Cropping Systems Alter Hydraulic Traits of Barley but not Pea Grown in Mixture

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Table S1 Water potentials for pea (*Pisum sativum* L.) and barley (*Hordeum vulgare* L.) (in MPa, n = 4), plant height (in cm, n = 3 to 4), aboveground biomass (in g, n = 4) and grain yield (in g, n = 4) per plant for pea and per stem for barley, grain dry matter content (DM, in g g^{-1}, n = 4) and harvest index (in g g^{-1}, n = 4) for pea and barley under different cropping systems in 2018.

Variable	Species	Date	Mean ± 1 SE				Cropping systems		
			C-IT	C-NT	O-IT	O-RT	df	*F*	*P*
Predawn water potential	Pea	2 Jun	-0.12 ± 0.03	-0.14 ± 0.02	-0.13 ± 0.03	-0.22 ± 0.03	3	2.8	0.085
		28 Jun	-0.6 ± 0.08 b	-0.89 ± 0.07 a	-0.71 ± 0.06 ab	-0.73 ± 0.11 ab	3	3.17	0.078
		(t-test)	(0.005 **)	(0.001 **)	(< 0.001 ***)	(0.014 *)			
	Barley	2 Jun	-0.14 ± 0.05	-0.08 ± 0.02	-0.23 ± 0.11	-0.11 ± 0.03	3	1.15	0.382
		28 Jun	-0.75 ± 0.08	-0.64 ± 0.04	-0.7 ± 0.11	-0.69 ± 0.09	3	0.3	0.822
		(t-test)	(< 0.001 ***)	(< 0.001 ***)	(0.023 *)	(0.005 **)			
Midday water potential	Pea	15 Jun	-1.07 ± 0.08	-0.99 ± 0.12	-1.29 ± 0.18	-1.04 ± 0.11	3	1.04	0.41
		20 Jun	-1.04 ± 0.03	-1.11 ± 0.2	-1.36 ± 0.27	-1.49 ± 0.17	3	1.24	0.353
		26 Jun	-1.29 ± 0.07	-1.31 ± 0.09	-1.35 ± 0.13	-1.28 ± 0.05	3	0.15	0.928
		15 to 26 Jun (minimum)	-1.29 ± 0.07 b	-1.36 ± 0.09 b	-1.77 ± 0.15 a	-1.49 ± 0.16 ab	3	3.42	0.066
	Barley	15 Jun	-2.31 ± 0.07	-2.25 ± 0.13	-2.25 ± 0.09	-2.14 ± 0.12	3	0.46	0.718
		20 Jun	-1.95 ± 0.06	-1.95 ± 0.08	-1.89 ± 0.04	-1.87 ± 0.1	3	0.31	0.815
		26 Jun	-2.16 ± 0.18	-2.03 ± 0.12	-2.07 ± 0.07	-2.19 ± 0.12	3	0.46	0.714
		15 to 26 Jun (minimum)	-2.42 ± 0.09	-2.35 ± 0.05	-2.32 ± 0.06	-2.35 ± 0.06	3	0.36	0.783
Plant height	Pea	22 May	36.1 ± 0.7 c	26.4 ± 0.4 a	34.9 ± 1.9 c	29.7 ± 0.5 b	3	17.51	0.001 **
		6 Jun	65.0 ± 2.3 b	55.6 ± 0.7 a	57.8 ± 3.5 a	54.7 ± 1.2 a	3	5.45	0.021 *
		20 Jun	64.3 ± 2.2 b	57.4 ± 3.4 ab	56.4 ± 5 ab	54.6 ± 1 a	3	3.17	0.078
	Barley	22 May	27.3 ± 2.4 b	13.0 ± 1.4 a	31.7 ± 2.3 b	14.6 ± 0.7 a	3	23.97	< 0.001 ***
		6 Jun	61.4 ± 1.0 b	49.9 ± 2.5 a	61.8 ± 1.6 b	53.4 ± 1.8 a	3	10.91	0.001 **
		20 Jun	59.7 ± 1.3 b	55.9 ± 1.3 a	61.1 ± 1.6 b	55.4 ± 0.7 a	3	4.91	0.019 *
Aboveground biomass	Pea	12 Jul	7.6 ± 0.2	8.6 ± 0.6	6.8 ± 1.0	6.4 ± 0.4	3	2.43	0.132
Grain yield			4.7 ± 0.1 ab	5.5 ± 0.3 b	4.3 ± 0.8 ab	4 ± 0.3 a	3	2.72	0.107
Grain DM			0.933 ± 0.001 b	0.929 ± 0.001 a	0.935 ± 0.002 b	0.930 ± 0.001 a	3	6.01	0.016 *
Harvest index			0.617 ± 0.01	0.647 ± 0.01	0.618 ± 0.014	0.622 ± 0.012	3	1.71	0.234
Aboveground biomass	Barley		2 ± 0.06	1.92 ± 0.1	1.84 ± 0.13	1.76 ± 0.12	3	1.69	0.239
Grain yield			0.98 ± 0.02 c	0.77 ± 0.01 a	0.94 ± 0.08 bc	0.81 ± 0.06 ab	3	5.42	0.021 *
Grain DM			0.777 ± 0.018 c	0.648 ± 0.017 a	0.845 ± 0.016 d	0.716 ± 0.027 b	3	18.1	< 0.001 ***
Harvest index			0.491 ± 0.01 bc	0.406 ± 0.024 a	0.51 ± 0.015 c	0.461 ± 0.006 b	3	8.77	0.002 **

C-IT, Conventional intensive tillage; C-NT, Conventional no tillage; O-IT, Organic intensive tillage; O-RT, Organic reduced tillage; df, degrees of freedom.

Effects of cropping systems were tested with linear mixed models (lmm). Differences of predawn water potentials measured on 2 June and 28 June were tested with t-tests. Asterisks indicate significant effects of cropping systems or significant differences between predawn water potentials, while different letters indicate significant differences among cropping systems tested with Tukey HSD ($P < 0.05$).

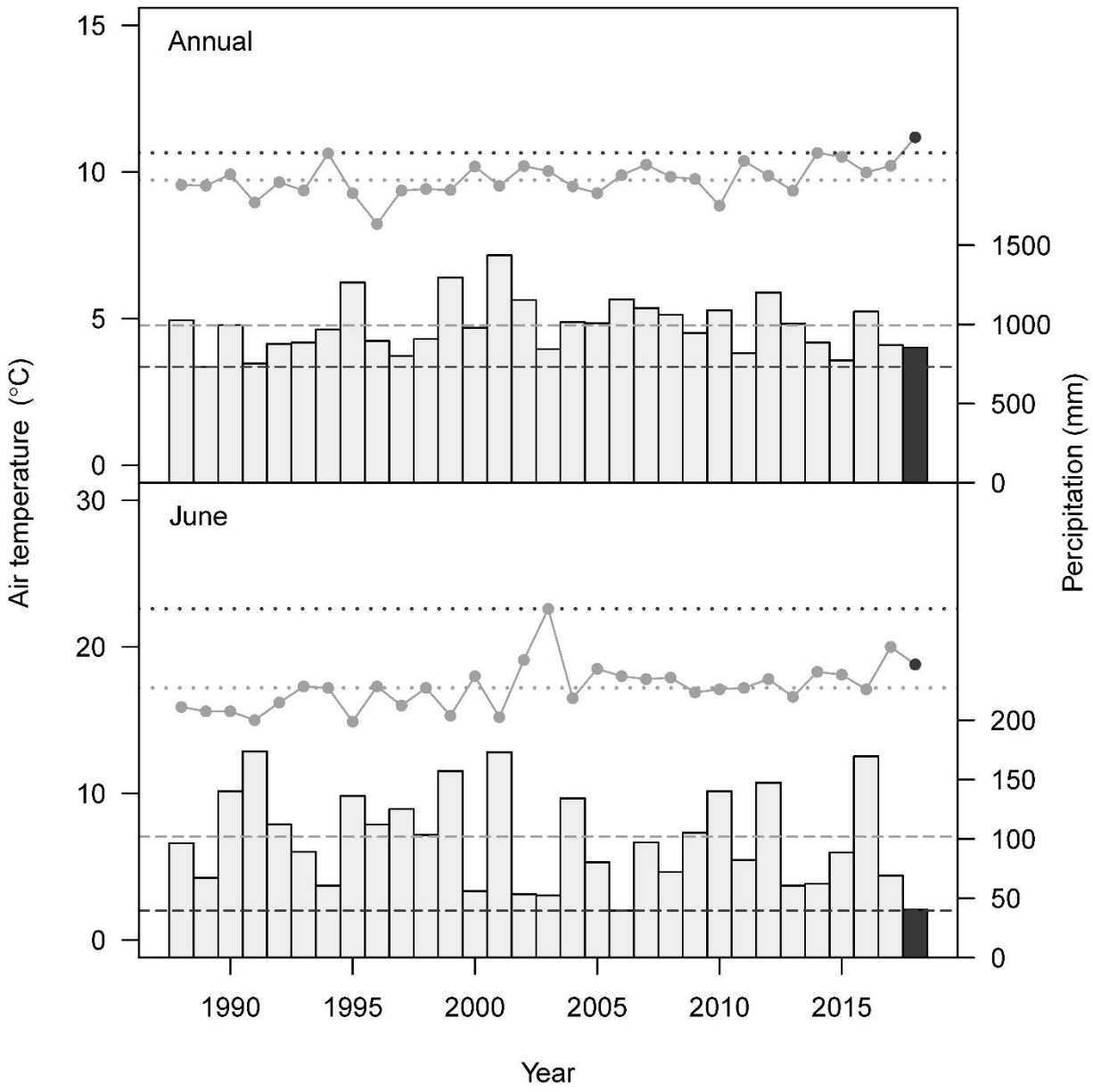

Fig. S1 Long-term annual (top) and June (bottom) air temperatures (solid line) and precipitation (bars) from a nearby weather station (Zürich/Kloten, KLO, 47.48° N, 8.54° E, 4.6 km from the research site; data from 1988 to 2017, MeteoSwiss, 2020). Dark symbols highlight data from 2018. Dotted lines in light and dark grey indicate the mean and the highest records for air temperature (from 1988 to 2017), respectively. Dashed lines in light and dark grey indicate the mean and the lowest records for precipitation, respectively.

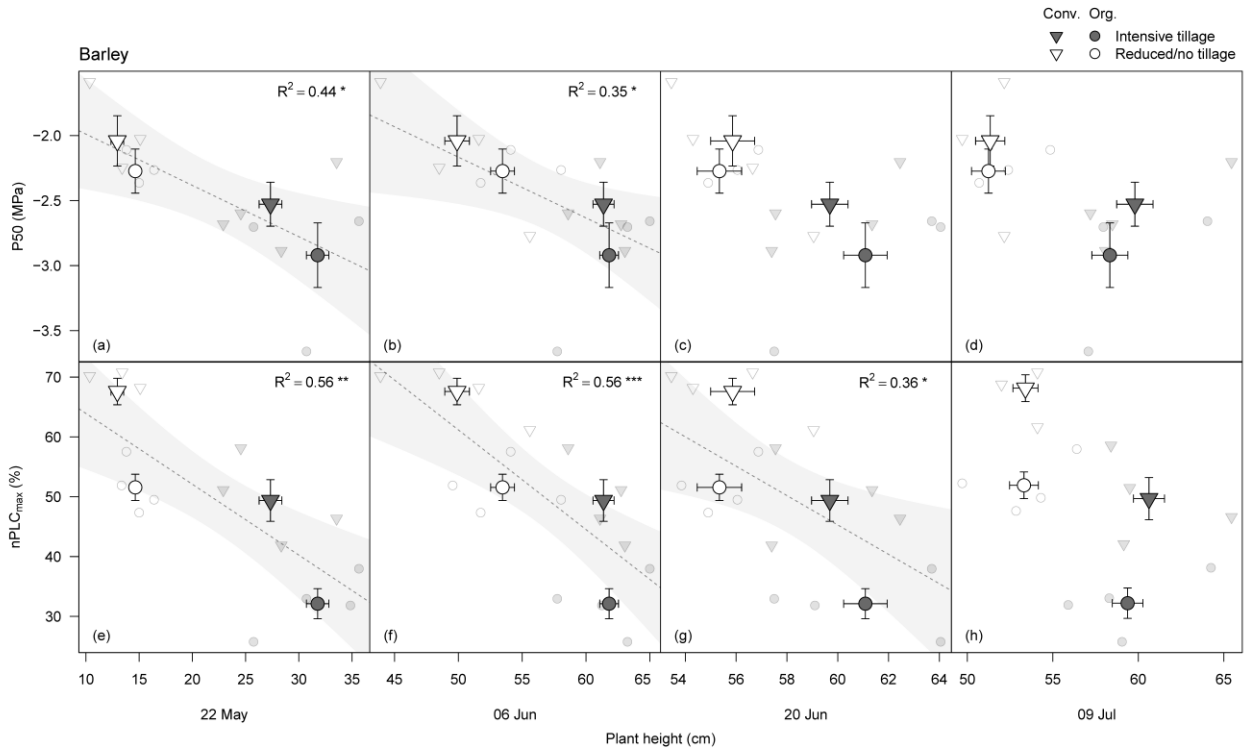

Fig. S2 Relationships between plant height measured on different dates and xylem water potential at 50% loss of hydraulic conductivity (P_{50}; n = 13-14) as well as highest native percentage loss of hydraulic conductivity ($nPLC_{max}$; n = 15-16) of barley (*Hordeum vulgare* L.) during a soil drying period (15 to 26 June 2018; Conv. for conventional, Org. for organic). Small symbols show individual replicates. Means and 1 SE are given with big symbols for all cropping systems. The dashed lines indicate linear regressions (if significant) based on the individual replicates across the four cropping systems. The shaded band lines correspond to the 95% confidence interval. Asterisk indicates the significance of linear correlation: *** $P < 0.001$, ** $0.001 \leq P < 0.01$, * $0.01 \leq P < 0.05$.