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Supplementary Material

Grain yield and physiological traits of rice drought-yield QTL *qDTY_{12.1}* lines showed different responses to drought and soil characteristics in upland environments

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Table S1. Genotypes included in each trial of this study

Trials/Experiments	Entry list
1	IR84984-21-19-62-B-B IR84984-21-19-60-B-B IR84984-83-15-851-B-B IR84984-83-15-6-B-B IR84984-83-15-157-B-B IR84984-21-19-48-B-B IR84984-83-15-332-B-B IR84984-83-15-481-B-B Vandana Way Rarem
2	IR84984-21-19-62-B-B IR84984-83-15-481-B-B Vandana Way Rarem
3,13	IR84984-21-19-60-B IR84984-21-19-62-B IR84984-83-15-332-B IR84984-83-15-481-B Vandana Way Rarem
4,5,6,7,8,9,10,14,15,16, Exp1, Exp2	IR84984-83-15-481-B IR84984-21-19-78-B IR90020:22-283-B-1 IR90020:22-283-B-4 Vandana Way Rarem
11,12,17,18	IR 84984-83-15-110-B IR 84984-83-15-481-B IR 84984-83-15-862-B IR 90019:17-159-B IR 90019:17-15-B IR 90020:22-265-B IR 90020:22-283-B Vandana Way Rarem

Table S2. P-values from ASREML repeated measured analyses comparing genotypes (Gen) and Dates at which leaf area, water uptake rates, and water use efficiency were measured in lysimeter studies Exp 1 and Exp 2

Analyses were run across the whole experiment in Exp1 and Exp 2 WW, and after rewatering in Exp 2 DD. Letter groups in the footnote indicate significant differences among genotypes

		Exp 1			Exp 2		
		Gen	Date	Gen x Date	Gen	Date	Gen x Date
Trait	Treatment	p-value			p-value		
Leaf area (cm ²)							
	-sand/WW	0.909	<0.001***	0.497	0.630	<0.001***	0.788
	+sand/WW	0.858	<0.001***	0.503	0.294	<0.001***	0.557
	-sand/DD	0.764	<0.001***	0.867	0.077	<0.001***	0.119
	+sand/DD ^a	0.046*	<0.001***	0.022*	0.515	<0.001***	0.079
Water uptake rate (g day ⁻¹ cm ⁻² leaf)							
	-sand/WW ^b	0.003*	<0.001***	0.995	0.329	<0.001***	0.108
	+sand/WW	0.313	<0.001***	0.868	0.834	<0.001***	0.987
	-sand/DD ^d	0.965	<0.001***	0.848	0.022*	<0.001***	0.270
	+sand/DD ^c	0.054	<0.001***	0.007**	0.964	<0.001***	0.738
Water use efficiency (cm ² leaf g ⁻¹ cumulative water uptake)							
	-sand/WW ^e	0.468	<0.001***	0.999	0.019*	<0.001***	0.610
	+sand/WW	0.924	<0.001***	1.000	0.785	<0.001***	0.842
	-sand/DD ^f	0.615	<0.001***	0.865	0.026*	<0.001***	0.014*
	+sand/DD	0.382	<0.001***	0.579	0.686	<0.001***	0.269

^aExp1: a 283-B-4, 283-B-1, 481-B; 78-B; ab Vandana; b Way Rarem

^b Exp1: a 283-B-4; ab Way Rarem; b 283-B-1, 481-B; bc 78-B, Vandana

^c Exp1: a Vandana, 283-B-4, Way Rarem; ab 283-B-1, 78-B; b 481-B

^d Exp2: a 283-B-1, 481-B; ab 78-B, 283-B-4, Way Rarem; b Vandana

^e Exp2: a Way Rarem; ab Vandana, 283-B-4; b 283-B-1, 481-B, b 78-B

^f Exp2: a 78-B; ab Vandana, 481-B, Way Rarem, 283-B-4; b 283-B-1

Table S3. Stomatal density in three drought treatment trials

Trial	Sampling date (das)	P-value	Stomatal density (stomates mm ⁻²)		
Stress			481-B	Vandana	Way Rarem
1	84	0.35	1762 ± 39.3	1844 ± 55.9	1847 ± 62.8
3	49	0.91	2107 ± 176	2058 ± 162	2200 ± 141
9	100 (120)	0.52	1856 ± 78.0	2045 ± 85.1	2096 ± 122

Table S4. Phosphorus uptake in greenhouse and field studies

Values shown are mean \pm s.e. of mg of phosphorus taken up per plant, except in Trials 10 and 16 in which the values shown are mg of phosphorus taken up in 9 tillers per plant. Sampling dates in parentheses are for Way Rarem, which was harvested later in Exp 2 and sown 20 days early in Trials 9 and 15. Letter groups in the footnote indicate significant differences among genotypes

Trial	Sampling date (das)	P-value (all entries)	Phosphorus uptake (mg)		
			481-B	Vandana	Way Rarem
Exp 1					
–sand/WW	97 (110)	0.0125 ^a	0.311 \pm 0.057	0.296 \pm 0.072	0.775 \pm 0.024
+sand/WW	97 (110)	<0.001 ^a	0.145 \pm 0.018	0.145 \pm 0.029	0.493 \pm 0.094
–sand/DD	97 (110)	<0.001 ^a	0.300 \pm 0.065	0.270 \pm 0.022	0.622 \pm 0.038
+sand/DD	97 (110)	<0.001 ^b	0.132 \pm 0.024	0.139 \pm 0.024	0.344 \pm 0.033
Stress					
9	71 (91)	0.008 ^a	0.150 \pm 0.018	0.162 \pm 0.010	0.288 \pm 0.049
10	49	0.465	0.077 \pm 0.004	0.079 \pm 0.016	0.089 \pm 0.022
Control					
15	71 (91)	0.011 ^a	0.126 \pm 0.071	0.152 \pm 0.071	0.429 \pm 0.036
16	49	0.131	0.16 \pm 0.022	0.114 \pm 0.020	0.120 \pm 0.012

^a a Way Rarem; b all other genotypes

^b a Way Rarem; b 283-B-4; c all other genotypes

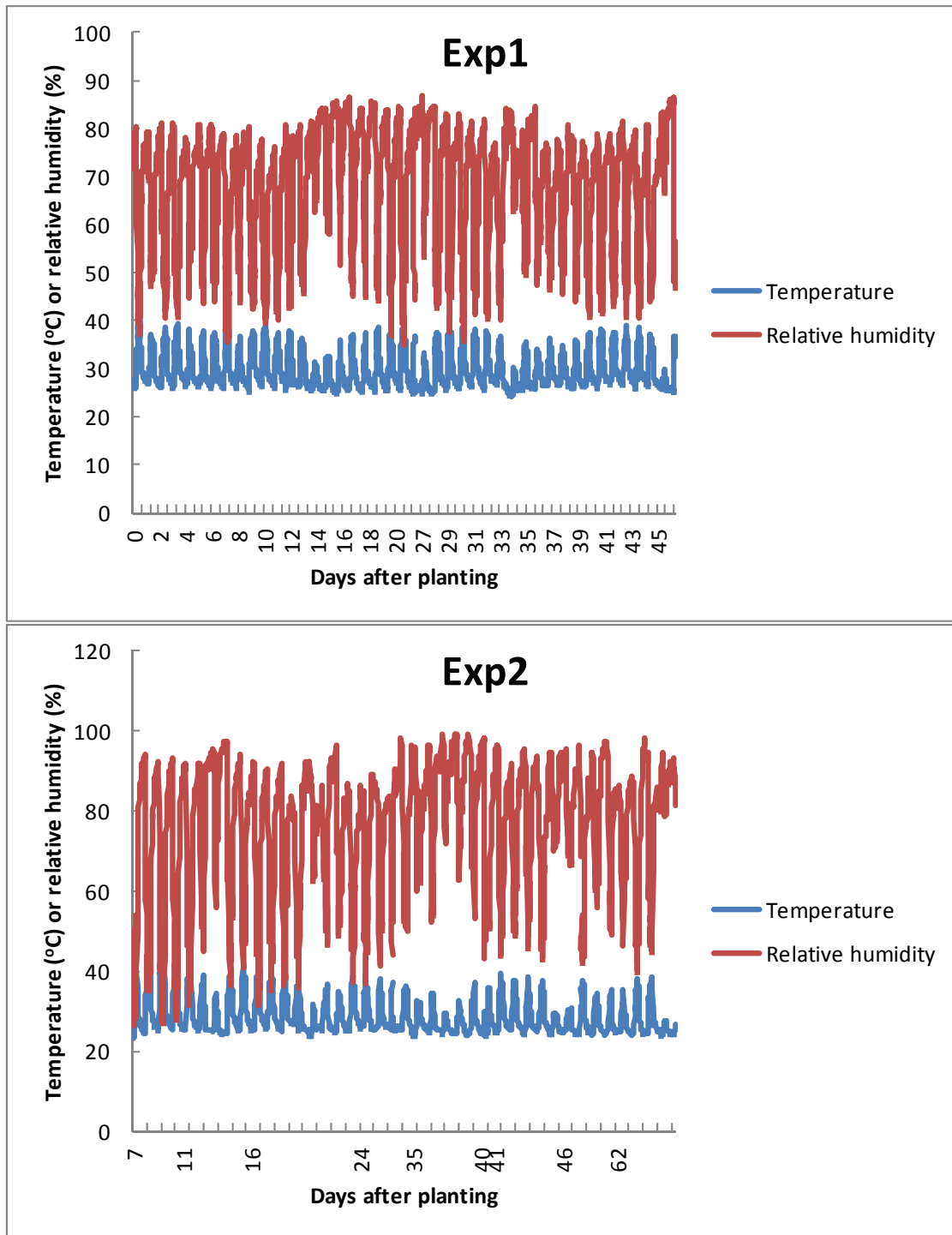


Fig. S1. Daily temperature and relative humidity conditions in the two lysimeter experiments.

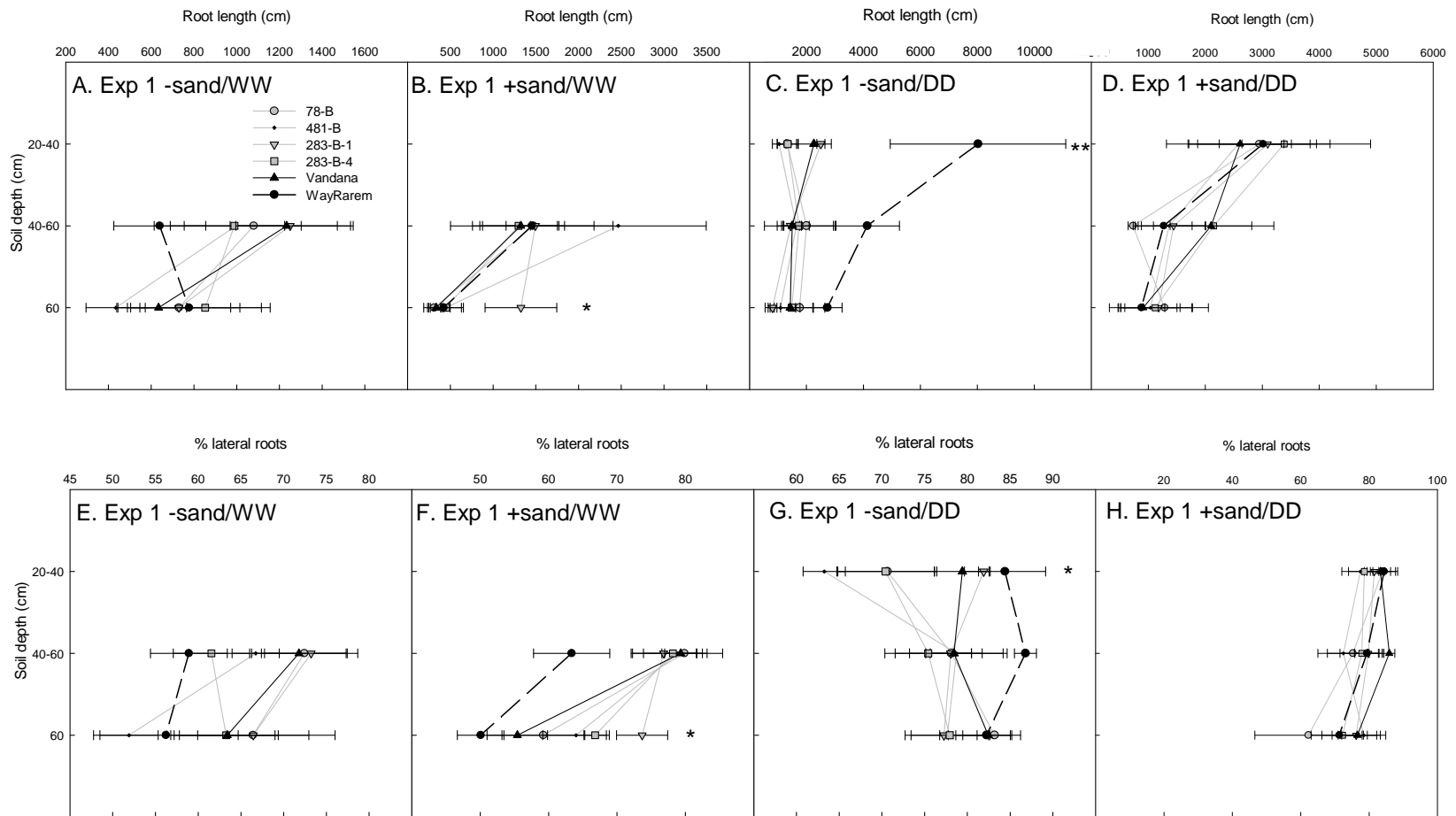


Fig. S2. Total root length and percent of total root length as lateral roots at different soil depths in lysimeter Exp 1. Values shown are mean \pm se. Significance levels are indicated by * <0.05 .

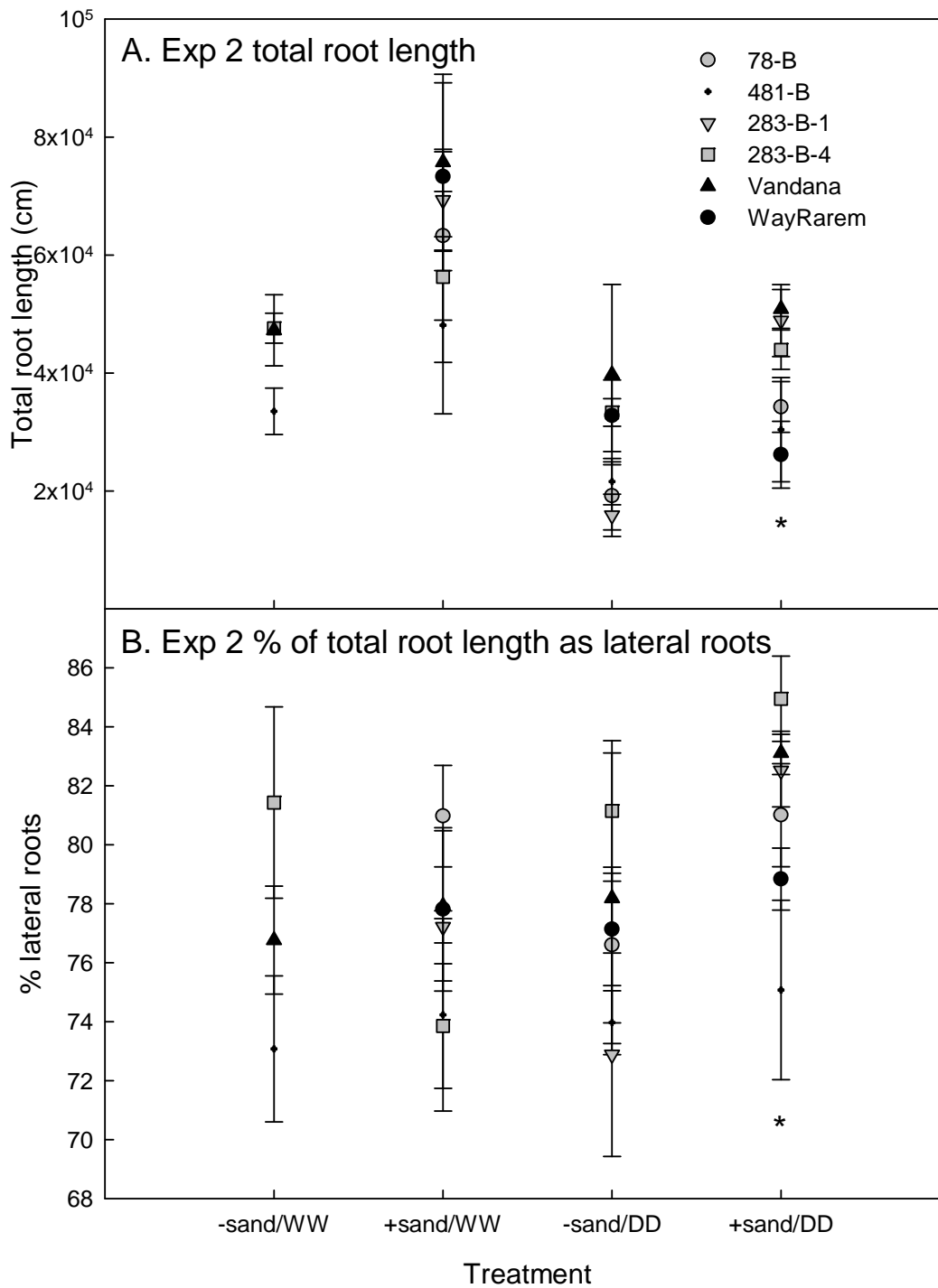


Fig. S3. Total root length and percent of total root length as lateral roots from the whole root system in lysimeter Exp 2. Values shown are mean \pm se. Significance levels are indicated by * <0.05 .

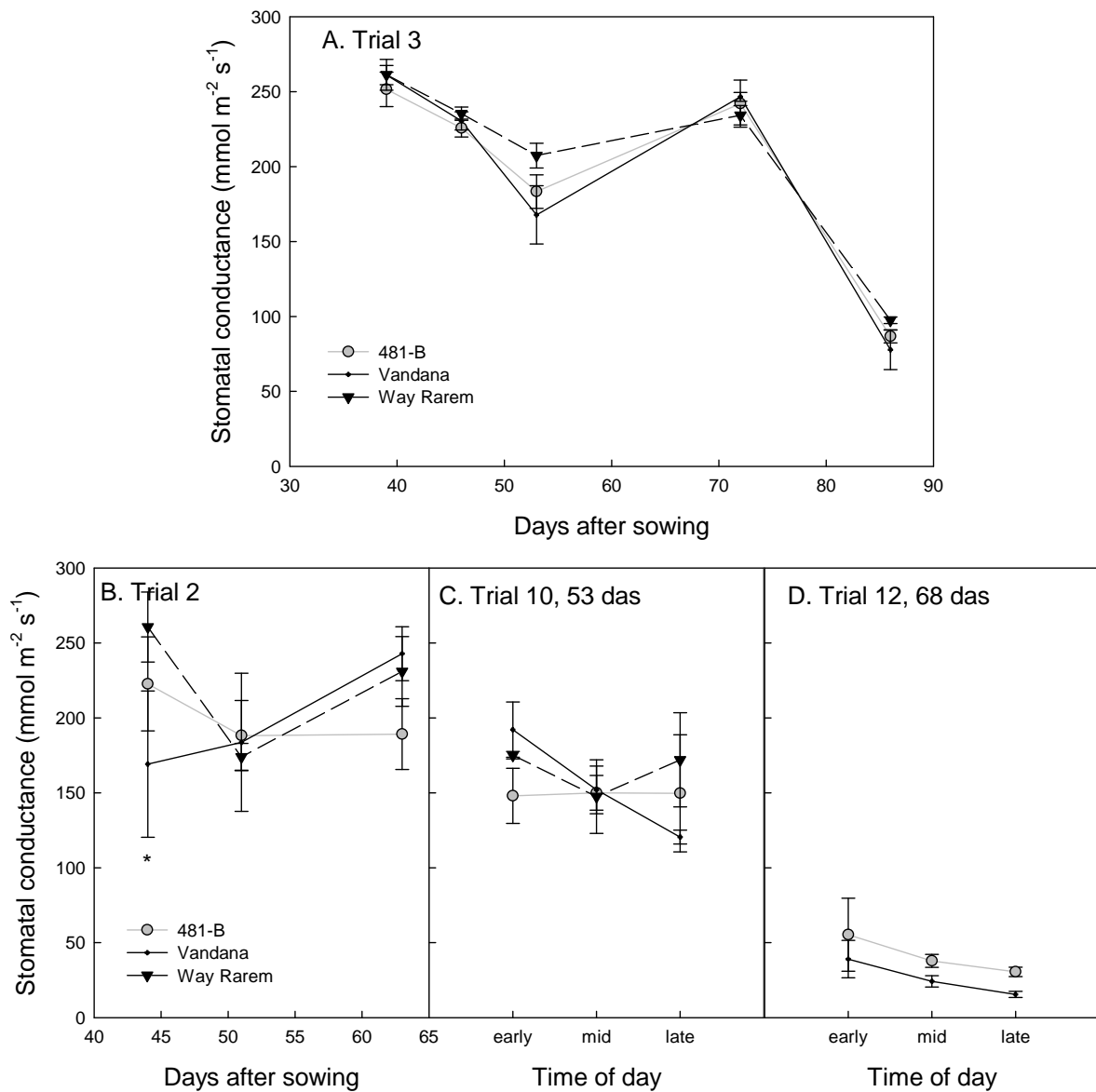


Fig. S4. Stomatal conductance in (above) A) Trial 3 in which 481-B showed a yield advantage over Vandana, and (below) B-D) trials without a yield advantage of 481-B over Vandana. Values shown are mean \pm se. Significance levels are indicated by * <0.05 .