000	9.386	4.954	9	0.529				