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Water uptake patterns of pea and barley responded to drought but not to cropping systems

Qing Sun et al.

Correspondence to: Qing Sun (s.qing@outlook.com)

Table S1 Stable water isotope values ($\delta^{18}O$ and $\delta^{2}H$, ‰) of soil in control and drought subplots under different cropping systems (C-IT for Conventional intensive tillage, C-NT for Conventional no tillage, O-IT for Organic intensive tillage, and O-RT for Organic reduced tillage) before the drought treatment (7 May), at the end of treatment (25 June), and after the treatment (11 July) in 2018. Mean ± 1 SE are given. Different small and capital letters indicate significant differences among CS in control and drought subplots, respectively, tested with Tukey HSD (honestly significant difference, $P < 0.05$).

Isotope	Depth (cm)	Control				Drought			
		C-IT	C-NT	O-IT	O-RT	C-IT	C-NT	O-IT	O-RT
Before drought treatment									
$\delta^{18}O$	0-5	-3.6±0.8	-4.6±0.5	-4.8±0.6	-5.1±0.7	-4.8±0.9	-4.7±0.5	-5.6±0.4	-4.2±0.8
	5-10	-4.7±0.8 b	-7.1±1.2 ab	-7.5±0.8 a	-8.2±0.4 a	-7.6±0.7 AB	-8.2±0.3 A	-6.3±1.1 B	-7.7±0.5 AB
	10-20	-6.6±0.6	-8.0±1.4	-9.2±0.5	-8.4±0.5	-7.9±0.8	-8.6±1.2	-7.8±1.0	-8.5±0.5
	20-30	-9.7±0.3 a	-7.8±0.8 b	-9.8±0.2 a	-9.7±0.2 a	-9.8±0.4	-9.8±0.9	-9.6±0.6	-9.6±0.3
	30-40	-10.2±0.3	-10.3±0.2	-9.7±0.5	-9.9±0.3	-10.4±0.1 A	-10.6±0.5 A	-9.6±0.4 B	-10.3±0.2 A
	40-60	-10.3±0.3	-10.2±0.3	-10.3±0.2	-10.5±0.5	-10.3±0.2	-10.5±0.3	-10.2±0.4	-10.4±0.4
$\delta^{2}H$	0-5	-48.6±3.3	-48.6±1.6	-50.6±3.1	-54.7±3.5	-53.8±2.7	-53.7±1.9	-55.5±2.6	-52.1±2.3
	5-10	-53.4±2.3 b	-62.4±6.5 ab	-65.6±3.7 a	-70.0±1.7 a	-67.6±2.5 AB	-70.8±1.7 A	-60.6±4.6 B	-68.6±2.2 A
	10-20	-63.4±2.0	-68.2±5.8	-72.7±2.3	-70.8±2.8	-69.3±2.7	-72.8±4.5	-69.4±3.5	-71.8±2.2
	20-30	-75.4±1.3 a	-65.0±3.9 b	-73.3±1.7 a	-75.9±1.5 a	-76.7±1.1	-76.7±3.7	-75.5±2.3	-75.9±1.3
	30-40	-76.0±1.5 a	-76.1±0.9 a	-71.8±2.7 b	-75.4±2.4 ab	-79.1±0.3 A	-77.5±1.9 A	-73.2±1.9 B	-77.3±0.9 A
	40-60	-75.5±2.0	-74.2±1.2	-73.9±1.0	-78.4±4.6	-77.9±1.5	-75.6±1.1	-75.9±1.4	-77.4±2.5
End of drought treatment									
$\delta^{18}O$	0-5	-4.7±0.7	-3.1±1.0	-4.7±0.5	-4.5±1.4	-4.0±0.4 B	-3.3±1.1 B	-4.0±0.3 B	-6.4±1.4 A
	5-10	-6.9±0.4	-5.9±1.0	-7.3±0.3	-6.9±0.7	-7.2±0.5	-4.8±1.3	-6.4±0.6	-6.3±1.0
	10-20	-8.9±0.3	-6.6±1.1	-6.8±0.8	-7.7±0.9	-9.0±0.3 A	-6.4±1.0 B	-7.6±1.4 AB	-8.5±0.4 AB
	20-30	-8.3±0.3	-8.2±0.4	-8.0±0.5	-8.2±0.7	-9.6±0.4	-9.5±0.2	-9.7±0.2	-10.0±0.2
	30-40	-9.9±0.2	-9.6±0.4	-9.3±0.4	-9.5±0.4	-10.9±0.1 A	-10.2±0.1 B	-10.7±0.1 A	-10.6±0.2 A
	40-60	-10.9±0.1 a	-10.3±0.2 b	-10.3±0.1 b	-10.2±0.2 b	-11.2±0.1 A	-10.6±0.2 B	-10.7±0.2 AB	-11±0.3 AB
$\delta^{2}H$	0-5	-47.9±2.7	-40.6±3.9	-45.8±2.1	-47.8±4.5	-52.2±1.4 B	-53.2±4.4 B	-54.8±1.4 B	-62.8±3.8 A
	5-10	-56.8±1.6	-52.6±3.9	-58±1.9	-57.1±2.8	-65.0±1.3	-59.0±3.9	-63.3±2.6	-61.2±3.4
	10-20	-69.0±1.7	-57.3±4.5	-55.9±3.5	-61.5±4.8	-72.0±1.1	-62.9±4.3	-67.9±5.9	-68.9±2.0
	20-30	-65.0±1.9	-64.2±2.4	-61.7±2.8	-63.4±4.7	-75.3±1.7	-75.3±1.1	-75.3±1.1	-77.3±1.1
	30-40	-74.9±1.8	-71.5±2.3	-69.3±2.7	-71.3±3.0	-81.4±0.4 A	-77.6±1.0 B	-80.2±0.6 A	-79.7±1.2 AB
	40-60	-79.8±1.2 a	-76.6±1.2 ab	-75.5±1.5 ab	-75.4±1.8 b	-81.8±0.9 A	-78.2±1.1 B	-79.4±1.4 AB	-81.5±2.4 A
After drought treatment									
$\delta^{18}O$	0-5	-3.8±0.3 ab	-3.5±0.3 b	-4.3±0.1 a	-4.3±0.5 a	-3.4±0.4	-2.2±1.4	-3.7±0.8	-3.6±0.5
	5-10	-4.8±0.5 ab	-5.4±0.3 a	-4.2±0.7 b	-5.3±0.1 a	-5.0±0.4	-4.5±0.5	-5.0±0.3	-4.7±0.5
	10-20	-5.2±0.3	-6.0±0.6	-5.4±0.8	-6.3±0.2	-5.3±0.2	-5.3±0.7	-5.7±0.5	-5.8±0.2
	20-30	-7.1±0.3	-7.5±0.7	-7.3±0.8	-7.2±0.5	-8.1±0.6	-8.2±0.3	-7.6±1.0	-8.2±0.7
	30-40	-9.0±0.3	-9.3±0.3	-8.9±0.4	-9.0±0.5	-9.9±0.8	-9.9±0.3	-9.5±0.3	-9.8±0.6
	40-60	-10.0±0.1	-10.0±0.3	-10.0±0.3	-9.9±0.2	-10.9±0.3	-10.5±0.2	-10.4±0.3	-10.6±0.2
$\delta^{2}H$	0-5	-36.9±1.5 b	-39.6±1.2 ab	-40.6±0.9 ab	-41.1±2.3 a	-36.6±1.9	-35.4±4.3	-38.1±3.1	-36.4±2.3
	5-10	-41.4±1.3 b	-47.0±1.7 a	-40.9±3.0 b	-43.4±0.5 ab	-41.3±1.6 C	-45.3±1.3 A	-42.9±1.5 BC	-43.0±1.0 B
	10-20	-43.2±1.9	-49.9±3.6	-44.6±4.0	-48.2±1.4	-43.5±1.2	-48.2±3.5	-46.2±2.7	-46.8±1.1
	20-30	-54.0±1.4	-59.6±4.3	-56.4±5.1	-55.1±3.5	-60.5±4.7	-64.3±1.9	-58.3±7.0	-64.2±5.0
	30-40	-67.2±2.3	-70.7±2.3	-67.5±3.0	-67.7±3.5	-74.7±6.4	-74.2±2.5	-71.3±2.2	-75.1±4.7
	40-60	-73.8±1.4	-74.6±1.4	-74.7±1.6	-73.0±1.8	-81.0±1.9	-77.4±1.2	-78.7±1.7	-79.6±1.8

Table S2 Effects of cropping systems (CS, df = 3), drought treatment (D, df = 1) and the interaction (CS × D, df = 3) on stable water isotope data ($\delta^{18}O$ and $\delta^{2}H$, ‰) of pea and barley in control and drought subplots under different cropping systems (C-IT for Conventional intensive tillage, C-NT for Conventional no tillage, O-IT for Organic intensive tillage, and O-RT for Organic reduced tillage) before the drought treatment (7 May), at the end of treatment (25 June), and after the treatment (11 July) in 2018 tested by linear mixed models (*P* values are given). Pea plants were already senesced in early July, therefore no stable water isotope data are available after the treatment. Significant differences are shown in bold ($P < 0.05$). Mean ± 1 SE are given. Different small and capital letters indicate significant differences among different cropping systems in control and drought subplots, respectively, tested with Tukey HSD (honestly significant difference, $P < 0.05$).

Species	Isotope	*P* value from linear mixed models				Mean ± 1 SE							
		CS	D	CS × D	Blocks	Control				Drought			
						C-IT	C-NT	O-IT	O-RT	C-IT	C-NT	O-IT	O-RT
Before drought treatment													
Pea	$\delta^{18}O$	0.449	0.257	0.267	0.652	-7.8±0.3 b	-8.4±0.4ab	-8.6±0.2ab	-8.8±0.3 a	-8.5±0.5	-8.6±0.3	-8.8±0.2	-8.6±0.1
	$\delta^{2}H$	0.334	**0.006**	**0.026**	0.462	-59.2±0.8 b	-64.8±2.4 a	-62.4±0.8ab	-65.4±1.5 a	-65.4±0.5	-65.6±1.3	-65.3±1.2	-64.9±1.6
Barley	$\delta^{18}O$	0.051	0.311	0.377	0.166	-9.7±0.1ab	-9.1±0.1 b	-9.9±0.3 a	-10.1±0.2 a	-9.7±0.3	-9.7±0.2	-10.0±0.2	-10.0±0.1
	$\delta^{2}H$	0.146	**0.026**	0.319	0.926	-72.2±1.0ab	-69.7±1.4 b	-70.8±0.9ab	-73.3±1.3 a	-72.4±0.5BC	-71.7±0.6C	-74.0±0.8 A	-73.9±0.6AB
End of drought treatment													
Pea	$\delta^{18}O$	0.100	**0.022**	0.085	**0.016**	-7.2±0.6	-7.6±0.4	-7.9±0.3	-7.9±0.3	-7.3±0.8 B	-6.0±1.0B	-5.7±1.5 B	-8.3±0.2 A
	$\delta^{2}H$	0.142	0.595	0.074	0.177	-54.9±1.4	-58±1.7	-57.8±1.4	-57.1±2.2	-59.5±3.5 B	-56.3±4.6B	-52.1±4.8 C	-65.1±1.0 A
Barley	$\delta^{18}O$	**0.035**	**0.008**	0.920	**0.008**	-8.4±0.3 b	-8.1±0.4 b	-8.9±0.3 a	-9±0.2 a	-8.9±0.4AB	-8.5±0.4B	-9.1±0.4AB	-9.3±0.2 A
	$\delta^{2}H$	0.174	**<0.001**	0.608	0.357	-65.4±1.3ab	-63.2±1.3 b	-66.2±1.5 a	-66.9±0.6 a	-71.4±0.8	-71.4±1.2	-71.5±0.6	-72.7±0.9
After drought treatment													
Barley	$\delta^{18}O$	0.278	0.473	0.504	**0.019**	-6.1±0.3 b	-6.3±0.3 b	-6.4±0.2ab	-6.8±0.2 a	-6.1±0.7	-6.5±0.7	-5.8±0.2	-6.7±0.3
	$\delta^{2}H$	0.158	0.519	0.557	0.081	-48.6±0.5 b	-52.7±2.1 a	-49.4±1.9ab	-50.9±1.2ab	-50.4±2.9AB	-54.8±4.5A	-47.1±1.0 B	-52.5±2.1AB

Table S3 Effects of cropping systems (CS, df = 3), drought treatment (D, df = 1) and the interaction (CS × D, df = 3) on the median proportional contributions (MPC) from different soil depths to water uptake of pea and barley before the drought treatment (7 May), at the end of treatment (25 June), and after the drought treatment on (11 July) in 2018 tested by linear mixed models. Proportional contributions were derived from 10 000 simulations of mixing models using $\delta^{18}O$ data. Pea plants were already senesced in early July, therefore no stable water isotope data are available after the treatment. Proportional contribution from 0-20 cm is the sum from 0-5, 5-10, and 10-20 cm, and 20-40 cm is the sum from 20-30 and 30-40 cm. CS and D were tested as two fixed effect factors for all subplots (*P* values are given). Significant differences are shown in bold ($P < 0.05$). Moreover, mean ± 1 SE for MPC (%) are given for different cropping systems (C-IT for Conventional intensive tillage, C-NT for Conventional no tillage, O-IT for Organic intensive tillage, and O-RT for Organic reduced tillage). Different small and capital letters indicate significant differences among cropping systems in control and drought subplots, respectively, tested with Tukey HSD (honestly significant difference, $P < 0.05$).

Species	Depth (cm)	*P* value from linear mixed models				Mean ± 1 SE							
						Control				Drought			
		CS	D	CS × D	Blocks	C-IT	C-NT	O-IT	O-RT	C-IT	C-NT	O-IT	O-RT
Before drought treatment													
Pea	0-5	0.927	0.749	0.419	0.442	13±3	15±5	18±5	13±3	17±7	19±6	11±4	15±4
	5-10	0.482	0.964	0.663	0.700	14±2	14±2	13±1	15±2	13±2	17±1	11±4	15±1
	10-20	0.499	0.347	0.642	0.461	13±2	12±2	14±2	14±1	13±2 AB	12±2 AB	10±2 A	14±1 B
	20-30	0.113	0.972	0.695	0.093	14±2 b	10±2 a	12±2 ab	15±1 b	13±2	10±1	15±3	14±1
	30-40	0.994	0.434	0.944	0.908	14±2	16±4	15±2	14±2	14±3	13±3	14±2	13±1
	40-60	0.746	0.665	0.216	0.545	16±3	20±8	12±2	13±2	14±3	14±4	26±11	13±1
Barley	0-5	0.275	0.233	0.498	0.073	3±1	6±2	3±1	3±1	8±5	8±3	2±2	3±1
	5-10	0.185	0.493	0.609	0.220	3±1	8±4	5±2	4±2	7±3 AB	10±4 B	3±2 A	4±2 AB
	10-20	0.576	0.700	0.593	0.071	4±1	8±3	8±5	5±2	7±2	10±3	5±3	5±3
	20-30	0.566	0.336	0.516	0.174	10±4	9±3	8±4	8±4	9±3	10±3	28±21	8±4
	30-40	0.897	0.962	**0.009**	0.244	17±6 a	26±7 ab	54±21 b	9±4 a	40±18 B	12±4 A	6±4 A	50±19 B
	40-60	0.940	0.467	0.100	0.634	49±19 ab	31±12 ab	15±7 a	63±17 b	18±6	38±19	49±24	20±8
End of drought treatment													
Pea	0-5	**0.048**	0.098	0.092	0.056	31±11 b	19±8 ab	15±5 a	14±2 a	33±7 AB	12±5 A	52±25 B	17±5 A
	5-10	0.658	0.718	0.958	0.101	16±3	14±3	12±2	16±3	15±2	14±7	10±6	16±2
	10-20	0.596	0.183	0.423	0.231	10±1	10±2	14±2	14±1	11±1	35±22	10±6	25±11
	20-30	0.608	0.077	0.908	0.151	12±2	11±1	11±1	14±2	10±1 AB	10±4 B	7±4 A	10±2 B
	30-40	0.327	**0.003**	0.289	**0.033**	10±2 a	19±7 b	15±3 ab	12±1 ab	8±1 AB	10±4 B	6±3 A	10±2 B
	40-60	0.398	**0.008**	0.272	**0.027**	8±1 a	16±4 ab	18±6 b	14±5 ab	9±1 AB	10±4 B	6±3 A	8±1 AB
Barley	0-5	0.534	0.144	0.413	**0.012**	10±1	10±4	6±1	7±2	12±3	9±1	9±4	12±2
	5-10	0.501	0.348	0.730	**0.028**	12±1	11±3	9±2	9±2	14±3	10±2	11±3	11±4
	10-20	0.063	0.669	0.800	0.178	14±2	11±3	8±2	10±3	14±0 C	10±2 AB	9±2 A	12±1 BC
	20-30	0.865	**0.027**	0.117	0.275	15±1 b	11±2 ab	11±3 a	10±2 a	13±1	16±1	14±3	16±1
	30-40	0.477	0.434	0.844	0.833	16±2	19±4	15±4	14±2	15±3	20±2	21±5	16±2
	40-60	0.207	**0.017**	0.213	**0.028**	15±1 a	23±9 ab	40±13 b	38±13 b	15±2	19±3	24±8	17±3
After drought treatment													
Barley	0-5	0.601	0.508	0.927	0.229	25±10	21±5	19±4	14±2	34±22	22±12	21±7	15±1
	5-10	0.231	0.552	0.414	0.553	13±1	18±3	17±4	16±3	11±4	15±3	31±13	17±3
	10-20	0.422	0.244	0.834	0.193	14±2	15±2	14±2	16±1	11±4 A	12±3 AB	12±2 AB	16±1 B
	20-30	0.709	0.676	0.701	**0.035**	13±2	11±1	13±2	13±1	11±4	12±3	10±3	14±2
	30-40	0.602	0.358	0.596	**0.003**	11±3	11±3	12±3	14±3	10±3	12±4	8±2	12±1
	40-60	0.852	0.401	0.225	**<0.001**	10±2	11±3	13±4	12±3	11±4	13±4	7±2	10±1

Table S4 The median proportional contributions (MPC) from different soil depths to water uptake of pea and barley before the drought treatment on 7 May, at the end of treatment on 25 June, and after the drought treatment on 11 July in 2018 (left) as well as effects of cropping systems (CS, df = 3), drought treatment (D, df = 1) and the interaction (CS × D, df = 3) on MPC tested by linear mixed models (right, *P* values are given).

Species	Depth (cm)	Mean ± 1 SE								Linear mixed models			
		Control				Drought				CS	D	CS × D	Blocks
		C-IT	C-NT	O-IT	O-RT	C-IT	C-NT	O-IT	O-RT				
Before drought treatment													
Pea	0-5	32±7	29±12	43±9	47±12	39±9	40±7	28±7	42±12	0.794	0.931	0.379	0.675
	10-May	26±8 b	11±3 a	14±6 ab	11±3 a	15±3	11±2	15±2	12±4	0.26	0.473	0.322	0.851
	20-Oct	11±2	9±2	9±1	9±2	12±3	13±4	15±3	11±3	0.828	0.103	0.753	0.312
	20-30	7±1	9±2	8±1	8±1	8±1	10±1	10±2	8±1	0.385	0.319	0.971	0.080
	30-40	7±1	22±13	9±1	8±2	7±1 A	8±1 AB	11±2 B	8±2 AB	0.345	0.373	0.337	0.400
	40-60	7±2	11±2	9±1	8±2	8±0	9±1	10±1	8±1	0.417	0.995	0.653	0.500
Barley	0-5	5±1	10±6	7±1	10±5	15±6 B	16±6 B	4±2 A	6±2 A	0.281	0.491	0.279	0.154
	10-May	5±0	7±3	12±3	8±3	11±1 BC	15±2 C	6±3 A	10±3 AB	0.663	0.101	**0.008**	0.425
	20-Oct	7±1	8±2	11±1	10±3	12±2	10±1	11±5	9±3	0.774	0.435	0.551	**0.046**
	20-30	21±4	11±4	15±1	34±22	14±1	11±2	15±6	33±18	0.485	0.561	0.620	0.501
	30-40	22±5 ab	41±20 b	16±1 a	10±3 a	19±4	16±4	10±4	15±3	0.087	0.114	0.193	0.545
	40-60	23±5	13±4	21±6	14±7	16±2	16±2	38±21	17±6	0.371	0.514	0.643	0.882
End of drought treatment													
Pea	0-5	55±14 b	27±13 a	23±3 a	27±8 a	68±14 B	22±12 A	84±10 C	25±11 A	**0.008**	0.054	**0.039**	0.773
	10-May	10±3	16±4	17±3	16±6	6±3 A	18±8 B	3±2 A	21±8 B	0.119	0.371	0.291	0.078
	20-Oct	10±5	9±1	17±3	15±6	6±2 AB	36±22 B	5±4 A	31±20 AB	0.513	0.376	0.336	0.205
	20-30	7±1 a	12±2 ab	12±1 ab	21±9 b	5±2 AB	6±2 B	2±1 A	6±2 B	0.257	**0.01**	0.412	0.763
	30-40	6±1 a	13±4 b	9±1 ab	6±1 a	5±2 AB	6±2 B	2±1 A	5±1 B	0.109	**0.002**	0.14	0.079
	40-60	5±1 a	12±4 b	7±1 ab	6±2 ab	5±2 AB	7±3 B	2±1 A	5±2 B	0.183	**0.022**	0.386	0.192
Barley	0-5	14±2	13±6	7±1	9±2	13±1 AB	9±1 A	13±3 AB	15±2 B	0.75	0.288	0.107	0.407
	10-May	15±3 b	10±2 ab	9±1 a	12±2 ab	16±1	10±1	14±2	16±4	0.116	0.119	0.618	0.243
	20-Oct	12±1	12±2	9±1	11±2	17±1 B	11±2 A	12±2 A	12±1 A	0.076	0.081	0.313	0.805
	20-30	14±2	13±1	11±1	15±4	14±1 A	17±1 B	16±1 AB	13±1 A	0.889	0.151	0.329	0.389
	30-40	13±2	17±3	19±3	12±1	13±1 A	20±2 B	16±2 AB	13±2 A	**0.028**	0.757	0.685	0.478
	40-60	18±6	20±5	34±6	31±9	11±1	17±2	15±2	17±6	0.396	**0.011**	0.362	0.495
After drought treatment													
Barley	0-5	21±2	21±4	21±3	15±2	31±17	26±17	21±6	20±2	0.800	0.387	0.958	0.250
	10-May	17±2	18±2	20±6	20±4	10±2	11±3	33±14	20±6	0.188	0.999	0.339	0.735
	20-Oct	17±1	16±2	16±3	18±2	11±3	13±5	13±3	18±2	0.479	0.134	0.874	0.373
	20-30	12±1	12±2	12±2	12±2	10±3	11±3	10±3	11±2	0.995	0.279	0.978	0.135
	30-40	10±2	10±2	10±2	8±2	12±4	12±4	6±2	9±1	0.427	0.894	0.546	**0.039**
	40-60	8±2	8±2	9±2	10±3	10±4 AB	15±5 B	5±1 A	12±4 AB	0.248	0.300	0.260	**0.014**

Proportional contributions were derived from 10 000 simulations of mixing models using δ^2H data. Pea plants were already senesced in early July, therefore no stable water isotope data were available after the treatment. Proportional contribution from 0-20 cm is the sum from 0-5, 5-10, and 10-20 cm, and 20-40 cm is the sum from 20-30 and 30-40 cm. Significant differences are shown in bold ($P < 0.05$). Moreover, mean ± 1 SE for MPC (%) are given for different cropping systems (C-IT for Conventional intensive tillage, C-NT for Conventional no tillage, O-IT for Organic intensive tillage, and O-RT for Organic reduced tillage). Different small and capital letters indicate significant differences among cropping systems in control and drought subplots, respectively, tested with Tukey HSD (honestly significant difference, $P < 0.05$).

Table S5 Effects of cropping systems (CS, df = 3), sampling times (Time, df = 1) and the interaction (CS × Time, df = 3) on the median proportional contributions (MPC) from different soil depths to water uptake of pea and barley. Differences in MPC before the drought treatment (7 May) compared to MPC at the end of treatment (25 June) as well as MPC at the end of treatment compared to MPC after the treatment (11 July) for the three soil layers in 2018 tested for control and drought subplots separately by linear mixed models (*P* values are given).

Species	Type	Control			Drought		
		0-20	20-40	40-60	0-20	20-40	40-60
Before compared to end of drought treatment							
Pea	CS	0.592	0.185	0.418	0.118	0.392	0.216
	Time	0.391	0.406	0.730	**<0.001**	**0.003**	**0.010**
	CS × Time	0.591	0.185	0.418	0.118	0.393	0.217
	Blocks	0.301	0.200	0.516	**0.003**	**0.010**	0.066
Barley	CS	0.429	0.284	0.129	0.242	0.177	0.521
	Time	**<0.001**	0.334	0.212	**<0.001**	0.562	0.084
	CS × Time	0.428	0.285	0.129	0.243	0.177	0.523
	Blocks	0.117	0.821	0.353	**0.008**	0.796	0.177
End compared to after drought treatment							
Barley	CS	**<0.001**	0.246	**<0.001**	**<0.001**	**0.002**	**0.002**
	Time	**<0.001**	0.246	**<0.001**	**<0.001**	**0.002**	**0.002**
	CS × Time	**<0.001**	0.515	**0.004**	**0.001**	**0.006**	**0.008**
	Blocks	**<0.001**	0.681	**0.004**	**0.014**	**0.027**	**0.014**

Proportional contributions were derived from 10 000 simulations of mixing models using $\delta^{18}O$ data. Pea plants were already senesced in early July, therefore no stable water isotope data are available after treatment. Significant differences are shown in bold (*P* < 0.05).

Table S6 Effects of cropping systems (CS, df = 3), drought treatment (D, df = 1) and the interaction (CS × D, df = 3) on absolute changes in median proportional contributions (MPC) to plant water uptake of pea and barley, calculated as the difference of MPC at the end (25 June; ET) and before the drought treatment (7 May; BT), from three soil layers by linear mixed models (*P* values are given).

Species	Depth (cm)	CS	D	CS × D	Blocks
Pea	0-20	0.534	**0.001**	0.053	0.178
	20-40	0.310	**0.005**	0.736	0.295
	40-60	0.714	0.052	0.084	0.249
Barley	0-20	0.391	0.818	0.308	0.630
	20-40	0.766	0.695	0.168	0.841
	40-60	0.934	0.764	0.085	0.865

MPC was derived from 10 000 simulations of mixing models using stable water isotope data. Proportional contribution from the shallow layer is the sum of 0-5, 5-10, and 10-20 cm depths, the middle layer is the sum of 20-30 and 30-40 cm depths, and the deep layer represents 40-60 cm. Significant differences are shown in bold ($P < 0.05$).

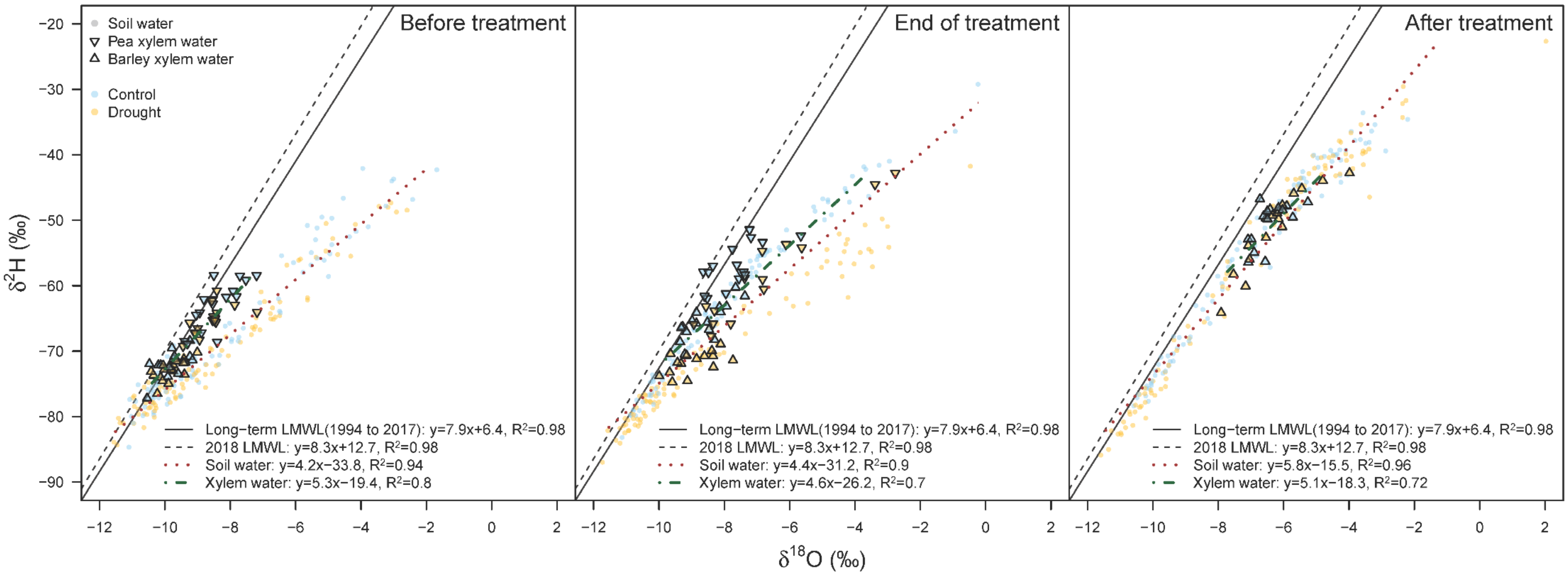

Fig. S1 Dual isotope plot of soil and plant samples from control and drought subplots for three different times during the experiment (before the drought treatment, at the end of drought, and after the drought treatment). The long-term local meteoric water line (LMWL; 1994 to 2017; R^2 = 0.98) was fitted with data from the closest GNIP station (Global Network of Isotopes in Precipitation, Buchs Suhr, 47.37° N, 8.08° E, 34 km from the research site, solid line). The local meteoric water line of 2018 (2018 LMWL; R^2 = 0.98) was fitted with data of precipitation samples collected at the field during the growing season combined with data of 2018 from GNIP Buchs (dashed line). All the precipitation data presented here are monthly means. Regressions for soil water and plant xylem water were fitted for both treatments together.

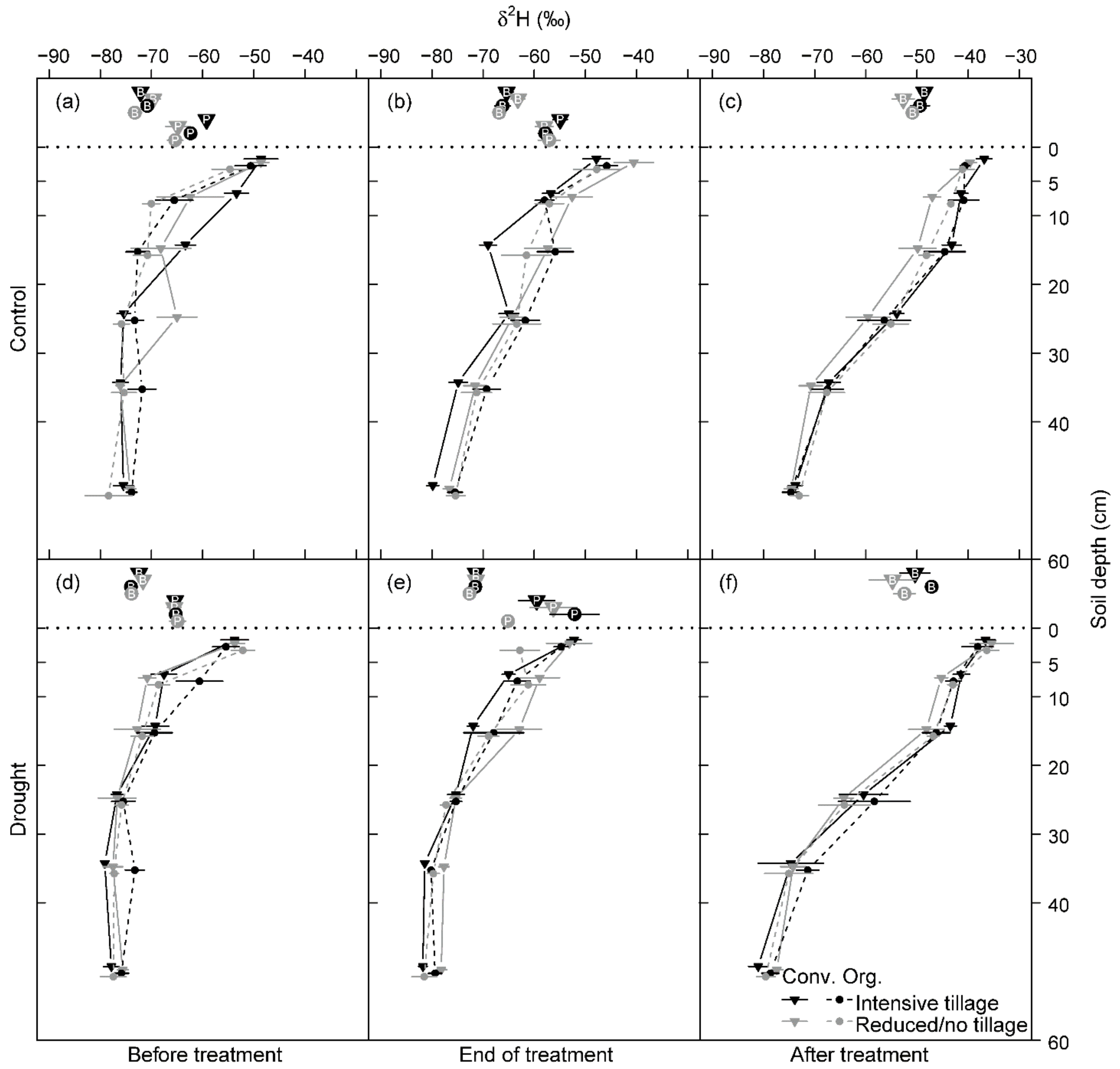

Fig. S2 δ^2H values of soil water from different depths and plant xylem water in each cropping system (a, d) before the drought treatment on 7 May, (b, e) at the end of the drought treatment on 25 June, and (c, f) after treatment on 11 July in 2018 (Conv. for conventional, Org. for organic). Horizontal dotted lines separate isotopic composition of soil and plant samples (P for pea, B for barley). Pea plants were already senesced in early July, therefore no stable water isotope data are available after treatment. Means and 1 SE (horizontal bars) are given of each cropping system (n = 3-4).

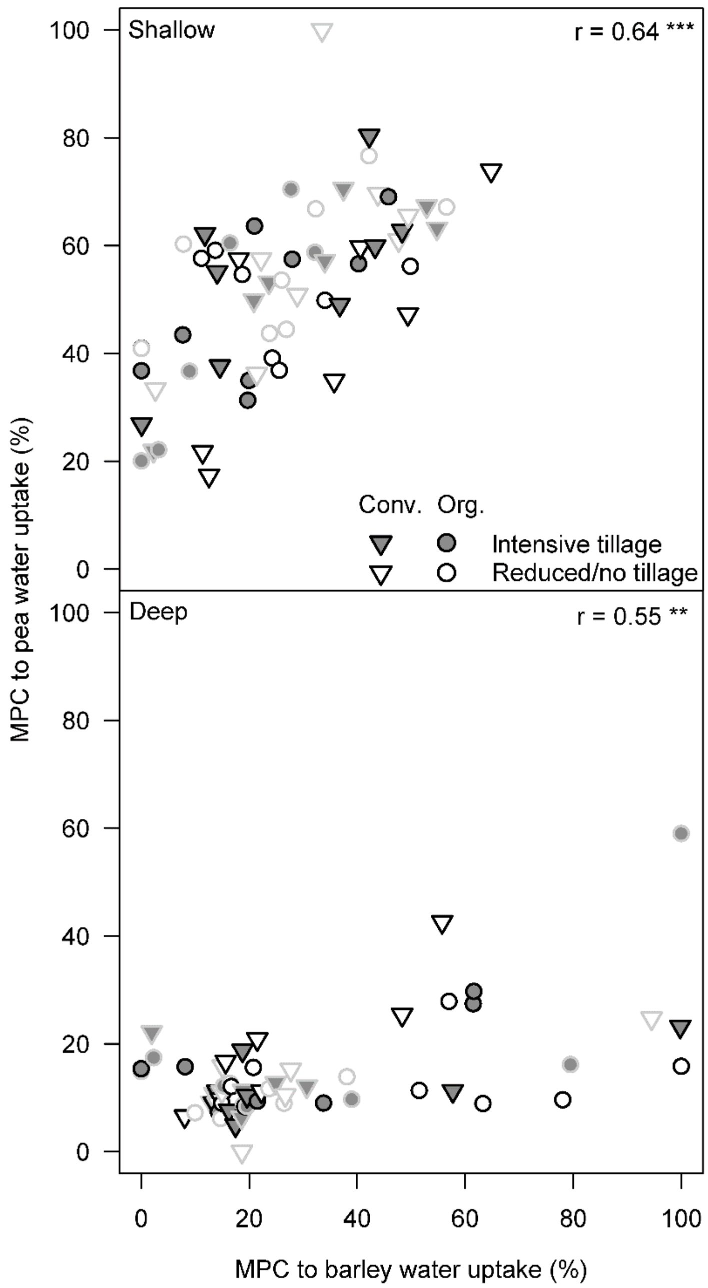

Fig. S3 Relationships of median proportional contributions (MPC) to plant water uptake from the shallow and deep soil layers of pea vs. barley (Conv. for conventional, Org. for organic; n = 29-31). The relationship of MPC from the middle layer (20-40 cm) is not significant (r = 0.2, data not shown). Symbols with dark outlines were from control subplots, those with light outlines from drought subplots. MPC was derived from 10 000 simulations of mixing models using stable water isotope data. Proportional contribution from the shallow layer is the sum of 0-5, 5-10, and 10-20 cm depths and the deep layer represents 40-60 cm. Asterisks indicate the significance of linear regression (*** $P < 0.001$, ** $0.001 \leq P < 0.01$).