

**Table S1** Effects of chlorophyll a (Chla) and chlorophyll b (Chlb) in *C. tientaiensis* subjected to different irradiance levels, including T1( $1800 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T2( $1500 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T3 ( $1200 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ) and T4 ( $900 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ). The values presented are the means  $\pm$  SE (n = 10 plants). Different lowercase letters indicate significant differences based on one way ANOVA followed by Duncan' s multiple comparisons ( $P \leq 0.05$ ).

Irradiance	Chlorophyll content ( $\text{mg g}^{-1}$ )	
	Chlorophyll a	Chlorophyll b
T1	$0.97 \pm 0.09\text{d}$	$0.37 \pm 0.02\text{d}$
T2	$1.31 \pm 0.06\text{c}$	$0.65 \pm 0.03\text{c}$
T3	$1.48 \pm 0.06\text{b}$	$0.87 \pm 0.04\text{b}$
T4	$1.65 \pm 0.07\text{a}$	$1.03 \pm 0.05\text{a}$

**Table S2** Photosynthetic parameters of *C. tientaiensis* subjected to four different irradiance levels, including T1 ( $1800 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T2 ( $1500 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T3 ( $1200 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ) and T4 ( $900 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ). The values presented are the means  $\pm$  SE (n = 10 plants). The values presented are the means  $\pm$  SE (n = 10 plants). Different lowercase letters indicate significant differences based on one-way ANOVA followed by Duncan' s multiple comparisons ( $P \leq 0.05$ ).

Irradiance	Photosynthetic parameters			
	Pn ( $\mu \text{mol m}^{-2} \text{s}^{-1}$ )	Gs ( $\mu \text{mol mol}^{-1}$ )	Ci ( $\mu \text{mol}/(\text{H}_2\text{O m}^2 \text{s})$ )	Tr ( $\text{mmol m}^{-2} \text{s}^{-1}$ )
T1	$5.42 \pm 0.21\text{c}$	$0.13 \pm 0.01\text{d}$	$289.40 \pm 7.62\text{a}$	$1.13 \pm 0.08\text{d}$
T2	$6.57 \pm 0.23\text{b}$	$0.19 \pm 0.02\text{c}$	$252.55 \pm 4.27\text{b}$	$1.57 \pm 0.05\text{c}$
T3	$7.55 \pm 0.28\text{a}$	$0.29 \pm 0.02\text{a}$	$277.40 \pm 9.29\text{a}$	$2.09 \pm 0.07\text{a}$
T4	$6.66 \pm 0.27\text{c}$	$0.23 \pm 0.02\text{b}$	$232.74 \pm 3.94\text{c}$	$1.80 \pm 0.07\text{b}$

**Table S3** The Rubisco activase enzyme (RAC) and Rubisco enzyme activity of *C. tientaiensis* subjected to different levels, irradiance including T1 ( $1800 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T2 ( $1500 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ), T3 ( $1200 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ) and T4 ( $900 \pm 30/0 \mu \text{mol m}^{-2} \text{s}^{-1}$ ). The values presented are the means  $\pm$  SE (n = 10 plants). Different lowercase letters indicate significant differences based on one-way ANOVA followed by Duncan' s multiple comparisons ( $P \leq 0.05$ ).

Irradiance	Rubisco activase enzyme ( $\text{mmol g}^{-1} \text{min}^{-1} \text{FW}$ )	Rubisco activity ( $\text{mmol g}^{-1} \text{min}^{-1} \text{FW}$ )
T1	$1.07 \pm 0.05\text{c}$	$140.36 \pm 3.67\text{c}$
T2	$1.37 \pm 0.04\text{b}$	$158.27 \pm 4.05\text{b}$
T3	$1.79 \pm 0.05\text{a}$	$187.36 \pm 4.34\text{a}$
T4	$1.35 \pm 0.05\text{b}$	$159.12 \pm 2.93\text{b}$

**Table S4** The  $O_2^{\cdot -}$  production rate and  $H_2O_2$  content of *C. tientaiensis* subjected to different irradiance levels, including T1 ( $1800 \pm 30/0 \mu mol m^{-2} s^{-1}$ ), T2 ( $1500 \pm 30/0 \mu mol m^{-2} s^{-1}$ ), T3 ( $1200 \pm 30/0 \mu mol m^{-2} s^{-1}$ ) and T4 ( $900 \pm 30/0 \mu mol m^{-2} s^{-1}$ ). The values presented are the means  $\pm$  SE (n = 10 plants). Different lowercase letters indicate significant differences based on one-way ANOVA followed by Duncan's multiple comparisons ( $P \leq 0.05$ ).

<b>Irradiance</b>	<b><math>O_2^{\cdot -}</math> production rate (mmol min<sup>-1</sup> g<sup>-1</sup> FW)</b>	<b><math>H_2O_2</math> content (mmol g<sup>-1</sup> FW)</b>
T1	35.61 $\pm$ 0.98a	1.34 $\pm$ 0.13a
T2	26.96 $\pm$ 1.77b	0.78 $\pm$ 0.04b
T3	17.99 $\pm$ 1.86d	0.29 $\pm$ 0.02c
T4	21.84 $\pm$ 1.28c	0.86 $\pm$ 0.11b

**Table S5** Effects of different irradiance levels on gene expression in *C. tientaiensis* leaves. Irradiance levels including T1 ( $1800 \pm 30/0 \mu mol m^{-2} s^{-1}$ ), T2 ( $1500 \pm 30/0 \mu mol m^{-2} s^{-1}$ ), T3 ( $1200 \pm 30/0 \mu mol m^{-2} s^{-1}$ ) and T4 ( $900 \pm 30/0 \mu mol m^{-2} s^{-1}$ ). Bars indicate SE (n=3).

<b>Irradiance</b>	<b>Related gene expression of chloroplast</b>			
	<i>psbA</i> (Fold change )	<i>psbb</i> (Fold change )	<i>psbc</i> (Fold change )	<i>Psb(OCE)</i> (Fold change )
T1	1.00 $\pm$ 0.03	1.00 $\pm$ 0.03	1.00 $\pm$ 0.02	1.00 $\pm$ 0.02
T2	0.56 $\pm$ 0.05	0.75 $\pm$ 0.08	0.87 $\pm$ 0.03	0.83 $\pm$ 0.04
T3	0.43 $\pm$ 0.05	0.51 $\pm$ 0.06	0.65 $\pm$ 0.03	0.72 $\pm$ 0.03
T4	0.22 $\pm$ 0.08	0.33 $\pm$ 0.07	0.51 $\pm$ 0.02	0.61 $\pm$ 0.03