

## **SUPPLEMENTARY INFORMATION**

**Bio-fertilisation with native plant growth promoting rhizobacteria increases the tolerance of the neotropical legume tree *Caesalpinia spinosa* to water deficit**

Irene Cordero, José J. Pueyo, Ana Rincón

**Table S1.** Exact number of plants in each treatment.

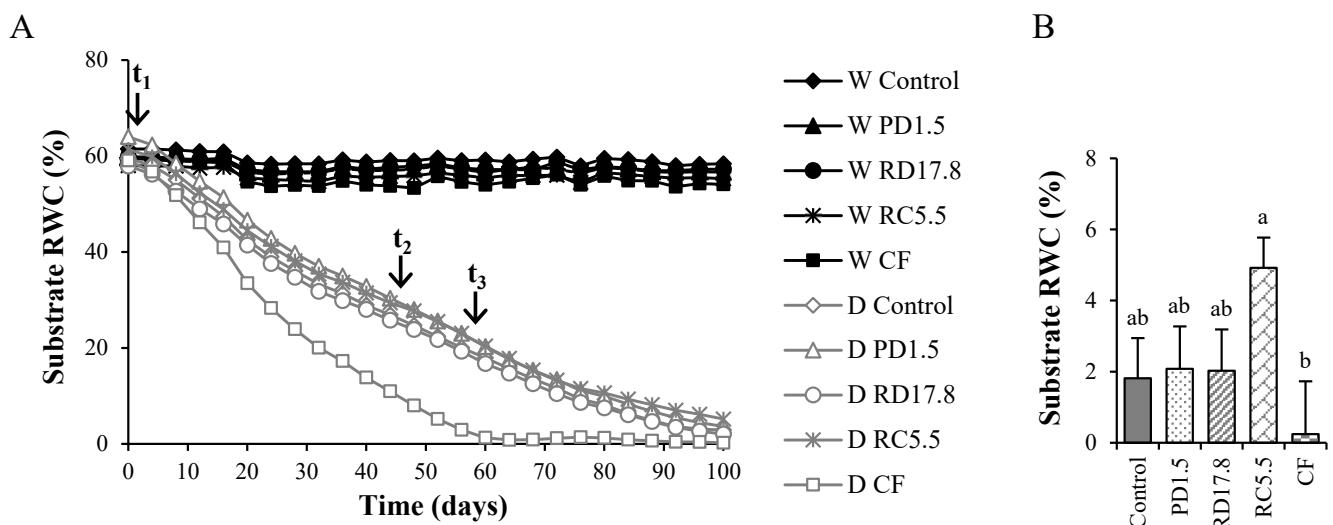
	<b>Fertilisation</b>	<b>Drought</b>	<b>Number of plants</b>
1	Control	Well-watered	11
2	PD1.5	Well-watered	12
3	RD17.8	Well-watered	11
4	RC5.5	Well-watered	11
5	CF	Well-watered	10
6	Control	Drought	10
7	PD1.5	Drought	10
8	RD17.8	Drought	11
9	RC5.5	Drought	12
10	CF	Drought	10
<b>TOTAL</b>			<b>108</b>

**Table S2.** Physiological and morphological response of *Caesalpinia spinosa* seedlings along the whole drought treatment (100 days), depending on the fixed factors fertilisation (F), drought (D) and time (T) analysed by lineal mixed models. Plant was included as a random factor.  $\chi^2$  values and significance of lineal mixed models after eliminating non-significant interactions (-) are shown; \* $p<0.05$ ; \*\* $p<0.01$ ; \*\*\* $p<0.001$ ; ns: not significant. RWC: leaf relative water content. A: net carbon assimilation rate.  $g_s$ : stomatal conductance. WUE: water use efficiency.  $F_v/F_m$ : Maximum quantum yield of PSII.

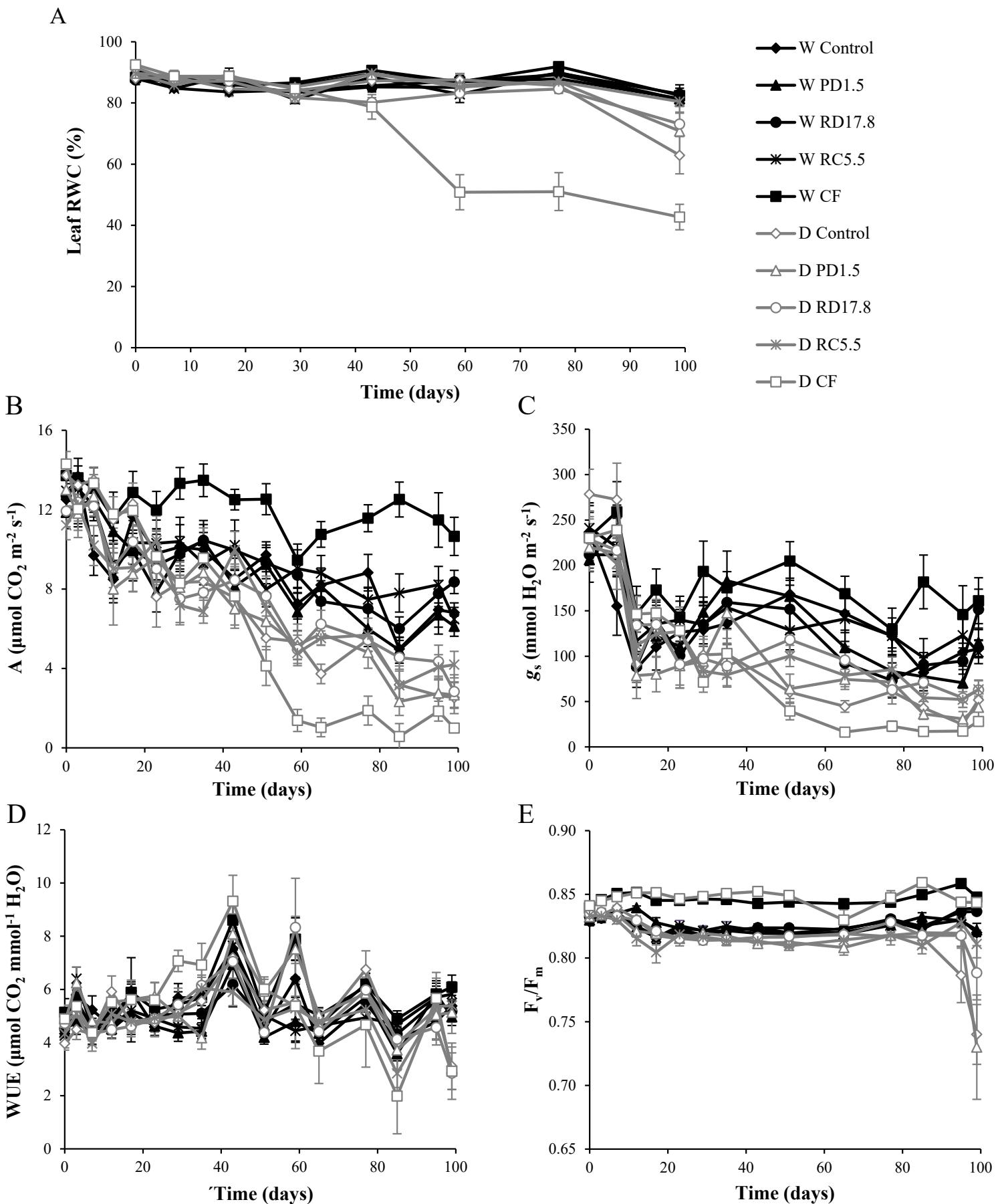
Fixed effect	RWC	A	$g_s$	WUE	$F_v/F_m$	Height	Diameter
Fertilisation	8.08 ns	26.47 ***	6.36	11.46 *	98.25 ***	11.00 *	7.78 ns
Drought	12.29 ***	0.02 ns	0.02 ns	0.08 ns	2.41 ns	0.05 ns	1.95 ns
Time	192.2 ***	1351.6 ***	378.0 ***	1.73 ns	52.29 ***	1208.4 ***	4423.8 ***
F x D	5.68 ns	7.24 ns	6.22 ns	-	7.46 ns	0.95 ns	2.16 ns
F x T	75.25 ***	25.54 ***	5.53	-	66.93 ***	520.01 ***	306.08 ***
D x T	112.19 ***	179.69 ***	53.08 ***	-	69.94 ***	240.82 ***	228.32 ***
F x D x T	93.30 ***	55.63 ***	15.41 **	-	23.22 ***	139.27 ***	180.64 ***

**Table S3.** Effects of the factors fertilisation (F), drought (D) and their interaction (F x D) on physiological and morphological variables of *Caesalpinia spinosa* seedlings at the end of the experiment (day 100), analysed by two-way ANOVA.  $\chi^2$  values and significance (\*: p<0.05; \*\*: p<0.01; \*\*\*: p<0.001) are showed. RWC: leaf relative water content.  $\Psi$ : plant water potential at midday. A: net carbon assimilation rate.  $g_s$ : stomatal conductance. WUE: water use efficiency.  $F_v/F_m$ : Maximum quantum yield of PSII. h RGR: height (cm) relative growth rate. Ø RGR: diameter (mm) relative growth rate. SLA: specific leaf area. DW: dry weight. S/R: Shoot-to-root ratio.

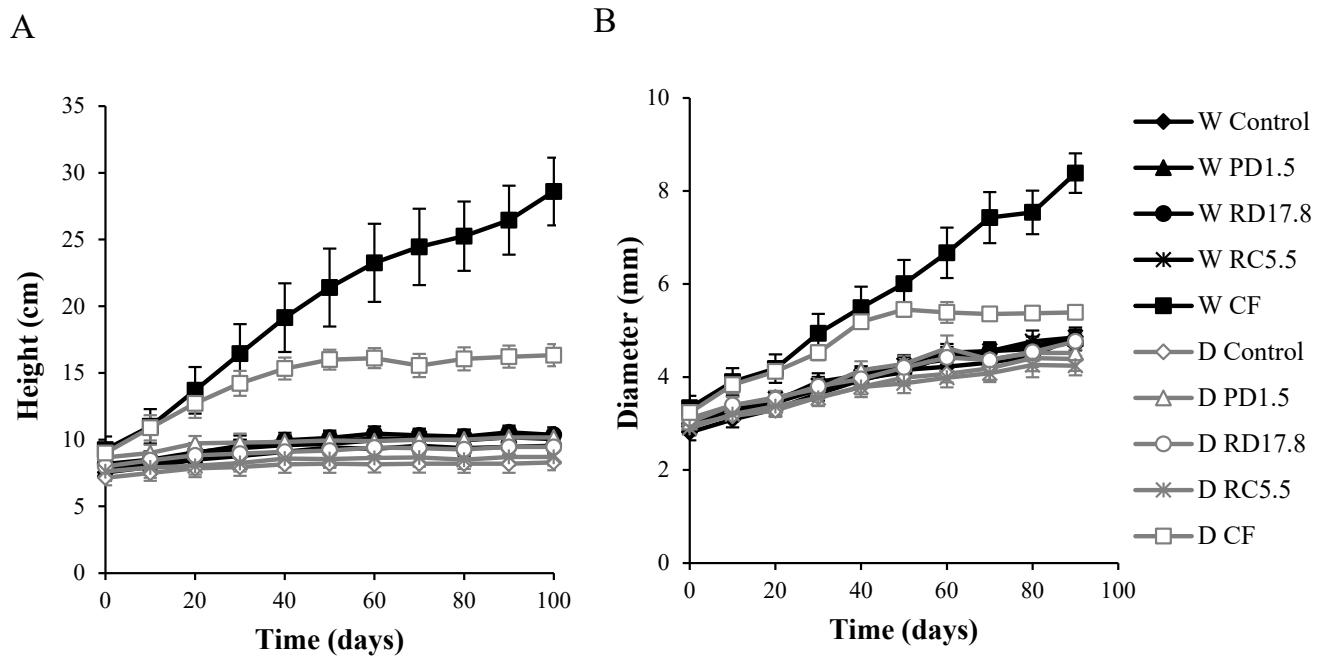
	F	D	F x D
<b>Physiological variables</b>			
RWC (%)	8.98	***	48.08 ***
$\Psi$ (MPa)	21.08	***	138.06 ***
A ( $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$ )	1.62		143.66 ***
$g_s$ ( $\text{mmol H}_2\text{O m}^{-2} \text{ s}^{-1}$ )	1.11		61.37 ***
WUE ( $\mu\text{mol CO}_2 \text{ mmol}^{-1} \text{ H}_2\text{O}$ )	2.68	*	17.06 ***
$F_v/F_m$	6.77	***	25.65 ***
<b>Morphological variables</b>			
Height (cm)	65.79	***	26.58 ***
Diameter (mm)	128.18	***	64.69 ***
h RGR (%)	34.50	***	36.13 ***
Ø RGR (%)	12.23	***	27.34 ***
SLA ( $\text{m}^2 \text{ kg}^{-1}$ )	5.55	***	56.04 ***
Shoot DW (g)	116.51	***	67.40 ***
Root DW (g)	19.85	***	14.12 ***
S/R	46.35	***	34.37 ***
			10.64 ***
			2.13



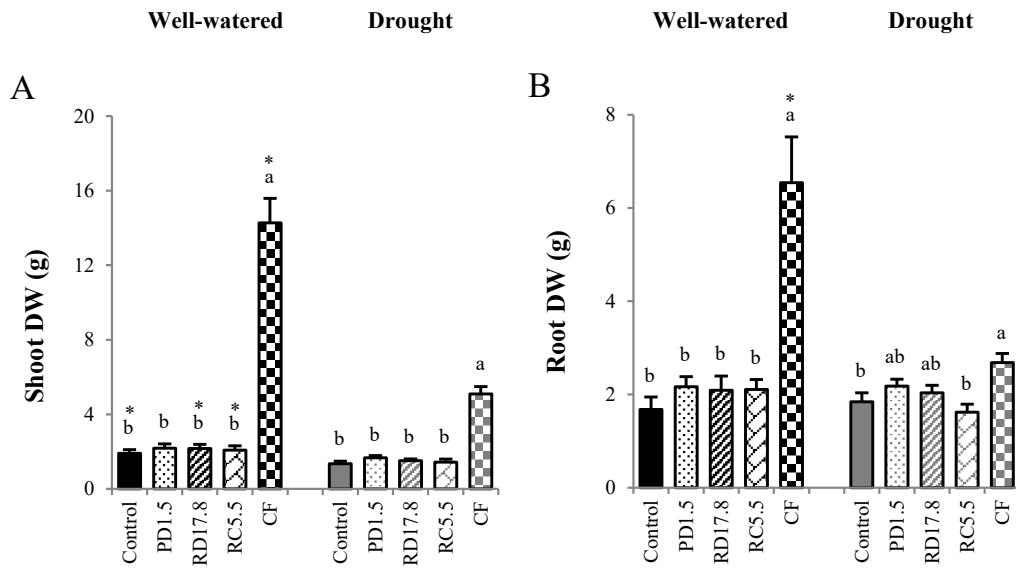
**Figure S1.** (A) Substrate relative water content (RWC) along the experiment in the different fertilisation treatments (biological fertilisation with different PGPR strains: PD1.5, RD17.8 or RC5.5, or chemical fertilisation: CF) and drought treatments (well-watered: W or drought: D). Arrows indicate when water input for drought treatments was reduced to  $t_1$ : 50%,  $t_2$ : 25%;  $t_3$ : 0% of daily water loss. (B) Substrate relative water content of drought stressed tara seedlings at day 100. Different letters denote significant differences among fertilisation treatments by Tukey test ( $p < 0.05$ ). Values = mean  $\pm$  SE,  $n = 10-12$ .



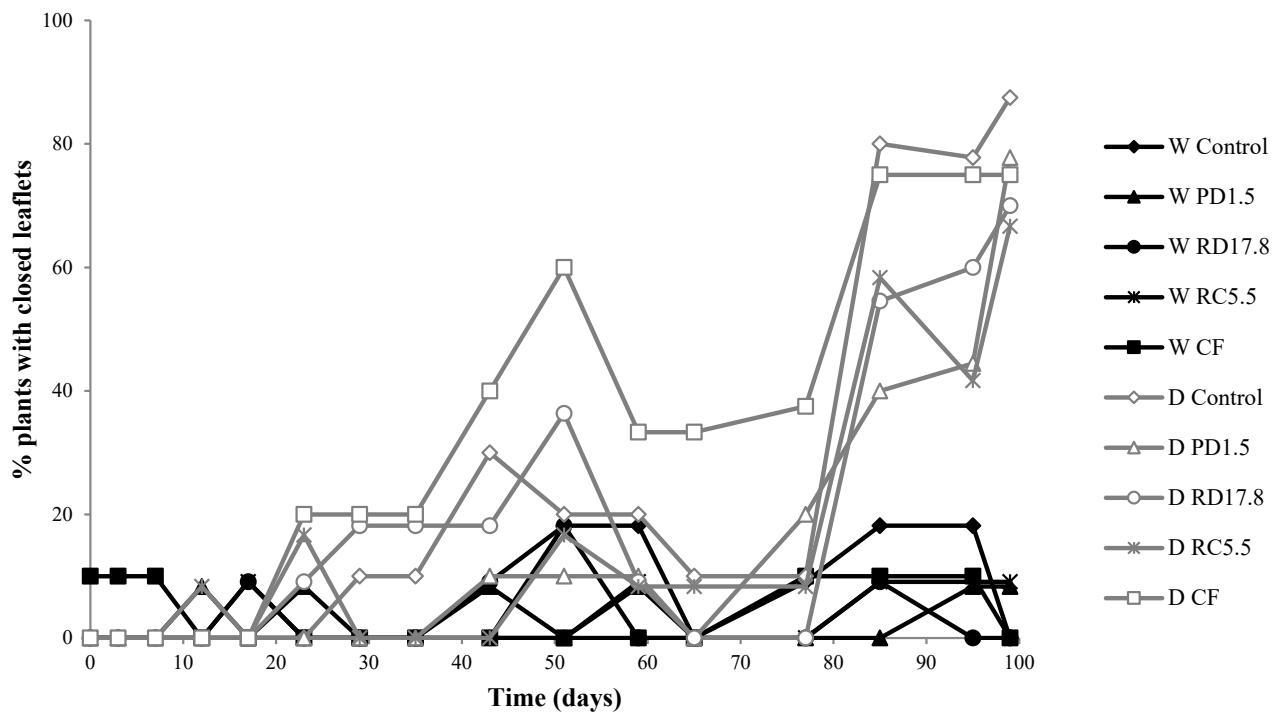
**Figure S2.** Physiological status of tara (*Caesalpinia spinosa*) seedlings along the experimental time depending on fertilisation (biological with different PGPR strains: PD1.5, RD17.8 or RC5.5, or chemical: CF) and drought treatments (well-watered: W or drought: D). A. Leaf relative water content (RWC). B. Net carbon assimilation rate (A). C. Stomatal conductance ( $g_s$ ). D. Water use efficiency (WUE). E. Maximum quantum yield of PSII ( $F_v/F_m$ ). Values = mean  $\pm$  standard error, n=10-12.



**Figure S3.** Growth of tara (*Caesalpinia spinosa*) seedlings along the experiment depending on fertilisation (biological with different PGPR strains: PD1.5, RD17.8 or RC5.5, or chemical: CF) and drought treatments (well-watered: W or drought: D). A. Height. B. Diameter. Values = mean  $\pm$  standard error, n=10-12.



**Fig. S4.** Biomass of tara (*Caesalpinia spinosa*) seedlings at the end of the experiment (day 100) depending on fertilisation (biological with different PGPR strains: PD1.5, RD17.8 or RC5.5, or chemical: CF) and drought treatments (well-watered or drought). A. Shoot dry weight (DW). B. Root dry weight (DW). For each drought treatment, different letters denote significant differences among fertilisation treatments following Tukey test ( $p < 0.05$ ). For each fertilisation treatment, asterisks indicate significant differences of factor drought. ns: not significant. Values = mean  $\pm$  standard error,  $n=10-12$ .



**Figure S5.** Leaflet closure of tara (*Caesalpinia spinosa*) seedlings along the simulated drought depending on fertilisation (biological with different PGPR strains: PD1.5, RD17.8 or RC5.5, or chemical: CF) and drought treatments (well-watered: W or drought: D).