

Supplementary Material

Table S1. Three-way analysis of Variance (ANOVA) results in *Pyropia yezoensis* on the relative growth rate at different $p\text{CO}_2$ concentrations, light intensities and salinity levels. df: degree of freedom, F: the value of F statistic, and Sig.: p value.

	df	F	Sig.
Growth			
$p\text{CO}_2$	1	0.22	0.648
Ligh	1	117.48	<0.001
Salinity	1	9.82	0.006
$p\text{CO}_2$ *Light	1	0.30	0.593
$p\text{CO}_2$ *Salinity	1	0.24	0.633
Light*Salinity	1	0.10	0.757
$p\text{CO}_2$ *Light*Salinity	1	0.50	0.492

Table S2. Three-way analysis of Variance (ANOVA) results in *Pyropia yezoensis* on the chlorophyll fluorescence parameters at different $p\text{CO}_2$ concentrations, light intensities and salinity levels. df: degree of freedom, F: the value of F statistic, and Sig.: p value.

	df	F	Sig.
rETR_{max}			
$p\text{CO}_2$	1	5.96	0.027
Ligh	1	26.41	<0.001
Salinity	1	38.73	<0.001
$p\text{CO}_2$ *Light	1	0.01	0.937
$p\text{CO}_2$ *Salinity	1	1.35	0.262
Light*Salinity	1	0.41	0.530
$p\text{CO}_2$ *Light*Salinity	1	0.09	0.764
α			
$p\text{CO}_2$	1	0.04	0.837
Ligh	1	3.49	0.080
Salinity	1	2.27	0.152
$p\text{CO}_2$ *Light	1	1.31	0.270
$p\text{CO}_2$ *Salinity	1	5.49	0.033
Light*Salinity	1	<0.01	0.993
$p\text{CO}_2$ *Light*Salinity	1	2.24	0.154
I_k			
$p\text{CO}_2$	1	1.05	0.321
Ligh	1	25.74	<0.001
Salinity	1	5.51	0.032
$p\text{CO}_2$ *Light	1	0.89	0.361
$p\text{CO}_2$ *Salinity	1	10.26	0.006
Light*Salinity	1	0.24	0.631
$p\text{CO}_2$ *Light*Salinity	1	3.59	0.077

Table S3. Three-way analysis of Variance (ANOVA) results in *Pyropia yezoensis* on the pigments at different $p\text{CO}_2$ concentrations, light intensities and salinity levels. df: degree of freedom, F: the value of F statistic, and Sig.: p value.

	df	F	Sig.
Chlorophyll a			
$p\text{CO}_2$	1	5.29	0.035
Ligh	1	0.33	0.576

Salinity	1	1.97	0.180
$p\text{CO}_2$ *Light	1	0.87	0.365
$p\text{CO}_2$ *Salinity	1	6.40	0.022
Light*Salinity	1	0.05	0.829
$p\text{CO}_2$ *Light*Salinity	1	0.87	0.365
Carotenoids			
$p\text{CO}_2$	1	2.75	0.117
Ligh	1	3.13	0.096
Salinity	1	2.56	0.129
$p\text{CO}_2$ *Light	1	1.05	0.321
$p\text{CO}_2$ *Salinity	1	7.21	0.016
Light*Salinity	1	0.03	0.874
$p\text{CO}_2$ *Light*Salinity	1	0.61	0.447
Phycoerythrin			
$p\text{CO}_2$	1	0.32	0.579
Ligh	1	38.93	<0.001
Salinity	1	0.50	0.491
$p\text{CO}_2$ *Light	1	0.77	0.392
$p\text{CO}_2$ *Salinity	1	4.05	0.061
Light*Salinity	1	0.13	0.721
$p\text{CO}_2$ *Light*Salinity	1	0.36	0.556

Table S4. Three-way analysis of Variance (ANOVA) results in *Pyropia yezoensis* on soluble sugar at different $p\text{CO}_2$ concentrations, light intensities and salinity levels. df: degree of freedom, F: the value of F statistic, and Sig.: p value.

	df	F	Sig.
Soluble sugar			
$p\text{CO}_2$	1	0.32	0.579
Ligh	1	0.32	0.583
Salinity	1	0.29	0.600
$p\text{CO}_2$ *Light	1	1.35	0.263
$p\text{CO}_2$ *Salinity	1	2.55	0.130
Light*Salinity	1	1.77	0.202
$p\text{CO}_2$ *Light*Salinity	1	0.25	0.625