

# Assessing the Role of Crop Rotation in Shaping Foliage Characteristics and Leaf Gas Exchange Parameters for Winter Wheat

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## Supplementary Material

### Abbreviations

An – the net assimilation rate ( $\mu\text{mol CO}_2 \cdot \text{m}^{-2} \cdot \text{s}^{-1}$ )

AGB – above-ground biomass ( $\text{g} \cdot \text{m}^{-2}$ )

AP-W – crop rotation A, forecrop field pea

BBCH – growth stage

BP-W – crop rotation B, forecrop field pea

BR-W – crop rotation B, forecrop winter rape

$c_a$  – atmospheric  $\text{CO}_2$  concentration ( $\mu\text{mol} \cdot \text{mol}^{-1}$ )

$c_i$  – intercellular  $\text{CO}_2$  concentration ( $\mu\text{mol CO}_2 \cdot \text{mol}^{-1}$ )

CGR – crop growth rate ( $\text{g} \cdot \text{m}^{-2} \text{ day}^{-1}$ )

Cl – chlorophyll content (SPAD)

CP-W – crop rotation C, forecrop pea

CW-W – crop rotation C, forecrop winter wheat

DB-W – crop rotation D, forecrop spring barley

DR-W – crop rotation D, forecrop winter rape

E – leaf transpiration rate ( $\text{mmol H}_2\text{O} \cdot \text{m}^{-2} \text{ s}^{-1}$ )

gs – stomatal conductance ( $\text{mol H}_2\text{O} \cdot \text{m}^{-2} \text{ s}^{-1}$ )

LA – area of 1 leaf ( $\text{cm}^2$ )

LAI – leaf area index ( $\text{m}^2 \cdot \text{m}^{-2}$ )

LMA – leaf mass per area ( $\text{g} \cdot \text{m}^{-2}$ )

Is – the stomatal limitation value

$N_{\text{area}}$  – leaf nitrogen content per unit area of leaves ( $\text{g} \cdot \text{N} \cdot \text{m}^{-2}$ )

T – leaf temperature ( $^{\circ}\text{C}$ )

WUE – the instantaneous water use efficiency ( $\mu\text{mol CO}_2 \cdot \text{mmol H}_2\text{O}^{-1}$ )

$\text{WUE}_1$  – the intrinsic water use efficiency ( $\mu\text{mol CO}_2 \cdot \text{mol H}_2\text{O}^{-1}$ )

**Table S1.** Experimental desing

Year	Crop Rotations															
	A				B				C				D			
2011	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	pea	<b>wheat</b>	rape*	pea	<b>wheat</b>	<b>wheat</b>	rape	<b>wheat*</b>	barley	<b>wheat</b>
2012	barley	pea	<b>wheat</b>	rape*	<b>wheat*</b>	pea	<b>wheat</b>	rape	pea	<b>wheat</b>	<b>wheat</b>	rape*	<b>wheat*</b>	barley	<b>wheat</b>	rape
2013	pea	<b>wheat</b>	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	<b>wheat</b>	<b>wheat</b>	rape*	pea	barley	<b>wheat</b>	rape	<b>wheat*</b>
2014	<b>wheat</b>	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	pea	<b>wheat</b>	rape*	pea	<b>wheat</b>	<b>wheat</b>	rape	<b>wheat*</b>	barley
2015	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	pea	<b>wheat</b>	rape*	pea	<b>wheat</b>	<b>wheat</b>	rape	<b>wheat*</b>	barley	<b>wheat</b>
2016	barley	pea	<b>wheat</b>	rape*	<b>wheat*</b>	pea	<b>wheat</b>	rape	pea	<b>wheat</b>	<b>wheat</b>	rape*	<b>wheat*</b>	barley	<b>wheat</b>	rape
2017	pea	<b>wheat</b>	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	<b>wheat</b>	<b>wheat</b>	rape*	pea	barley	<b>wheat</b>	rape	<b>wheat*</b>
2018	<b>wheat</b>	rape*	barley	pea	<b>wheat</b>	rape	<b>wheat*</b>	pea	<b>wheat</b>	rape*	pea	<b>wheat</b>	<b>wheat</b>	rape	<b>wheat*</b>	barley

\*with catch crop (blue tansy)

years of research presented in manuscript

Each year: 16 plots (4 rape, 3 pea, 2 barley, 7 wheat) x 4 replicates = 64 plots