Supplementary Materials

Table S1. Spectral characteristics of the UV lamps used in the experiments

Wavelength (nm)	UV irradiation intensity ($W\ m^{-2}$)			
	Experiment 1		Experiment 2	
220–380 (UV)	6.0	10.0	4.0	6.0
220–280 (UV-C)	0.0	0.0	0.0	0.0
280–315 (UV-B)	4.6	7.8	3.1	4.6
315–380 (UV-A)	1.4	2.3	0.9	1.4

The spectral radiant flux of the UV-B lamp (TL20W/01 RS; Philips, Hamburg, Germany) was measured by using a spectroradiometer (USR-45D; Ushio Inc., Tokyo, Japan).

Table S2. UV irradiation conditions during experiment 1

Treatment	Days of UV irradiation	UV irradiation intensity ($W\ m^{-2}$)	Irradiation period per day ($h\ d^{-1}$)	Cumulative UV irradiation during the experiment ($kJ\ m^{-2}$)	$UV\text{-}B_{BE}$ ($W\ m^{-2}$)
Control	0	0	0	0	0
6 W	3	6	16	1,037	0.83
10 W	3	10	16	1,728	1.38

$UV\text{-}B_{BE}$: biologically effective UV-B radiation.

Table S3. UV irradiation conditions during experiment 2

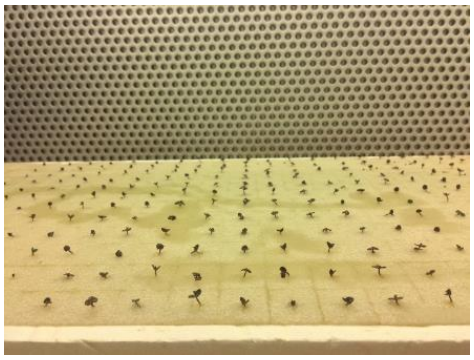
Treatment	Days of UV irradiation	UV irradiation intensity ($W\ m^{-2}$)	Irradiation period per day ($h\ d^{-1}$)	Cumulative UV irradiation during the experiment ($kJ\ m^{-2}$)	$UV\text{-}B_{BE}$ ($W\ m^{-2}$)
Control	0	0	0	0	0
4W24h	3	4	24	1,037	0.55
6W16h	3	6	16	1,037	0.83

$UV\text{-}B_{BE}$: biologically effective UV-B radiation.

Table S4. Primers used for the real-time PCR of phenylpropanoid and flavonoid pathway genes and the internal reference gene, actin

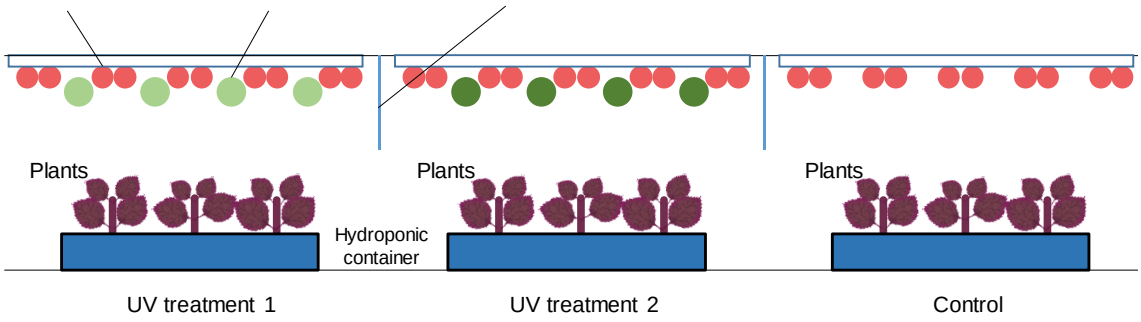
Gene symbol	Gene name (accession no.)		Primer sequence (5'-3')	Product length (bp)
PAL	Phenylalanine ammonia-lyase (JQ277717.1)	Forward Reverse	TAATTGCTCTGTGCCAGGCA CACCACGCTGATCAAGTCCT	209
TAT	Tyrosine aminotransferase (HQ221576)	Forward Reverse	CGCTTAGGTTGGTTGGTGAT CAGCCTGGATGAATGTAGCA	118
RAS	Rosmarinic acid synthase (KC355369)	Forward Reverse	CTATCTCCGGCGAACTACCA GTTGTCGTCGTTCAGCTTCA	156
CHS	Chalcone synthase (AB002582.1)	Forward Reverse	CTACCACTGCCGCAAACAAC GATAGGTGCTCTGGTCGACG	184
F3H	Flavanone 3-hydroxylase (AB002816.1)	Forward Reverse	TACCCGAAATGCCCTCAACC TGAAGCCCACCCACTTGATC	101
DFR	Dihydroflavonol 4-reductase (AB002817.1)	Forward Reverse	TCCCGACTGAGTTTGAAGGC TCCCTTCTCTCTGCAGCTCT	143
ANS	Anthocyanin synthase (AB003779.1)	Forward Reverse	GAGGAGAAGGAGGCATACGC CCGTCTTGTGTTCCGGGTAA	139
ACT	Actin (AB002819.1)	Forward Reverse	GATCTGGCACCACACCTTTT ATACATGGCTGGCACATTGA	148

(A)



(B)

Figure S1. Red perilla cultivation procedure. (A) Seeds were sown in water-saturated urethane sponges in a tray placed on a cultivation shelf in the plant factory with artificial light at Chiba University. Conditioned air comes out from behind the back side of the shelf. (B) Plants were transplanted into hydroponic containers when the first true leaf appeared 21 days after sowing (DAS) and cultivated until 45–60 DAS. The distance between the lamps and plants was approximately 30 cm.



(A) Layout of hydroponic containers under different UV treatments

(B) The photo of red perilla plants grown under UV-B and red lamps

Figure S2. The illustration of the UV lamp installation above the plants. The distance between the red LED lamps and plants was approximately 30 cm. The distance between the UV-B fluorescent lamps and plants was approximately 25 cm.

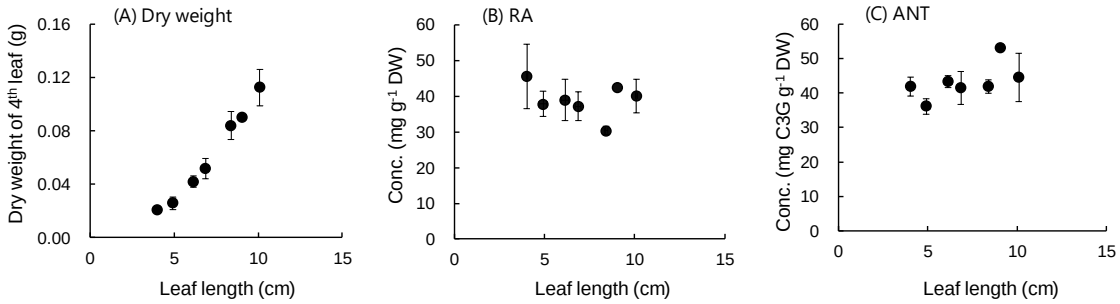


Figure S3. Changes indry weight (A), rosmarinic acid (B) and anthocyanin (C) concentrations in the 4th leaves of red perilla.

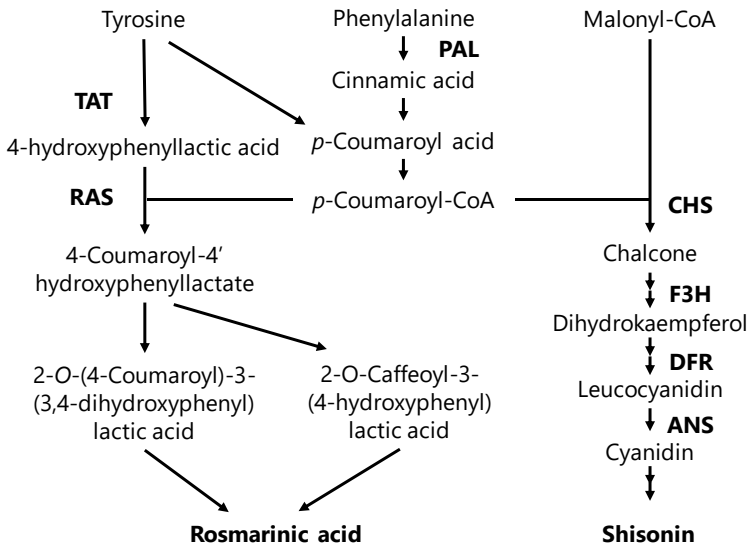


Figure S4. The following mRNAs related to phenylpropanoid and flavonoid biosynthetic pathways were analyzed: phenylalanine ammonia-lyase (PAL), tyrosine aminotransferase (TAT), rosmarinic acid synthase (RAS), chalcone synthase (CHS), flavanone 3-hydroxylase (F3H), dihydroflavonol 4-reductase (DFR), and anthocyanidin synthase (ANS). Actin (ACT) was used as a reference gene.