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Appendix | Open Access

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Photoreceptor-induced sinapate synthesis contributes to photoprotection in Arabidopsis

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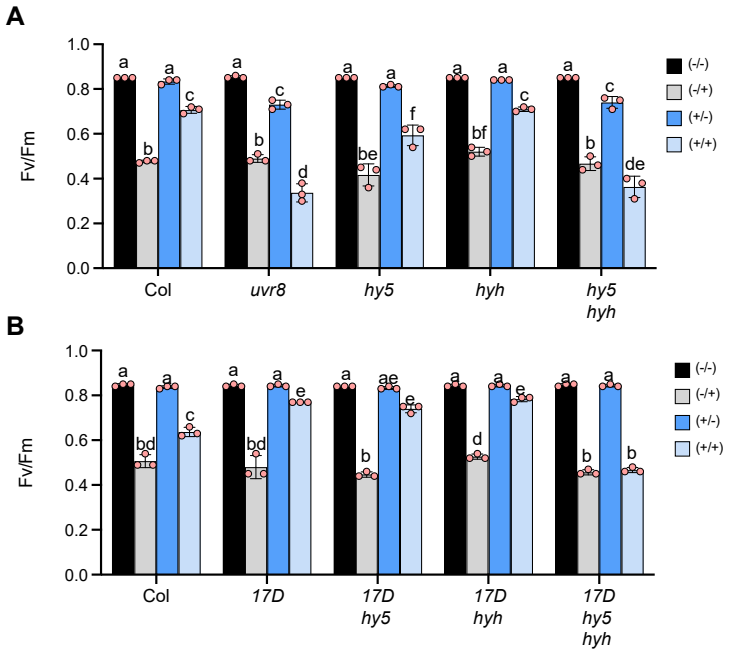
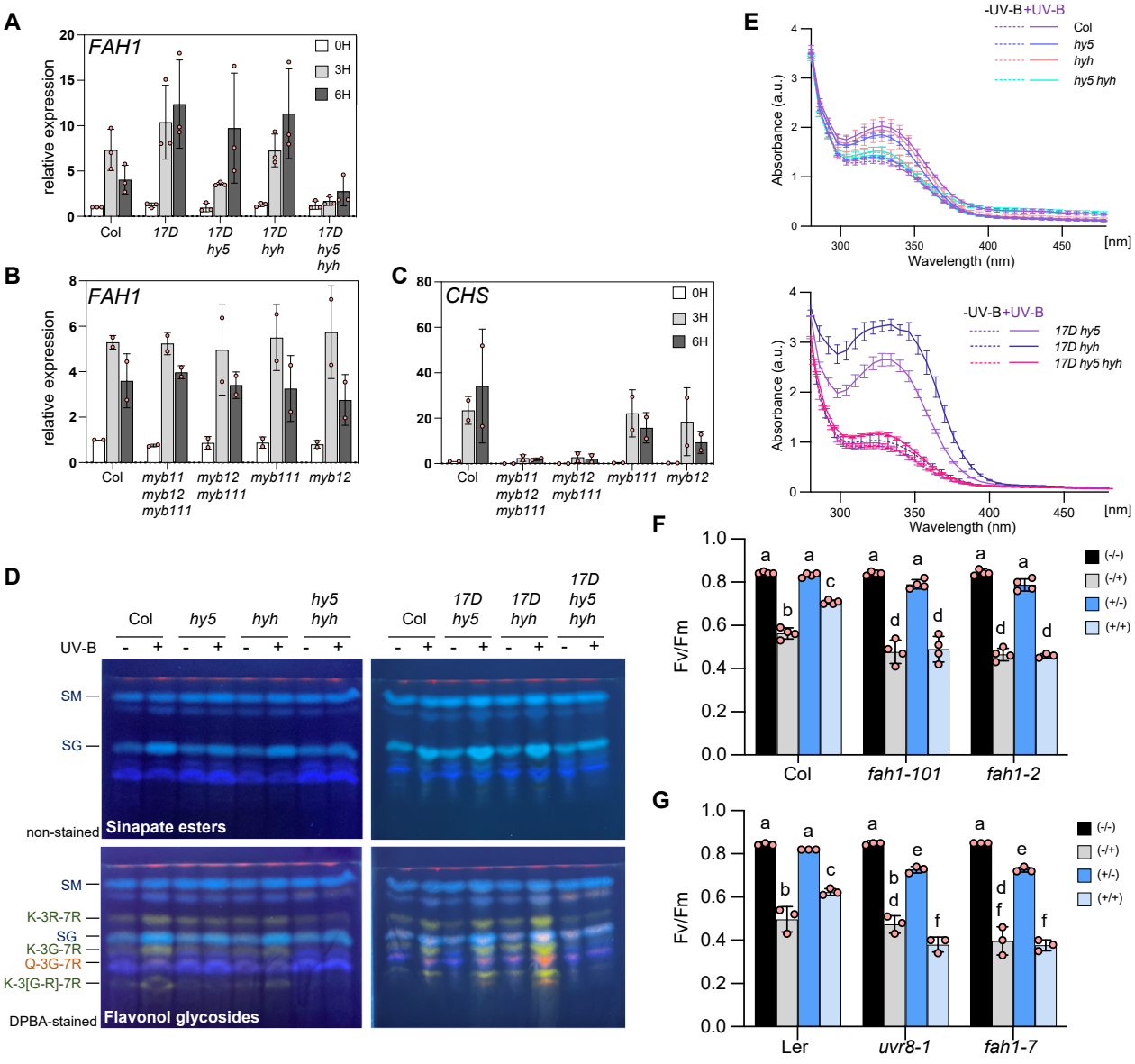


Supplementary Figure S1. Enhanced photoprotection through UVR8-mediated UV-B acclimation depends on HY5 and HYH.
(A, B) Maximum efficiency of PSII (Fv/Fm) in (A) wild type (Col), *uvr8-6* (*uvr8*), *hy5, hyh*, and *hy5 hyh*, and in (B) Col, *uvr8-17D* (*17D*), *uvr8-17D hy5* (*17D hy5*), *uvr8-17D hyh* (*17D hyh*), and *uvr8-17D hy5 hyh* (*17D hy5 hyh*) grown as described in Figure 1A. Values of independent experiments (orange points) and means ± SD are shown (*n* = 3). Shared letters indicate no statistically significant difference between the means (P > 0.05), as determined by two-way ANOVAs followed by Tukey's test for multiple comparisons. -/-, not acclimated, not stressed; -/+, not acclimated, stressed; +/-, acclimated, not stressed; +/+, acclimated, stressed.



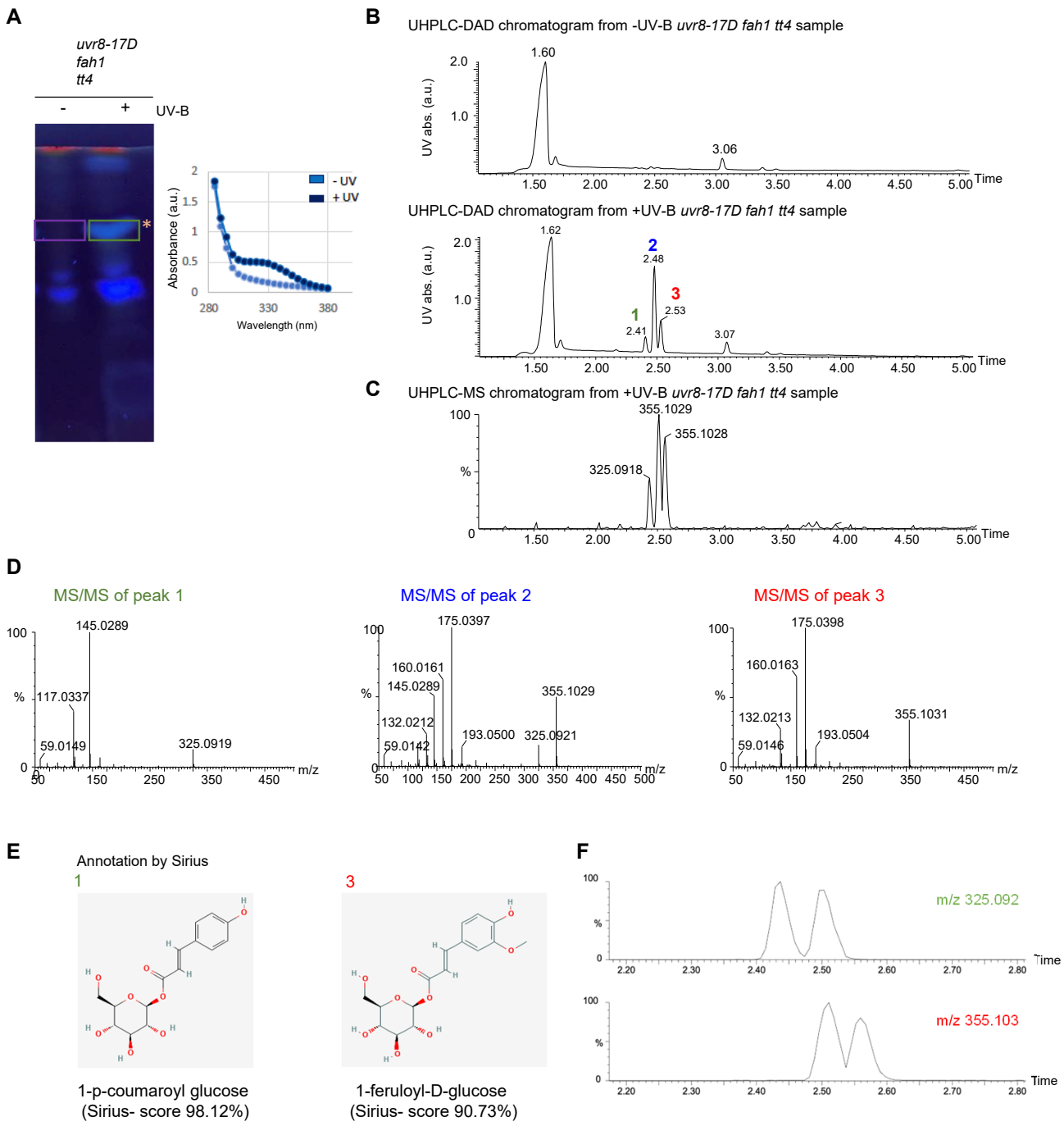
Supplementary Figure S2. UVR8 signaling induction of *FAH1* expression and accumulation of sinapate esters depend on HY5 and HYH.

(A-C) RT-qPCR analysis of (A) *FAH1* gene expression changes in response to 3h and 6h supplemental UV-B (0.08 mW cm^{-2}) in 7-d-old light grown seedlings (20 µmol m^{-2} s^{-1}) of *uvr8-17D* (*17D*), *uvr8-17D hy5* (*17D hy5*), *uvr8-17D hyh* (*17D hyh*), and *uvr8-17D hy5 hyh* (*17D hy5 hyh*) compared to wild type (Col). Values of independent measurements (orange points) and means ± SDs are shown (*n* = 3). (B) *FAH1* and (C) *CHS* gene expression in Col, *myb11 myb12 myb111, myb12 myb111, myb111, myb12.* Values of independent measurements (orange points) and means ± SDs are shown (*n* = 2).

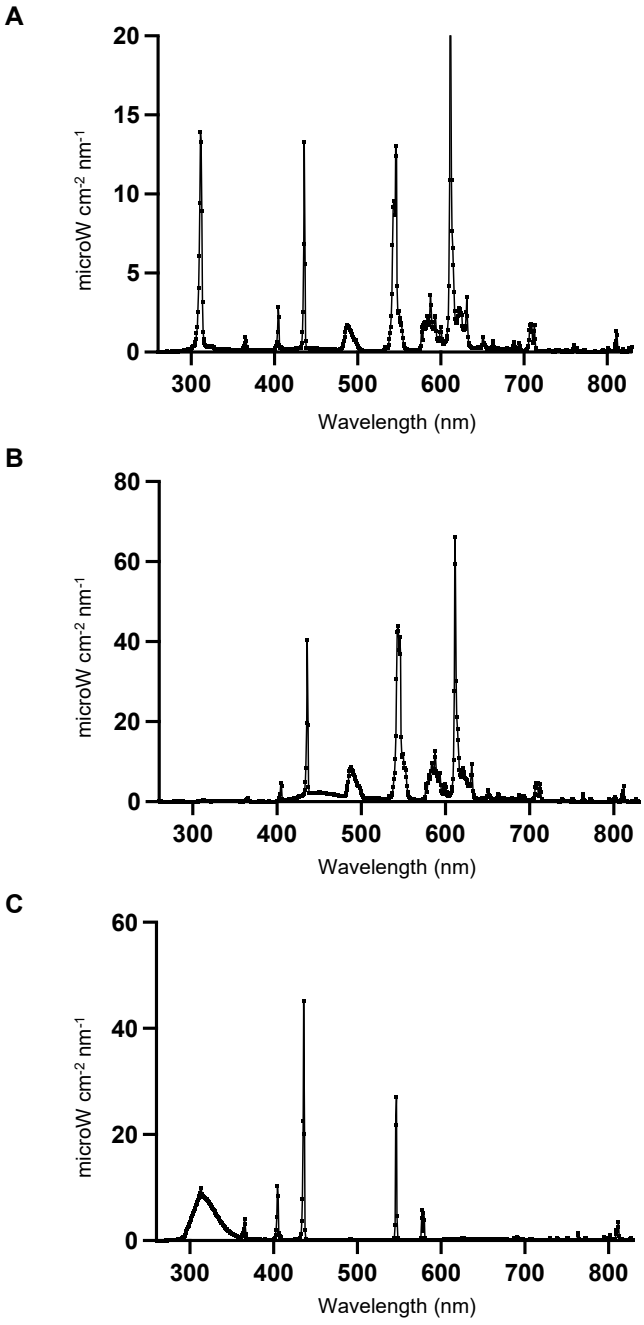
(D) HPTLC analysis of sinapate esters (*upper panels*) and flavonol glycosides (*lower panels*) levels in 10-d-old seedlings of wild type (Col), *hy5*, *hyh*, *hy5 hyh*, *uvr8-17D hy5* (*17D hy5*), *uvr8-17D hyh* (*17D hyh*), and *uvr8-17D hy5 hyh* (*17D hy5 hyh*) grown for 7 days in white light (20 µmol m^{-2} s^{-1}) and exposed to supplemental UV-B (0.08 mW cm^{-2}) for 3 days (UV-B: +) or not (UV-B: -). SM, sinapoyl malate; K-3R-7R, kaempferol-3-*O*-rhamnoside-7-*O*-rhamnoside; SG, sinapoyl glucose; K-3G-7R, kaempferol-3-*O*-glucoside-7-*O*-rhamnoside; Q-3G-7R, quercetin-3-*O*-glucoside-7-*O*-rhamnoside; K-3[G-R]-7R, kaempferol 3-*O*-[rhamnosyl-glucoside]-7-*O*-rhamnoside.

(E) 280–480 nm absorption spectra of methanolic extracts (2:1, v/FW) from 10-d-old seedlings of wild type (Col), *hy5*, *hyh*, *hy5 hyh*, *uvr8-17D hy5* (*17D hy5*) , *uvr8-17D hyh* (*17D hyh*), and *uvr8-17D hy5 hyh* (*17D hy5 hyh*) grown for 7 days in white light (20 µmol m^{-2} s^{-1}) and exposed to supplemental UV-B (0.08 mW cm^{-2}) for 3 days (+, continuous line) or not (-, dashed lines). Values of means ± SEM are shown (*n* = 3). FW, fresh weight; a.u., arbitrary units.

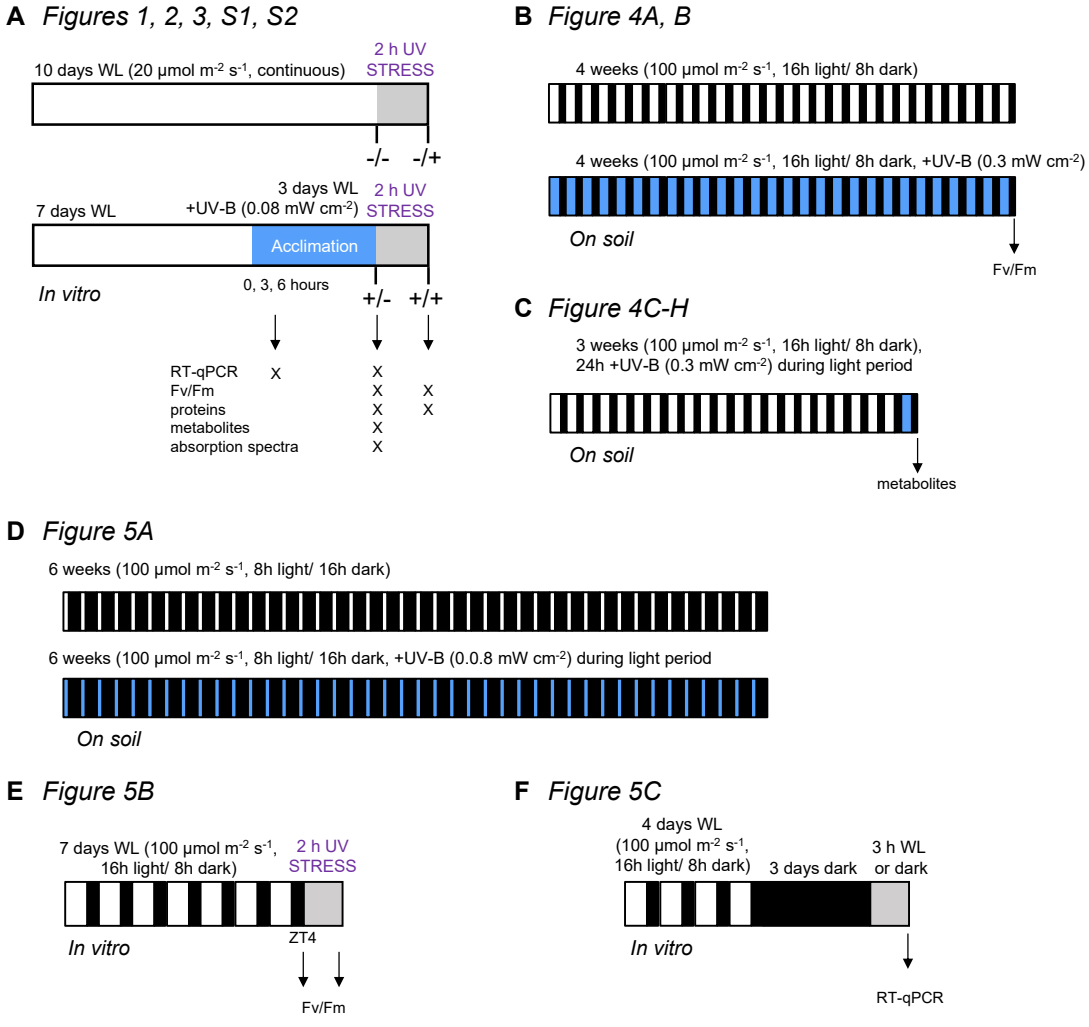
(F, G) Fv/Fm measurements of 10-d-old seedlings of **(F)** wild type (Col), *fah1-101*, and *fah1-2*, and **(G)** wild type (Ler), *uvr8-1*, and *fah1-7* grown as described in Figure 1A. Values of independent experiments (orange points) and means ± SD are shown (n = 3 or 4). Shared letters indicate no statistically significant difference between the means (P > 0.05), as determined by two-way ANOVAs followed by Tukey's test for multiple comparisons. -/-, not acclimated, not stressed; -/+, not acclimated, stressed; +/-, acclimated, not stressed; +/+, acclimated, stressed.



Supplementary Figure S3. Enhanced UVR8 signaling promotes accumulation of coumaroyl glucose and feruloyl glucose.
(A) (*left panel*) HPTLC of sinapate esters in 10-d-old *uvr8-17D fah1 tt4* seedlings grown for 7 days in white light (20 µmol m^{-2} s^{-1}) and exposed to supplemental UV-B (0.08 mW cm^{-2}) for 3 days (UV-B: +) or not (UV-B: -). The asterisk (*) indicates the specific metabolite(s) mainly detectable in the *fah1* mutant extracts (see Figure 3C, D); (*right panel*) Absorption spectra between 280–480 nm of UV-absorbing compounds in methanolic extracts prepared from bands scraped off the silica plate at the indicated positions (-UV corresponds to purple rectangle on HPTLC, +UV corresponds to green rectangle). a.u., arbitrary units.
(B) UHPLC-DAD chromatograms of methanolic extracts from silica scraped off from the HPTLC plate region indicated by the purple rectangle in Supplementary Figure S3A (-UV-B) (*upper panel*) or from the region indicated by the green rectangle (+UV-B) (*lower panel*). a.u., arbitrary unit. 1 (green), 2 (blue), 3 (red) indicate peaks present in the + UV-B but not -UV-B extracts.
(C) UHPLC-MS chromatogram of methanolic extracts from silica scraped off from the HPTLC plate region indicated by the green rectangle (Supplementary Figure S3A; +UV-B).
(D) UHPLC-MS/MS spectra of peaks 1, 2 and 3 indicated in Supplementary Figure S3B.
(E) Chemical structures of 1-p-coumaroyl glucose and 1-feruloyl-D-glucose, identified with the highest score by the program Sirius as the major compounds in peaks 1 and 3, respectively.
(F) UHPLC-MS extracted ion chromatograms at m/z 325.092 and m/z 355.103 showing the presence of two isomers for both coumaroyl-glucose and feruloyl-glucose. Peak 2 contains a mixture both compounds detected in peaks 1 and 3.



Supplementary Figure S4. Spectra of the different light sources used in the study.
(A) Spectra of the Osram L18W/30 white-light fluorescent tubes (20 µmol m^{-2} s^{-1}), supplemented with Philips TL20W/01RS narrowband UV-B tubes (0.08 mW cm^{-2}), **(B)** spectrum of Philips Alto II F17T8/TL841 white-light tubes (100 µmol m^{-2} s^{-1}), **(C)** spectrum of the broadband UV-B tubes (Philips TL20W/12RS; 2.2 mW cm^{-2}). **(A-C)** Spectral irradiance was measured in 0.8 nm intervals using an Ocean Optics QE65000 spectrometer.



Supplementary Figure S5. Graphical representation of the experimental setups used in this study.
Experimental conditions used to generate the data presented in (A) Figures 1, 2, and 3, and Supplementary Figures S1 and S2, (B, C) in Figure 4, and (D-F) in Figure 5. Black bars and white bars represent the dark and light periods, respectively. Blue Bars represent light period with additional UV-B. Grey bars represent the UV treatment under broadband UV lamps.

Supplementary Table S1. Quantification of hydroxycinnamic acids (HCAs) and flavonol glycosides in 10-day-old seedlings grown in vitro (related to Figure 2).

		Sinapoyl-glucose		Sinapoyl-malate		diSinapoyl-glucose		diSinapoyl-glucose isomer		K-3G-7R		Q-3G-7R		K-3R-7R		K-3[G-R]-7R	
condition	**genotype**	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*
- UV	**Col**	**68.0**	*7.3*	**2.5**	*0.6*	**9.0**	*1.8*	**2.5**	*0.6*	**2.8**	*0.5*	**10.3**	*1.3*	**31.5**	*3.5*	**16.5**	*1.3*
	uvr8	**68.3**	*5.2*	**4.3**	*0.5*	**8.0**	*0.8*	**3.0**	*0.0*	**3.3**	*0.5*	**12.3**	*1.0*	**37.3**	*2.2*	**19.5**	*2.5*
	rup1 rup2	**64.8**	*8.2*	**4.3**	*0.5*	**9.3**	*2.1*	**3.5**	*0.6*	**4.5**	*0.6*	**10.0**	*1.8*	**32.5**	*4.2*	**17.8**	*2.4*
	uvr8-17D	**62.3**	*8.5*	**5.8**	*0.5*	**8.8**	*0.5*	**2.5**	*0.6*	**5.5**	*0.6*	**12.8**	*1.3*	**34.8**	*3.1*	**17.5**	*1.7*
	hy5	**90.3**	*9.6*	**2.3**	*0.5*	**14.3**	*1.9*	**6.0**	*0.8*	**0.8**	*0.5*	**6.8**	*1.0*	**23.0**	*2.2*	**17.5**	*3.1*
	hyh	**66.5**	*5.9*	**4.0**	*0.8*	**8.0**	*1.4*	**2.0**	*1.4*	**4.0**	*1.2*	**12.5**	*3.1*	**39.0**	*7.9*	**15.3**	*2.8*
	hy5 hyh	**101.8**	*7.9*	**4.5**	*0.6*	**10.0**	*1.2*	**4.3**	*1.0*	**1.3**	*1.3*	**8.8**	*1.3*	**24.8**	*4.1*	**12.3**	*1.7*
	fah1-101	**19.0**	*14.9*	**0.3**	*0.5*	**1.0**	*1.2*	**0.5**	*0.6*	**2.8**	*0.5*	**6.8**	*1.0*	**26.3**	*4.4*	**10.0**	*0.8*
	tt4	**61.0**	*3.6*	**4.5**	*0.6*	**3.8**	*0.5*	**1.5**	*0.6*	**0.8**	*1.0*	**0.8**	*1.0*	**5.3**	*3.4*	**2.3**	*2.2*
+ UV	**Col**	**214.3**	*34.9*	**6.0**	*1.4*	**11.8**	*2.4*	**20.0**	*5.6*	**17.3**	*4.9*	**22.5**	*7.2*	**88.5**	*31.2*	**29.5**	*5.1*
	uvr8	**73.0**	*9.1*	**4.8**	*0.5*	**7.0**	*0.8*	**2.0**	*0.8*	**3.5**	*0.6*	**13.5**	*1.7*	**39.0**	*3.7*	**21.0**	*1.4*
	rup1 rup2	**556.0**	*14.6*	**7.8**	*0.5*	**21.0**	*3.8*	**56.3**	*2.1*	**128.5**	*13.8*	**104.8**	*18.5*	**367.8**	*35.8*	**151.3**	*17.2*
	uvr8-17D	**349.5**	*23.1*	**9.3**	*1.3*	**16.3**	*1.5*	**29.3**	*4.1*	**58.8**	*7.8*	**44.5**	*11.4*	**188.0**	*20.3*	**69.3**	*5.5*
	hy5	**130.3**	*37.2*	**4.0**	*1.4*	**9.5**	*2.6*	**8.0**	*2.4*	**1.3**	*0.5*	**7.3**	*1.0*	**24.8**	*4.3*	**17.0**	*2.2*
	hyh	**218.5**	*50.4*	**7.5**	*2.4*	**10.5**	*2.5*	**17.0**	*5.9*	**18.8**	*5.1*	**29.8**	*6.2*	**91.3**	*19.6*	**32.5**	*7.2*
	hy5 hyh	**99.8**	*6.8*	**4.3**	*0.5*	**8.0**	*2.2*	**3.0**	*0.0*	**0.3**	*0.5*	**6.5**	*1.3*	**19.0**	*2.2*	**10.3**	*1.7*
	fah1-101	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**16.8**	*1.3*	**19.8**	*2.1*	**79.5**	*7.0*	**24.5**	*1.3*
	tt4	**228.0**	*35.3*	**11.5**	*3.7*	**6.8**	*0.5*	**22.5**	*7.9*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*

Average in µg equivalent of sinapate /g FW for HCA esters, in µg equivalent of rutin /g FW for flavonol glycosides.

SD= Standard Deviation of the mean (n=4)

K-3G-7R, kaempferol-3-O-glucoside-7-O-rhamnoside; Q-3G-7R, quercetin-3-O-glucoside-7-O-rhamnoside; K-3R-7R, kaempferol-3-O-rhamnoside-7-O-rhamnoside; K-3[G-R]-7R, kaempferol 3-O-[rhamnosyl-glucoside]-7-O-rhamnoside

Supplementary Table S2. Quantification of hydroxycinnamic acids (HCAs) and flavonol glycosides in 10-day-old seedlings grown in vitro (related to Figure 3).

		Sinapoyl-glucose		Sinapoyl-malate		diSinapoyl-glucose isomer 1		diSinapoyl-glucose isomer 2		Coumaroyl-glucose isomer 1		Coumaroyl-glucose isomer 2		Feruloyl -gucose isomer 1		Feruloyl -glucose isomer 2		K-3G-7R		Q-3G-7R		K-3R-7R		K-3[G-R]-7R	
condition	**genotype**	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*
- UV	**Col**	**49.0**	*3.5*	nd		**6.0**	*1.6*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**3.5**	*1.0*	**7.0**	*1.2*	**29.5**	*3.4*	**17.0**	*2.6*
	uvr8	**52.5**	*7.7*	nd		**7.5**	*1.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**7.5**	*1.9*	**14.5**	*3.4*	**52.0**	*8.3*	**26.0**	*3.7*
	rup1 rup2	**60.0**	*5.9*	nd		**8.5**	*1.9*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**7.0**	*1.2*	**12.5**	*1.0*	**39.0**	*2.6*	**28.0**	*4.6*
	uvr8-17D	**60.0**	*3.7*	nd		**10.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**12.5**	*1.0*	**17.0**	*2.6*	**60.5**	*2.5*	**33.5**	*1.9*
	fah1	**0.5**	*1.0*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**6.0**	*1.6*	**16.5**	*2.5*	**33.5**	*7.0*	**17.5**	*4.4*
	tt4	**56.0**	*4.9*	nd		**4.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
	uvr8-17D fah1	**0.0**	*0.0*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**7.5**	*1.0*	**12.0**	*1.6*	**31.5**	*2.5*	**23.0**	*1.2*
	uvr8-17D tt4	**68.5**	*3.4*	nd		**4.5**	*1.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
	uvr8-17D fah1 tt4	**1.0**	*1.2*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.5**	*1.0*	**0.0**	*0.0*
+ UV	**Col**	**210.5**	*9.6*	nd		**8.0**	*0.0*	**10.5**	*3.8*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**26.5**	*4.7*	**35.0**	*7.7*	**113.0**	*21.7*	**42.0**	*2.8*
	uvr8	**64.0**	*21.4*	nd		**3.5**	*2.5*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**8.5**	*1.0*	**16.0**	*1.6*	**54.0**	*8.2*	**32.5**	*10.9*
	rup1 rup2	**605.0**	*44.0*	nd		**16.5**	*3.4*	**42.5**	*5.7*	**5.5**	*1.0*	**9.0**	*1.2*	**5.0**	*1.2*	**2.0**	*0.0*	**151.5**	*16.8*	**158.5**	*14.0*	**484.5**	*26.1*	**223.5**	*20.7*
	uvr8-17D	**504.5**	*51.8*	nd		**15.0**	*1.2*	**33.0**	*4.2*	**2.0**	*0.0*	**3.5**	*1.9*	**1.5**	*1.0*	**0.0**	*0.0*	**105.0**	*10.6*	**103.0**	*14.3*	**336.5**	*24.6*	**136.0**	*13.9*
	fah1	**0.0**	*0.0*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**15.5**	*1.0*	**5.5**	*1.0*	**40.0**	*11.3*	**45.5**	*9.7*	**141.5**	*30.5*	**60.0**	*14.5*
	tt4	**168.0**	*27.8*	nd		**6.5**	*1.9*	**9.0**	*3.8*	**0.5**	*1.0*	**0.5**	*1.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
	uvr8-17D fah1	**0.0**	*0.0*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**5.0**	*1.2*	**8.0**	*2.8*	**63.0**	*12.3*	**21.5**	*3.0*	**100.0**	*27.9*	**70.5**	*18.0*	**332.5**	*74.2*	**144.5**	*41.5*
	uvr8-17D tt4	**488.0**	*48.7*	nd		**13.5**	*4.4*	**46.0**	*6.3*	**14.0**	*3.7*	**18.5**	*3.0*	**9.5**	*1.9*	**3.5**	*1.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
	uvr8-17D fah1 tt4	**0.0**	*0.0*	nd		**0.0**	*0.0*	**0.0**	*0.0*	**36.5**	*4.7*	**48.0**	*5.4*	**240.5**	*25.3*	**89.5**	*5.5*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*

Average in µg equivalent of sinapate /g FW for HCA esters, in µg equivalent of rutin /g FW for flavonol glycosides

SD= Standard Deviation of the mean (n=4)

K-3G-7R, kaempferol-3-O-glucoside-7-O-rhamnoside; Q-3G-7R, quercetin-3-O-glucoside-7-O-rhamnoside; K-3R-7R, kaempferol-3-O-rhamnoside-7-O-rhamnoside; K-3[G-R]-7R, kaempferol 3-O-[rhamnosyl-glucoside]-7-O-rhamnoside

Supplementary Table S3. Quantification of hydroxycinnamic acids (HCAs) and flavonol glycosides in soil-grown plants (related to Figure 4).

		Sinapoyl-glucose		Sinapoyl-malate		diSinapoyl-glucose isomer 1		diSinapoyl-glucose isomer 2		Coumaroyl-glucose isomer 1		Coumaroyl-glucose isomer 2		Feruloyl -gucose isomer 1		Feruloyl -glucose isomer 2		K-3G-7R		Q-3G-7R		K-3R-7R		K-3[G-R]-7R	
condition	**genotype**	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*	**average**	*SD*
- UV	**Col**	**28.0**	*15.6*	**60.8**	*48.0*	**38.1**	*20.2*	**41.8**	*17.1*	**0.1**	*0.3*	**0.3**	*0.3*	**0.0**	*0.0*	**0.1**	*0.3*	**30.1**	*18.1*	**0.6**	*0.3*	**14.6**	*4.8*	**47.0**	*13.0*
	uvr8	**19.8**	*4.4*	**50.1**	*4.2*	**19.6**	*21.6*	**23.9**	*19.2*	**0.0**	*0.0*	**0.3**	*0.3*	**0.0**	*0.0*	**0.0**	*0.0*	**19.1**	*3.8*	**0.5**	*0.0*	**11.5**	*2.0*	**39.6**	*3.3*
	uvr8-17D	**62.3**	*11.6*	**48.8**	*11.3*	**33.5**	*26.0*	**29.9**	*15.6*	**0.1**	*0.3*	**0.4**	*0.3*	**0.0**	*0.0*	**0.0**	*0.0*	**88.4**	*29.7*	**49.0**	*27.8*	**123.8**	*57.4*	**110.5**	*31.7*
	rup1 rup2	**77.8**	*11.8*	**58.1**	*9.6*	**39.3**	*34.0*	**35.3**	*20.0*	**0.4**	*0.3*	**0.5**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**155.3**	*17.9*	**112.3**	*14.8*	**236.1**	*21.0*	**171.3**	*10.5*
	tt4	**39.3**	*4.6*	**63.0**	*7.6*	**28.6**	*27.8*	**31.7**	*23.0*	**0.1**	*0.3*	**0.5**	*0.0*	**0.1**	*0.3*	**0.0**	*0.0*	**0.9**	*0.5*	**0.9**	*0.5*	**2.0**	*1.1*	**1.5**	*0.7*
	fah1	**0.9**	*0.5*	**0.5**	*0.4*	**0.6**	*0.2*	**0.4**	*0.2*	**0.0**	*0.0*	**0.0**	*0.0*	**0.8**	*0.3*	**1.0**	*0.0*	**29.0**	*4.1*	**1.9**	*0.8*	**21.0**	*3.1*	**60.6**	*5.6*
	fah1 tt4	**0.4**	*0.3*	**0.3**	*0.3*	**0.3**	*0.1*	**0.2**	*0.1*	**0.0**	*0.0*	**0.0**	*0.0*	**0.4**	*0.3*	**1.0**	*0.0*	**0.5**	*0.0*	**0.3**	*0.3*	**0.6**	*0.3*	**1.1**	*0.6*
	uvr8-17D fah1	**1.9**	*3.8*	**0.6**	*1.3*	**1.9**	*1.4*	**1.3**	*0.5*	**0.1**	*0.3*	**0.3**	*0.5*	**3.3**	*1.5*	**1.4**	*0.8*	**69.4**	*37.9*	**54.3**	*25.8*	**117.8**	*57.3*	**92.5**	*46.7*
	uvr8-17D tt4	**91.8**	*27.4*	**53.8**	*22.1*	**48.7**	*31.9*	**39.1**	*14.7*	**1.5**	*1.1*	**1.9**	*1.2*	**0.9**	*0.5*	**0.3**	*0.3*	**1.1**	*0.9*	**0.8**	*0.9*	**2.0**	*1.8*	**1.5**	*1.4*
	uvr8-17D fah1 tt4	**1.0**	*0.7*	**0.5**	*0.4*	**0.7**	*0.3*	**0.5**	*0.2*	**0.6**	*0.5*	**1.3**	*0.9*	**10.9**	*8.4*	**3.4**	*2.3*	**0.5**	*0.0*	**0.1**	*0.3*	**0.9**	*0.3*	**0.6**	*0.3*
	rup1 rup2 fah1	**0.4**	*0.3*	**0.0**	*0.0*	**0.2**	*0.2*	**0.1**	*0.1*	**0.0**	*0.0*	**0.1**	*0.3*	**1.9**	*1.9*	**1.0**	*0.4*	**87.1**	*23.4*	**66.6**	*11.1*	**155.4**	*20.1*	**114.1**	*24.6*
+ UV	**Col**	**99.0**	*10.7*	**89.8**	*16.3*	**54.0**	*46.9*	**51.7**	*30.1*	**27.0**	*4.4*	**31.4**	*4.1*	**6.6**	*0.6*	**2.5**	*0.4*	**97.4**	*10.9*	**92.0**	*12.3*	**155.6**	*13.0*	**111.1**	*7.7*
	uvr8	**19.4**	*2.1*	**61.8**	*6.0*	**22.3**	*27.3*	**29.3**	*23.5*	**0.8**	*0.5*	**1.1**	*0.6*	**0.9**	*0.8*	**0.3**	*0.3*	**19.4**	*0.6*	**2.9**	*1.1*	**12.6**	*0.9*	**34.9**	*2.7*
	uvr8-17D	**121.6**	*7.9*	**79.4**	*6.8*	**53.9**	*56.5*	**49.1**	*30.5*	**32.4**	*6.8*	**38.6**	*5.8*	**9.5**	*1.8*	**3.1**	*0.5*	**134.8**	*11.4*	**134.5**	*8.8*	**238.5**	*9.6*	**136.3**	*7.5*
	rup1 rup2	**120.1**	*7.9*	**66.5**	*6.1*	**50.2**	*54.4*	**44.3**	*26.4*	**14.9**	*3.6*	**15.1**	*3.8*	**6.5**	*1.1*	**2.1**	*0.3*	**163.3**	*7.8*	**130.0**	*4.7*	**250.1**	*11.7*	**165.6**	*6.7*
	tt4	**168.6**	*14.6*	**99.4**	*3.8*	**71.6**	*77.5*	**63.1**	*41.3*	**108.9**	*6.8*	**124.4**	*7.6*	**21.0**	*2.3*	**9.5**	*1.2*	**3.8**	*0.3*	**2.9**	*0.9*	**4.4**	*1.1*	**2.4**	*0.5*
	fah1	**6.0**	*7.2*	**2.3**	*3.2*	**4.7**	*2.3*	**3.1**	*1.1*	**13.1**	*3.6*	**18.0**	*4.5*	**31.4**	*4.4*	**9.1**	*0.6*	**96.4**	*14.7*	**39.9**	*14.9*	**112.6**	*13.7*	**101.3**	*8.5*
	fah1 tt4	**0.5**	*0.0*	**0.1**	*0.3*	**0.2**	*0.2*	**0.2**	*0.1*	**27.1**	*2.8*	**39.5**	*4.9*	**60.9**	*10.8*	**20.4**	*1.7*	**1.6**	*0.8*	**1.9**	*1.4*	**3.0**	*1.8*	**2.0**	*0.9*
	uvr8-17D fah1	**1.5**	*2.0*	**0.5**	*0.4*	**1.1**	*0.8*	**0.7**	*0.3*	**38.9**	*3.6*	**43.5**	*3.9*	**74.0**	*3.5*	**16.8**	*1.4*	**144.9**	*8.2*	**130.3**	*7.0*	**227.1**	*8.6*	**130.5**	*3.8*
	uvr8-17D tt4	**208.9**	*9.7*	**89.0**	*6.8*	**78.6**	*94.8*	**67.3**	*40.9*	**163.1**	*28.8*	**179.1**	*26.6*	**26.0**	*4.4*	**11.1**	*1.8*	**8.8**	*5.7*	**9.4**	*8.9*	**15.3**	*12.8*	**7.5**	*6.2*
	uvr8-17D fah1 tt4	**2.6**	*1.9*	**1.3**	*0.9*	**1.7**	*0.8*	**1.1**	*0.4*	**137.1**	*3.7*	**159.6**	*5.0*	**170.0**	*6.1*	**53.8**	*3.2*	**2.5**	*2.1*	**3.9**	*3.6*	**5.9**	*4.7*	**3.0**	*2.5*
	rup1 rup2 fah1	**2.4**	*1.9*	**2.5**	*3.7*	**2.6**	*0.8*	**2.4**	*1.2*	**9.6**	*1.7*	**10.6**	*1.4*	**52.1**	*4.9*	**11.1**	*1.2*	**152.0**	*2.9*	**114.9**	*2.9*	**218.4**	*7.9*	**145.3**	*3.2*

Average in µg equivalent of sinapate /g FW for HCA esters, in µg equivalent of rutin /g FW for flavonoids

SD= Standard Deviation of the mean (n=4)

K-3G-7R, kaempferol-3-O-glucoside-7-O-rhamnoside; Q-3G-7R, quercetin-3-O-glucoside-7-O-rhamnoside; K-3R-7R, kaempferol-3-O-rhamnoside-7-O-rhamnoside; K-3[G-R]-7R, kaempferol 3-O-[rhamnosyl-glucoside]-7-O-rhamnoside

Supplementary Table S4: Genotyping information

					fragment length (bp)	
GENE	***mutant***	**primer 1 (5'-3')**	**primer 2 (5'-3')**	**T°C**	**WT**	**mutant**
HYH	*hyh* (WiscDsLox253D10)	ACCCACACGCTCTGTGAATA	ACTCGCATAAGAACATGTGGG	55	1202	-
		ACCCACACGCTCTGTGAATA	AACGTCCGCAATGTGTTATTAAGTTG	55	-	500-800
FAH1	*fah1-101* (SAIL_80_C01)	CGTCGATACTAGTGTCCTCCG	CTGAGTCATGGGCTTCAGTTC	55	1223	-
		CGTCGATACTAGTGTCCTCCG	GCTTCCTATTATATCTTCCCAAATTACCAATACA	55	-	550
TT4	*tt4-11* (SALK_020583)	CTTCTCTGGACACCAGACAGC	TCGAATAGACCTGTCCAGCAC	55	1061	-
		CTTCTCTGGACACCAGACAGC	ATTTTGCCGATTTCGGAAC	55	-	500-800
UVR8	*uvr8-1*	ATGGGGCTGGGGAAGA	TAAATTATTGCCGACTCCTACT	55	1210	-
CRY1	*hy4-2.23N*	CAATTGGAATTTGGTACATTG	GCACGAGATTTTGTGGGAAGC	55	524	-