

**Optimization of photosynthetic photon flux density and root-zone temperature for enhancing secondary metabolite accumulation and production of coriander in plant factory**

Duyen T.P. Nguyen<sup>a</sup>, Na Lu<sup>b\*</sup>, Natsuko Kagawa<sup>a,b\*</sup>, Michiko Takagaki<sup>a</sup>

<sup>a</sup> Graduate School of Horticulture, Chiba University, 648 Matsudo, Chiba 271-8510, Japan

<sup>b</sup> Center for Environment, Health and Field Sciences, Chiba University, 6-2-1 Kashiwanoha, Kashiwa, Chiba 277-0882, Japan

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**Table S1.** Fresh weight (FW), dry weight (DW) and water content of leaf, stem and root of coriander on day 19 after transplanting

Treatment code <sup>z</sup>	Leaf FW (g)	Stem FW (g)	Root FW (g)	Leaf DW (g)	Stem DW (g)	Root DW (g)	Leaf water content (%)	Stem water content (%)	Root water content (%)
20-100	3.75 ± 0.12 e <sup>x</sup>	3.99 ± 0.19 d	2.60 ± 0.15 de	0.40 ± 0.02 d	0.24 ± 0.01 f	0.14 ± 0.01 e	89.2 ± 0.24 ab	93.9 ± 0.28 ab	94.5 ± 0.12 ab
20-200	5.41 ± 0.15 cd	5.97 ± 0.25 c	4.69 ± 0.22 bc	0.65 ± 0.02 c	0.39 ± 0.02 de	0.25 ± 0.01 d	88.0 ± 0.29 bcd	93.8 ± 0.16 abc	94.7 ± 0.14 ab
20-300	6.13 ± 0.19 bc	6.68 ± 0.55 c	7.94 ± 0.55 a	0.83 ± 0.04 b	0.50 ± 0.02 bc	0.48 ± 0.03 a	86.5 ± 0.29 e	92.5 ± 0.21 de	93.9 ± 0.21 b
25-100	4.77 ± 0.19 d	5.56 ± 0.19 c	2.58 ± 0.19 de	0.49 ± 0.03 d	0.30 ± 0.02 ef	0.13 ± 0.01 e	89.7 ± 0.19 a	94.6 ± 0.11 a	94.8 ± 0.19 ab
25-200	6.80 ± 0.22 b	9.31 ± 0.28 b	5.71 ± 0.32 b	0.76 ± 0.03 bc	0.54 ± 0.02 bc	0.29 ± 0.02 cd	88.8 ± 0.22 abc	94.2 ± 0.17 ab	94.8 ± 0.22 a
25-300	8.55 ± 0.37 a	10.7 ± 0.32 a	7.73 ± 0.95 a	1.06 ± 0.04 a	0.70 ± 0.03 a	0.40 ± 0.04 ab	87.5 ± 0.42 cde	93.4 ± 0.25 bcd	94.5 ± 0.22 ab
30-100	3.34 ± 0.13 e	3.59 ± 0.14 d	1.81 ± 0.10 e	0.43 ± 0.02 d	0.26 ± 0.01 f	0.13 ± 0.01 e	87.2 ± 0.23 de	92.8 ± 0.36 cd	92.9 ± 0.23 c
30-200	5.44 ± 0.20 cd	5.82 ± 0.22 c	3.32 ± 0.13 cde	0.74 ± 0.02 bc	0.48 ± 0.01 cd	0.25 ± 0.01 d	86.2 ± 0.28 e	91.7 ± 0.24 e	92.4 ± 0.22 c
30-300	5.15 ± 0.20 d	5.97 ± 0.28 c	3.94 ± 0.17 bcd	0.84 ± 0.04 b	0.58 ± 0.03 b	0.34 ± 0.01 bc	83.8 ± 0.45 f	90.3 ± 0.24 f	91.3 ± 0.25 d
ANOVA <sup>y</sup>									
RZT (A)	***	***	***	***	***	**	***	***	***
PPFD (B)	***	***	***	***	***	***	***	***	***
A x B	***	***	***	**	**	**	NS	*	*

<sup>z</sup> For treatment code, 20, 25 or 30 represents a root–zone temperature of 20, 25 or 30 °C respectively, and 100, 200 or 300 represents a light intensity of 100, 200 or 300  $\mu\text{mol m}^{-2} \text{s}^{-1}$  respectively.

<sup>y</sup> The result of two-way ANOVA are shown. RZT, root-zone temperature; PPFD, photosynthetic photon flux density; NS, non-significant. Asterisks show the significance of factors/interaction for: \*\*\* $P < 0.001$ ; \*\* $P < 0.01$ ; \*  $P < 0.05$ .

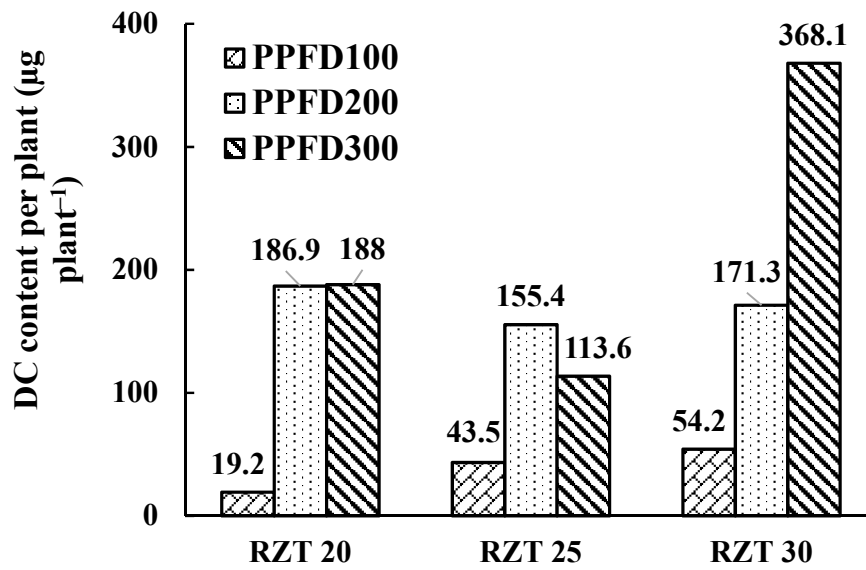
<sup>x</sup> Data are shown as means  $\pm$  SE ( $n = 15$ ). Different letters in each column indicate significant differences between the treatments at  $P < 0.05$ , determined by Tukey's test.

**Table S2.** Analysis of variance for growth parameters (fresh weight (FW), dry weight (DW), and water content (WC) of leaf, stem and root) in coriander plants cultivated for 19 days under 9 combinations of two factors: 3 levels of root-zone temperature (RZT) and 3 levels of light intensity (LI).

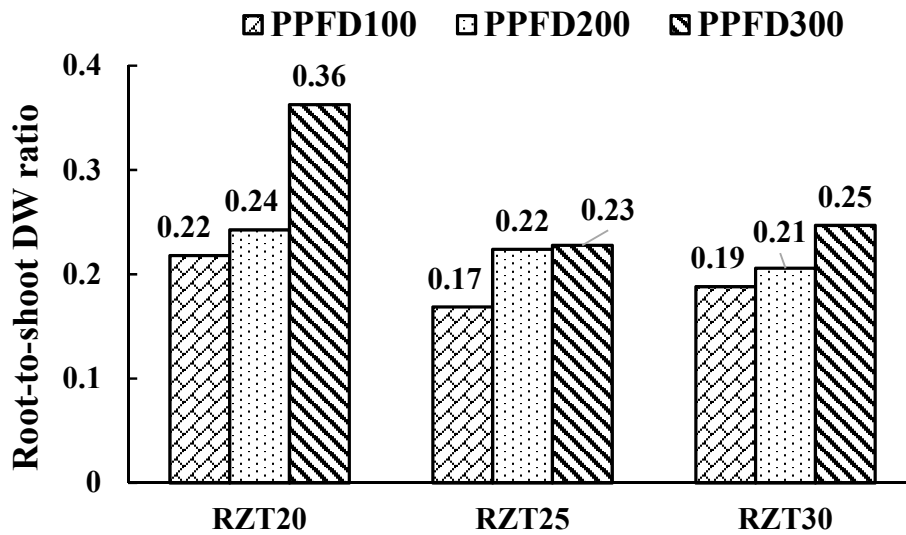
Source	df	<i>P</i> value								
		Leaf FW	Stem FW	Root FW	Leaf DW	Stem DW	Root DW	Leaf WC	Stem WC	Root WC
Corrected Model	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Intercept	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RZT	2	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000
PPFD	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RZT x PPFD	4	0.000	0.000	0.000	0.006	0.009	0.002	0.288	0.028	0.010

**Table S3.** Analysis of variance for total phenolic content, antioxidant capacity, *trans*-2-decenal (DC) content per shoot, chlorogenic acid (CA) content per leaf and stem dry weight (DW), and per plant, rutin (QR) content per leaf and stem dry weight, and per plant in coriander plants cultivated for 19 days under 9 combinations of two factors: 3 levels of root-zone temperature (RZT) and 3 levels of photosynthetic photon flux density (PPFD).

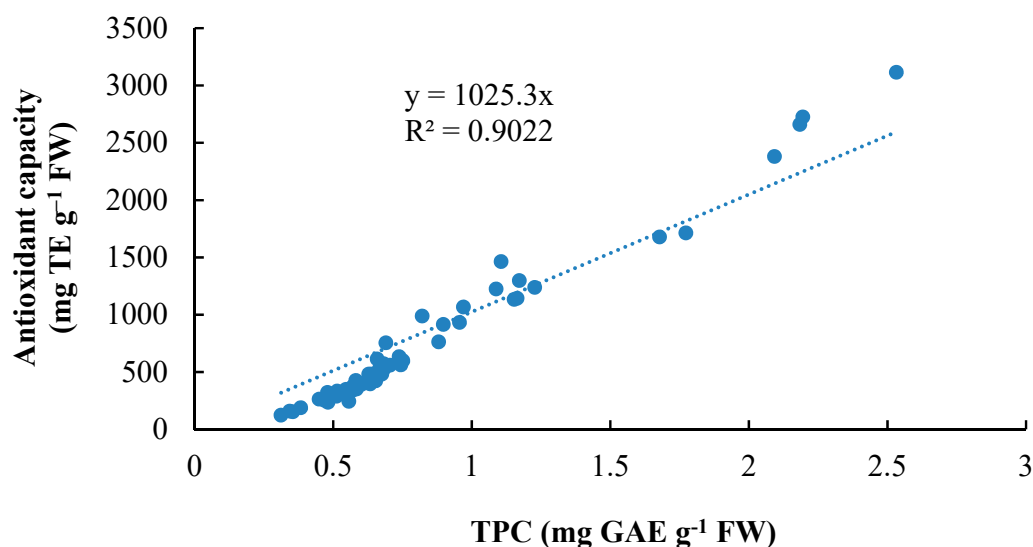
Source	df	<i>P</i> value								
		TPC	Antioxidant capacity	DC content	CA content per leaf DW	CA content per stem DW	CA content per plant	QR content per leaf DW	QR content per stem DW	QR content per plant
Corrected										
Model	8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Intercept	1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RZT	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PPFD	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020
RZT x PPFD	4	0.0000	0.0000	0.0110	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000



**Figure S1.** *trans*-2-Decenal content per plant after 19 days of cultivation under different photosynthetic photon flux density and root-zone temperatures. Data are shown as the mean,  $n = 6$ .



**Figure S2.** Root-to-shoot dry weight (DW) ratio of coriander plant under different photosynthetic photon flux density and root-zone temperatures. Data are shown as the mean,  $n = 15$ .



**Figure S3.** Correlation between total phenolic content and DPPH radical-scavenging activity.

### Chemicals

Gallic acid (analytical standard), 1,1-diphenyl-2-picrylhydrazyl (DPPH), Folin–Ciocalteu reagent, chromatographic grade methanol and acetonitrile, and QA (quercetin 3-rutinoside trihydrate, analytical standard) were obtained from Sigma-Aldrich Japan (Tokyo, Japan). Trolox standard, sodium carbonate and water (liquid chromatography mass spectrometry (LC-MS grade)) were obtained from Fujifilm Wako Pure Chemical Corporation (Osaka, Japan). CA (pharmaceutical reference standard) was obtained from ChromaDex Inc. (CA, USA). A standard of DC was purchased from Tokyo Chemical Industry Co., Ltd. (Tokyo, Japan). Formic acid was obtained from Kanto Chemical Co., Inc. (Tokyo, Japan).