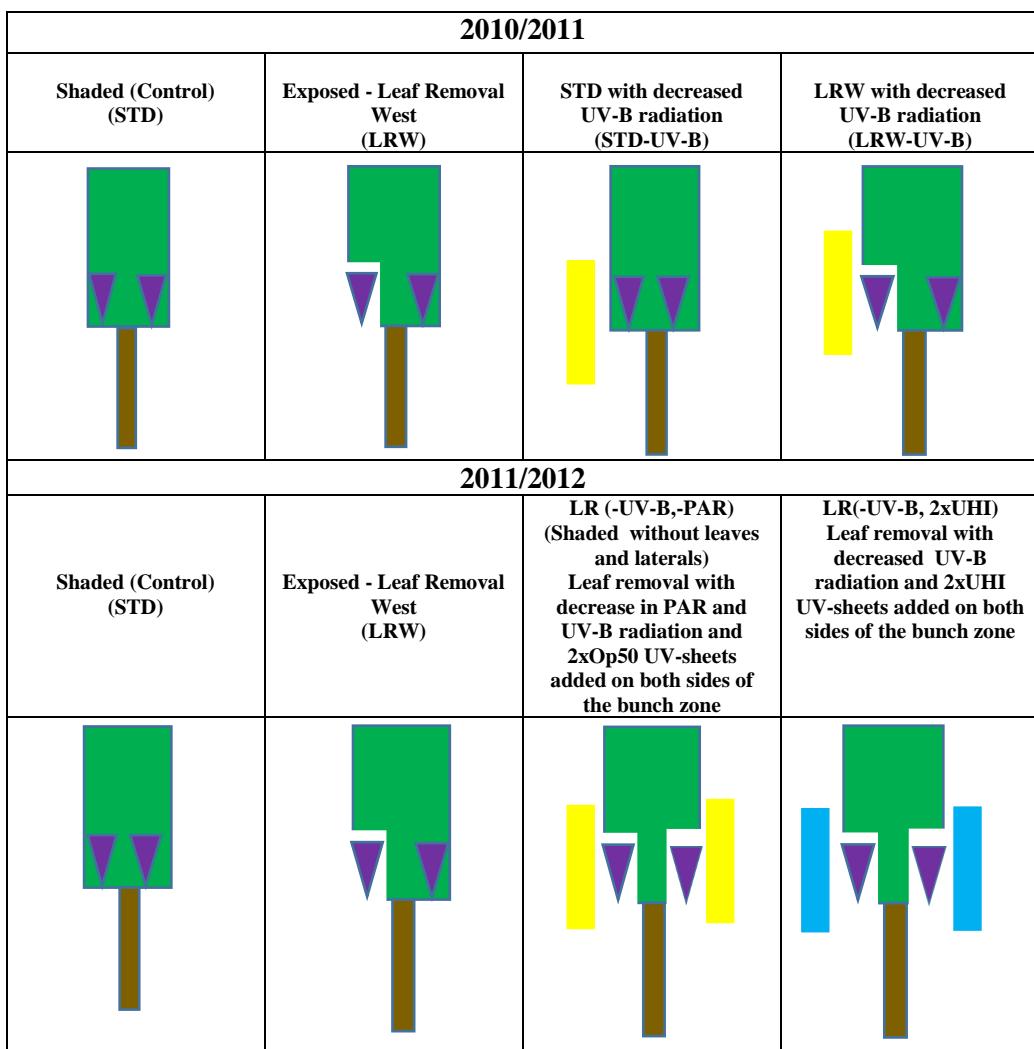


Table S1. The experimental layout created by leaf removal and UVB attenuation and optical properties of ‘Perspex’ ® and acrylic UV sheets.



2010/2011									
Perspex ® Opal 050	Visible (380-780 nm)		Solar (350-2100 nm)					Shading coefficient	UV Elimi- nation
	Light transmission %	Light reflection %	Total elimination %	Direct reflection %	Absorption %	Direct transmission %	Total Trans- missio n %		
	27	42	59	31	38	31	41	0.47	99
2011/2012									
Extruded high impact acrylic	89	78	12	8	6	86	88	1.0	99

Table S2. Sampling dates (for phenolic analysis) and days after anthesis for 2010/2011 and 2011/2012 seasons (Blancquaert, 2015).

Sampling and days after anthesis dates					
2010/2011 season			2011/2012 season		
Sampling dates		Days after anthesis	Sampling dates		Days after anthesis
7 December 2010		13	14 December 2011		26
11 December 2010		17	21 December 2011		33
16 December 2010		22	28 December 2011		40
11 January 2011		48	04 January 2012		47
25 January 2011		62	11 January 2012		54
08 February 2011		76	25 January 2012		68
22 February 2011		90	08 February 2012		82
20 March 2011		116	22 February 2012		96
			06 March 2012		110
			26 March 2012		130

Table S3. Temperature classes at different phenological stages.

2010-2011	Minimum temperature				Mean temperature				Maximum temperature			
	Green berry stage	Véraison	Mature berry stage	Harvest	Green berry stage	Véraison	Mature berry stage	Harvest	Green berry stage	Véraison	Mature berry stage	Harvest
STD	16,37	15,02	16,35	16,85	23,42	23,55	23,83	23,85	31,84	32,83 b	33,34 b	34,31 b
LRW	16,21	14,93	16,13	16,11	23,74	24,08	24,53	23,94	34,04	35,00 ab	36,95 a	36,93 a
STD-UV-B	16,10	14,63	16,03	16,39	23,85	24,30	24,27	24,18	33,17	35,23 a	34,29 b	33,48 ab
LRW-UV-B	16,21	14,93	16,34	16,85	23,74	24,08	23,94	23,85	34,04	35,00 ab	33,94 b	34,31 b
p-value	ns	ns	ns	ns	ns	ns	ns	ns	ns	0,024396	0,000001	0,000001
2011-2012	Minimum temperature				Mean temperature				Maximum temperature			
	Green berry stage	Véraison	Mature berry stage	Harvest	Green berry stage	Véraison	Mature berry stage	Harvest	Green berry stage	Véraison	Mature berry stage	Harvest
STD	13,56	18,85	13,76	12,33	23,86	25,47	23,59	23,72	41,96 a	39,99 a	39,17 a	44,24 a
LRW	13,51	18,76	13,80	12,51	23,08	25,45	23,18	22,89	35,78 b	37,13 b	38,16 a	40,97 b
LR(-UV-B,2xOp50)	13,26	18,62	13,56	12,31	24,22	26,42	23,97	23,62	39,93 a	40,89 a	39,43 a	39,91 b
LR(-UV-B,2xUHI)	13,23	18,55	13,55	12,28	22,92	25,10	22,56	22,21	35,42 b	35,4878 c	33,84 b	35,62 c
p-value	ns	ns	ns	ns	ns	ns	ns	ns	0,000000	0,000000	0,000000	0,000000

Each value represents the mean of 5 replicates. STD (Shaded/Control); LRW (Leaf Removal West); STD-UV-B (STD with decreased UV-B radiation); LRW-UV-B (LRW with decreased UV-B radiation). LR (-UV-B,-PAR) (Leaf removal with decreased UV-B radiation and 2xOp50 UV-sheets added on both sides of the bunch zone); LR-UV-B, 2xUHI (Leaf removal with decreased UV-B radiation and 2xUHI UV-sheets added on both sides of the bunch zone). Different letters indicate significant differences at ($p \leq 0.05$, 0.01, and 0.001, respectively; ns: not significant).

Table S4. Berry parameters at harvest of 2010/2011 and 2011/2012 (Blancquaert, 2015).

Treatment	Total soluble solids	Fresh mass (g)	Sugar per berry
2010/2011			
STD	20.5 b	60.3 b	290.9 b
LRW	22.4 a	58.3 b	282.9 b
STD-UV-B	22.4 a	52.1 c	285.2 b
LRW-UV-B	22.9 a	63.1 a	316.7 a
<i>Significance</i>	**	***	***
2011/2012			
STD	23.9 a	72.7 a	348.0 a
LRW	23.1 bc	68.4 b	327.3 b
LR (-UV-B, 2xOp50)	23.1 b	68.4 b	289.7 d
LR(-UV-B, 2xUHI)	22.6 c	63.4 c	305.1 c
<i>Significance</i>	***	***	***

Each value represents the mean of 5 replicates (\pm) standard deviation. Treatments: STD (Shaded/Control); LRW (Leaf Removal West); STD-UV-B (STD with decreased UV-B radiation); LRW-UV-B (LRW with decreased UV-B radiation); LR-UV-B, 2xOp50 (Leaf removal with decreased UV-B radiation and 2xOp50 UV-sheets added on both sides of the bunch zone); LR-UV-B, 2xUHI (Leaf removal with decreased UV-B radiation and 2xUHI UV-sheets added on both sides of the bunch zone). Different letters indicate significant differences at ($p \leq 0.05, 0.01$, and 0.001 , respectively; ns: not significant).

Table S5. Compositional and structural characterization of seed extracts during ripening in 2010/2011 done by phloroglucinolysis (Blancquaert, 2015).

DAA	Treatment	Terminal units ^a			Extension units ^a			mDP	%G ^b	avMM ^b	Proanthocyanidins
		C	EC	ECG	C	EC	ECG				
13	Standard (Control)	79.63 ± 3.91	14.89 ± 3.09	5.46 ± 0.97	12.01 ± 1.59	86.95 ± 1.83	1.03 ± 0.30	5.9 ± 0.7	1.8 ± 0.5 a	1726 ± 205 a	11.2 ± 5.5 a
	Leaf Removal West	83.71 ± 1.73	12.74 ± 1.38	3.53 ± 0.64	12.17 ± 0.43	87.1 ± 0.36	0.731 ± 1.25	5.5 ± 0.5	1.2 ± 0.25 b	1611 ± 162 ab	12.5 ± 2.6 a
	STD-UV-B	88.98 ± 1.60	12.01 ± 1.00	nd	12.13 ± 0.90	88.79 ± 1.46	nd	5.0 ± 0.4	0 c	1466 ± 106 b	11.06 ± 5.5 a
	LRW-UV-B	79.63 ± 3.91	14.89 ± 3.09	5.46 ± 0.97	12.01 ± 1.59	88.79 ± 1.46	nd	5.9 ± 0.7	1.8 ± 0.5 a	1726 ± 205 a	11.2 ± 2.4 a
<i>Significance</i>		***	ns	***	ns	ns	ns	ns	ns	ns	ns
17	Standard (Control)	81.52 ± 1.57	14.06 ± 1.23	4.40 ± 0.87	10.78 ± 0.58	88.2 ± 0.64	1.01 ± 0.49	8.1 ± 0.3 a	1.4 ± 0.5 a	2360 ± 99.3 a	16.2 ± 2.2 a
	Leaf Removal West	81.65 ± 1.37	14.18 ± 1.49	4.16 ± 0.50	11.23 ± 0.61	87.70 ± 0.40	1.06 ± 0.31	7.1 ± 0.6 b	1.4 ± 0.3 a	2081.2 ± 194 b	14.6 ± 3.1 a
	STD-UV-B	86.03 ± 0.83	13.31 ± 1.51	0.65 ± 0.96	11.11 ± 0.54	88.73 ± 0.54	0.1 ± 0.15	6.5 ± 0.9 b	0.2 ± 0.2 b	1896 ± 276 c	13.2 ± 2.3 a
	LRW-UV-B	81.52 ± 1.57	14.06 ± 1.23	4.4 ± 0.87	10.78 ± 0.58	88.73 ± 0.54	0.1 ± 0.15	8.1 ± 0.3 a	1.4 ± 0.5 a	2360 ± 99.3 a	16.2 ± 2.2 a
<i>Significance</i>		ns	ns	ns	ns	ns	ns	**	**	***	ns
22	Standard (Control)	72.71 ± 2.73	16.19 ± 1.39	11.09 ± 3.01	10.05 ± 0.14	86.08 ± 1.30	3.86 ± 1.37	9.2 ± 0.2 a	4.6 ± 1.5 a	2720 ± 92.7 a	19.8 ± 0.8 a
	Leaf Removal West	75.31 ± 2.37	16.68 ± 0.75	8 ± 3.01	10.26 ± 0.43	87.25 ± 0.80	2.48 ± 1.05	9.1 ± 0.4 a	3.1 ± 1.1 a	2692 ± 145.1 a	17.6 ± 1.45 b
	STD-UV-B	82.82 ± 2.19	18.05 ± 0.67	nd	11.36 ± 0.47	90.43 ± 4.02	0.1 ± 0.14	7.6 ± 0.2 b	0.13 ± 0.12 b	2192 ± 92.3 b	11.48 ± 2.5 c
	LRW-UV-B	72.71 ± 2.73	16.19 ± 1.39	11.09 ± 0.87	10.05 ± 0.14	90.43 ± 4.02	0.1 ± 0.14	9.2 ± 0.2 a	4.6 ± 1.5 a	2720 ± 92.7 a	19.8 ± 0.8 a
<i>Significance</i>		***	ns	***	ns	**	*	***	***	***	***
48	Standard (Control)	64.73 ± 3.24	31.08 ± 2.21	4.18 ± 5.07	12.08 ± 1.39	85.41 ± 2.06	2.5 ± 3.21	2.0 ± 0.7 b	1.7 ± 0.9 a	588.1 ± 205 b	29.6 ± 3.4 b
	Leaf Removal West	66.25 ± 1.97	28.54 ± 1.65	5.2 ± 0.76	10.37 ± 0.47	86.53 ± 0.59	3.09 ± 0.44	3.1 ± 0.3 a	3.7 ± 0.5 b	915.1 ± 97.7 a	34.7 ± 2.5 a
	STD-UV-B	67.08 ± 1.79	30.96 ± 1.74	1.94 ± 0.69	11.15 ± 0.97	87.94 ± 0.85	0.9 ± 0.301	2.7 ± 0.2 a	1.3 ± 0.4 b	791.4 ± 62.4 a	27.46 ± 1.9 b
	LRW-UV-B	67.01 ± 1.53	29.95 ± 1.11	3.02 ± 1.18	11.21 ± 0.62	87.94 ± 0.85	0.9 ± 0.301	3.0 ± 0.3 a	2.02 ± 0.8 b	876 ± 107.5 a	28.1 ± 1.35 b
<i>Significance</i>		ns	ns	ns	**	ns	ns	***	**	*	**
62	Standard (Control)	58.57 ± 1.55	37.12 ± 1.49	4.3 ± 2.34	10.83 ± 0.53	85.56 ± 2.19	3.6 ± 2.22	3.8 ± 0.5 a	3.8 ± 2.2 a	1123.9 ± 157.9 a	33.5 ± 4.6 a

	Leaf Removal West	62 ± 3.00	34.5 ± 2.41	3.49 ± 0.94	11.56 ± 0.79	85.95 ± 0.74	2.48 ± 0.44	3.7 ± 0.5 a	2.7 ± 0.5 a	1108 ± 150 a	26.2 ± 3.6 b
	STD-UV-B	60 ± 3.35	39.22 ± 3.51	0.76 ± 0.46	12.03 ± 0.37	87.58 ± 0.21	0.38 ± 0.26	2.9 ± 0.2 b	0.5 ± 0.3 b	863.1 ± 72.4 b	18.1 ± 2.6 c
	LRW-UV-B	60.92 ± 0.70	37.74 ± 1.25	1.33 ± 1.42	12.36 ± 0.51	87.58 ± 0.21	0.38 ± 0.26	3.0 ± 0.3 b	1.1 ± 1.1 b	886.7 ± 101.8 b	20.4 ± 2.5 c
	<i>Significance</i>	<i>ns</i>	*	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	**	*	*	***

Each value represents the mean of 5 replicates (\pm) standard deviation in units of mg/g seed tannin extract. STD (Shaded/Control); LRW (Leaf Removal West); STD-UV-B (STD with decreased UV-B radiation); LRW-UV-B (LRW with decreased UV-B radiation). ^aPercent composition of proanthocyanidin subunits (in moles) C, (+)-catechin; EC, (-)-epicatechin; ECG, (-)-epicatechin-3-O-gallate. mDP, mean degree of polymerization; %G, percentage galloylation; avMM, average molecular mass ; nd, not detected. Different letters indicate significant differences at ($p \leq 0.05$, 0.01, and 0.001, respectively; ns: not significant).

Table S6. Compositional and structural characterization of seed extracts during ripening in 2011/2012 done by phloroglucinolysis (Blancquaert, 2015).

DAA	Treatment	Terminal units ^a			Extension units ^a			mDP	%G ^b	avMM ^b	Proanthocyanidins
		C	EC	ECG	C	EC	ECG				
26	Standard (Control)	54.8 ± 2.9	11.9 ± 1.0	33.3 ± 2.0	8.6 ± 0.7	77 ± 1.5	14.4 ± 0.9	7.8 ± 0.8 a	16.8 ± 0.9 ab	2450 ± 257.4 a	31.3 ± 3.7 a
	Leaf Removal West	56.3 ± 0.5	11.4 ± 0.4	32.3 ± 0.7	8.1 ± 0.4	77.6 ± 0.3	14.3 ± 0.4	7.4 ± 0.2 a	16.7 ± 0.3 b	2347.2 ± 66.0 a	28.6 ± 1.4 a
	LR (-UV-B,-PAR)	54.2 ± 1.4	10.6 ± 1.1	31.2 ± 7.2	8.3 ± 0.6	71.9 ± 8.8	14 ± 3.9	7.5 ± 0.6 a	17.9 ± 1.1 a	2353.5 ± 173.2 a	28.8 ± 2.5 a
	LR (-UV-B, 2xUHI)	53.7 ± 4.4	11.6 ± 1.0	29.4 ± 6.6	8.3 ± 0.9	73.1 ± 9.5	12.7 ± 2.9	7.9 ± 0.5 a	16.5 ± 0.7 b	2485 ± 150.9 a	29.9 ± 3.3 a
<i>Significance</i>		<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
33	Standard (Control)	49.6 ± 2.5	13.3 ± 1.4	37.2 ± 2.1	8.9 ± 0.6	77.6 ± 1.2	13.5 ± 0.9	7.6 ± 0.9 a	16.6 ± 0.9 ab	2384 ± 7.2 a	21.2 ± 7.2 a
	Leaf Removal West	52.3 ± 1.0	13.0 ± 1.6	34.8 ± 1.1	9.2 ± 0.5	77.7 ± 0.4	13.1 ± 0.6	7.5 ± 0.2 a	15.9 ± 0.7 b	2342.6 ± 51.0 a	23.3 ± 3.6 a
	LR (-UV-B,-PAR)	51.8 ± 1.2	12.1 ± 0.4	36.1 ± 0.8	9.8 ± 0.4	75.8 ± 0.7	14.4 ± 0.4	6.8 ± 0.3 a	17.6 ± 0.4 a	2145.4 ± 83.3 a	23.0 ± 2.8 a
	LR (-UV-B, 2xUHI)	51.7 ± 2.5	12.7 ± 1.8	32.0 ± 8.8	9.7 ± 0.9	77.4 ± 1.5	12.8 ± 0.6	7.5 ± 0.6 a	15.9 ± 0.8 b	2330.2 ± 178.7 a	25.3 ± 3.3 a
<i>Significance</i>		<i>ns</i>	<i>ns</i>	*	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	*	<i>ns</i>	<i>ns</i>
40	Standard (Control)	46.9 ± 1.1	16.0 ± 0.8	37.2 ± 0.6	9.4 ± 0.5	78.8 ± 0.5	11.9 ± 0.4	7.1 ± 0.3 b	15.4 ± 0.3 a	2218.9 ± 84.5 b	24.7 ± 3.3 b
	Leaf Removal West	50.7 ± 1.2	13.8 ± 0.6	35.5 ± 1.1	9.6 ± 0.3	79.2 ± 0.6	11.2 ± 0.7	7.5 ± 0.2 a	14.4 ± 0.5 c	2330.9 ± 68.8 a	26.2 ± 0.7 b
	LR (-UV-B,-PAR)	46.6 ± 0.7	15.8 ± 1.0	37.6 ± 0.4	9.8 ± 0.2	79.1 ± 0.5	11.1 ± 0.4	7.0 ± 0.2 b	14.9 ± 0.3 b	2181.5 ± 80.9 bc	27.4 ± 0.8 ab
	LR (-UV-B, 2xUHI)	49.4 ± 1.1	15.4 ± 0.7	35.2 ± 1.0	9.9 ± 0.3	79.4 ± 0.4	10.7 ± 0.2	6.8 ± 0.2 b	14.3 ± 0.3 c	2130.5 ± 54.8 c	29.7 ± 1.7 a
<i>Significance</i>		*	<i>ns</i>	*	<i>ns</i>	<i>ns</i>	<i>ns</i>	***	***	***	.
47	Standard (Control)	48.8 ± 2.9	19.8 ± 0.7	31.4 ± 2.5	9.6 ± 0.2	78.6 ± 0.5	11.8 ± 0.4	4.5 ± 0.6 b	16.2 ± 0.2 ab	1406.2 ± 202.5 b	40.7 ± 6.1 a
	Leaf Removal West	48.8 ± 1.5	18.7 ± 1.3	32.5 ± 2.3	9.3 ± 0.3	79 ± 0.3	11.7 ± 0.4	5.2 ± 0.6 a	15.7 ± 0.3 bc	1637 ± 190.9 a	35.7 ± 4.3 bc
	LR (-UV-B,-PAR)	46.4 ± 1.1	20.2 ± 1.7	33.4 ± 2.2	9.9 ± 0.3	78.1 ± 0.45	12 ± 0.3	4.8 ± 0.5 ab	16.4 ± 0.3 a	1506.9 ± 156.8 ab	32.0 ± 2.6 b
	LR (-UV-B, 2xUHI)	51.4 ± 4.2	17.1 ± 2.4	28.9 ± 0.8	9.4 ± 0.6	79.2 ± 0.3	11 ± 0.4	4.6 ± 0.3 b	15.3 ± 0.4 c	1436 ± 107.2 b	39.1 ± 2.1 ab
<i>Significance</i>		*	<i>ns</i>	<i>ns</i>	<i>ns</i>	***	<i>ns</i>	<i>ns</i>	***	<i>ns</i>	*
54	Standard (Control)	62.5 ± 2.0	33.6 ± 2.4	4.2 ± 3.5	11.4 ± 1.5	85.9 ± 1.4	1.6 ± 1.6	3.2 ± 0.3 b	2.3 ± 2.2 b	949.1 ± 81.4 b	25.3 ± 4.5
	Leaf Removal West	66 ± 3.7	31.5 ± 3.4	2.4 ± 1.4	11.3 ± 0.6	87.9 ± 0.6	0.8 ± 0.6	3.2 ± 0.3 b	1.3 ± 0.8 b	945.6 ± 78.6 b	19.5 ± 4.9
	LR (-UV-B,-PAR)	64.4 ± 1.6	33.6 ± 1.5	2.0 ± 1.0	12.5 ± 0.8	87 ± 0.6	0.5 ± 0.3	3.4 ± 0.35 ab	0.9 ± 0.5 b	994.3 ± 102.8 b	22.1 ± 9.5

Each value represents the mean of 5 replicates (\pm) standard deviation in units of mg/g seed tannin extract.). STD (Shaded/Control); LRW (Leaf Removal West); LR (-UV-B,-PAR) (Leaf removal with decreased UV-B radiation and 2xOp50 UV-sheets added on both sides of the bunch zone); LR-UV-B, 2xUHI (Leaf removal with decreased UV-B radiation and 2xUHI UV-sheets added on both sides of the bunch zone). ^aPercent composition of proanthocyanidin subunits (in moles) C, (+)-catechin; EC, (-)-epicatechin; ECG, (-)-epicatechin-3-O-gallate. mDP, mean degree of polymerization; %G, percentage galloylation; avMM, average molecular mass ; nd, not detected. Different letters indicate significant differences at ($p \leq 0.05$, 0.01, and 0.001, respectively; ns: not significant).

Table S7. Compositional and structural characterization of skin extracts during ripening in 2010/2011 done by phloroglucinolysis (Blancquaert, 2015).

DAA	Treatment	Terminal units ^a			Extension units ^a				mDP	%G	% P	avMM	Proanthocyanidins
		C	EC	ECG	C	EC	ECG	EGC					
13	Standard (Control)	94.0 ± 5.5	5.95 ± 5.55	nd	2.52 ± 0.19	45.52 ± 1.19	0.15 ± 0.09	51.802 ± 1.39	22.5 ± 2.3	0.15 ± 0.1 a	49.5 b	6735.8 ± 701 a	12.1 ± 6.1 a
	Leaf Removal West	95.8 ± 5.66	4.13 ± 5.66	nd	2.65 ± 0.47	41.39 ± 2.4	0.08 ± 0.07	55.86 ± 2.76	22.4 ± 5.2	0.08 ± 0.1 b	53.3 a	6661.4 ± 1541 a	11 ± 3.4 a
	STD-UV-B	94.96 ± 4.6	5.03 ± 4.66	nd	2.52 ± 0.19	45.52 ± 1.19	0.15 ± 0.09	51.8 ± 1.39	22.8 ± 2.4	0.10 ± 0.1 ab	49.5 b	6754 ± 712 a	7.3 ± 4.1 a
	LRW-UV-B	94.0 ± 5.5	5.95 ± 5.55	nd	2.52 ± 0.19	45.52 ± 1.19	0.15 ± 0.09	51.8 ± 1.39	22.5 ± 2.3	0.15 ± 0.1 ab	49.5 b	6735.8 ± 701 a	12.1 ± 6.1 a
<i>Significance</i>		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
17	Standard (Control)	91.4 ± 0.46	8.53 ± 0.46	nd	1.93 ± 0.16	41.4 ± 1.49	0.20 ± 0.07	56.45 ± 1.61	35.3 ± 1.85 a	0.16 ± 0.1 ab	54.9 a	10497 ± 555.7 a	20.5 ± 2.5 a
	Leaf Removal West	100	nd	nd	2.81 ± 0.39	37.5 ± 2.86	nd	59.67 ± 2.96	21.2 ± 3.5 b	0 ± 0 c	56.8 a	6302 ± 1049 b	4.7 ± 1.9 c
	STD-UV-B	97.8 ± 4.8	2.16 ± 4.83	nd	2.1 ± 0.29	39.4 ± 2.57	0.05 ± 0.08	58.30 ± 2.84	31.6 ± 8.13 a	0.05 ± 0.1 bc	56.4 a	9416.7 ± 2428.3 a	12.6 ± 3.2 b
	LRW-UV-B	91.4 ± 0.46	8.53 ± 0.46	nd	1.93 ± 0.16	41.4 ± 1.49	0.20 ± 0.07	56.45 ± 1.61	35.3 ± 1.85 a	0.16 ± 0.1 ab	54.8 a	10497 ± 555.7 a	20.5 ± 2.5 a
<i>Significance</i>		ns	ns	ns	*	ns	ns	ns	***	***	ns	**	***
22	Standard (Control)	100	nd	nd	2.58 ± 0.52	41.6 ± 1.30	0.41 ± 0.11	55.39 ± 1.18	20.5 ± 4.3	0.4 ± 0.1 a	52.6 b	6089.7 ± 1301.4 a	6.5 ± 3.2 a
	Leaf Removal West	100	nd	nd	2.43 ± 0.25	39.0 ± 1.78	0.03 ± 0.07	58.49 ± 1.97	24 ± 2.9	0.03 ± 0.1 c	56 a	7140.2 ± 869 a	7.7 ± 2.0 a
	STD-UV-B	86.9 ± 2.12	13 ± 2.12	nd	2.55 ± 0.36	42.2 ± 1.5	0.24 ± 0.07	54.99 ± 1.84	22.7 ± 3.1	0.23 ± 0.1 b	52.5 b	6742.2 ± 934 a	8.4 ± 3.5 a
	LRW-UV-B	100	nd	nd	2.58 ± 0.52	41.6 ± 1.30	0.41 ± 0.11	55.39 ± 1.18	20.5 ± 4.3	0.4 ± 0.1 a	52.6 b	6089.7 ± 1301.4 a	6.5 ± 3.2 a
<i>Significance</i>		ns	ns	ns	ns	ns	ns	ns	ns	**	***	ns	ns
48	Standard (Control)	95.9 ± 1.0	nd	nd	1.50 ± 0.18	40.9 ± 0.85	0.44 ± 0.08	57.12 ± 0.92	38.8 ± 2.0 b	0.53 ± 0.1 a	55.6 b	11546.5 ± 610 b	18.4 ± 2.3 a
	Leaf Removal West	89.4 ± 1.7	10.5 ± 1.7	nd	1.76 ± 0.29	35.8 ± 3.47	0.45 ± 0.84	61.97 ± 2.46	38.2 ± 4.1 b	0.44 ± 0.1 a	60.3 a	11397.8 ± 1272.6 b	16.6 ± 5.3 ab
	STD-UV-B	100	nd	nd	1.72 ± 0.18	39.6 ± 3.04	0.14 ± 0.08	58.46 ± 3.17	42.1 ± 5.1 ab	0.14 ± 0.1 a	57.1 b	12523.6 ± 1540.7 ab	13.4 ± 3.2 b
	LRW-UV-B	78.1 ± 32.7	2.3 ± 3.2	nd	1.32 ± 0.56	32.7 ± 16.56	0.24 ± 0.18	46.74 ± 22.63	44.7 ± 2.8 a	0.31 ± 0.1 a	56.3 b	13300.8 ± 846 a	17.1 ± 2.1 ab
<i>Significance</i>		**	ns	ns	ns	ns	ns	*	*	ns	*	*	ns
62	Standard (Control)	57.7 ± 11.4	23.4 ± 7.95	nd	1.70 ± 0.23	40.7 ± 4.76	0.47 ± 0.70	57.34 ± 5.01	23.7 ± 6.5 c	1.5 ± 1.4 a	54.8 a	7086.2 ± 1909 c	7.1 ± 1.9 b

	Leaf Removal West	70.2 ± 4.8	22.8 ± 3.16	nd	1.71 ± 0.13	41.36 ± 1.26	1.7 ± 0.08	55.75 ± 1.36	43.9 ± 4.5 a	1.3 ± 0.1 ab	54.5 a	13127.6 ± 1368.0 a	13.9 ± 2.2 a
	STD-UV-B	68.6 ± 7.2	21.6 ± 7.49	nd	1.78 ± 0.24	41.8 ± 0.36	0.30 ± 0.06	56.11 ± 0.32	33.5 ± 8.3 b	0.60 ± 0.1 ab	54.3 a	9975.2 ± 2482.3 b	9.5 ± 2.8 b
	LRW-UV-B	89.7 ± 2.12	8.07 ± 18.06	nd	1.77 ± 0.14	40.4 ± 1.35	0.19 ± 0.07	57.48 ± 1.22	42.1 ± 1.6 a	0.44 ± 0.1 b	56.2 a	12543.5 ± 481.6 a	8.3 ± 2.0 b
	<i>Significance</i>	*	*	ns	ns	ns	***	ns	***	*	ns	***	**
76	Standard (Control)	65.1 ± 7.39	13.03 ± 1.55	nd	1.72 ± 0.09	41.4 ± 2.27	0.25 ± 0.14	56.61 ± 2.36	23.3 ± 4.4 d	1.2 ± 0.5 a	54.1 b	6974.8 ± 1302.3 c	6.3 ± 1.3 c
	Leaf Removal West	54.9 ± 5.2	31.1 ± 8.01	nd	1.66 ± 0.20	41.3 ± 2	1.09 ± 0.20	55.92 ± 2.37	31.9 ± 1.9 b	1.5 ± 0.3 a	54.1 b	9539.6 ± 586.4 b	11.7 ± 1.6 a
	STD-UV-B	66.79 ± 5.21	23.42 ± 5.38	nd	1.93 ± 0.12	42.2 ± 1.8	0.27 ± 0.16	55.52 ± 1.84	27.6 ± 27.6 c	0.62 ± 0.1 b	53.5 b	8213.6 ± 83.1 c	9.3 ± 1.5 b
	LRW-UV-B	80.9 ± 6.83	3.22 ± 7.2	nd	1.72 ± 0.13	39.6 ± 2.2	0.11 ± 0.03	58.39 ± 2.19	40.5 ± 2.9 a	0.6 ± 0.3 b	56.9 a	12066.7 ± 880.6 a	10.8 ± 1.7 ab
	<i>Significance</i>	***	***	ns	ns	ns	***	ns	***	**	*	***	**
90	Standard (Control)	62.15 ± 9.6	18.60 ± 10.5	nd	1.81 ± 0.19	37.8 ± 1.43	0.18 ± 0.09	60.21 ± 1.52	25 ± 3.5 b	0.94 ± 0.11 ab	57.8 a	7483.6 ± 1057.2 b	7.5 ± 0.8 b
	Leaf Removal West	59.3 ± 3.91	29.1 ± 6.87	nd	1.87 ± 0.34	43.5 ± 7.8	0.29 ± 0.17	54.27 ± 8.36	24 ± 3.3 b	0.77 ± 0.2 b	51.9 a	7151.2 ± 979.6 b	10.1 ± 2.3 a
	STD-UV-B	78.7 ± 7.18	nd	nd	1.88 ± 0.25	42.1 ± 1.05	0.38 ± 0.07	55.56 ± 1.19	35 ± 3.2 a	0.81 ± 0.04 ab	55.8 a	10.436.7 ± 970.6 a	8.7 ± 0.8 ab
	LRW-UV-B	77.6 ± 1.7	29.12 ± 6.8	nd	1.76 ± 0.17	40.5 ± 2.31	0.36 ± 0.11	56.4 ± 1.74	38.6 ± 1.1 a	0.97 ± 0.11 a	54 a	11525.2 ± 343.6 a	8.7 ± 0.6 ab
	<i>Significance</i>	*	***	ns	ns	ns	ns	ns	***	*	ns	***	ns
116	Standard (Control)	67.0 ± 6.8	9.89 ± 5.67	nd	1.34 ± 0.12	40.11 ± 2.08	0.57 ± 0.27	57.95 ± 2.10	20.6 ± 2.1 c	1.66 ± 0.2 a	55.1 a	6178.9 ± 620.5 c	4.9 ± 0.4 c
	Leaf Removal West	67.3 ± 10	18.74 ± 10.72	nd	1.59 ± 0.12	40.7 ± 2.62	0.36 ± 0.06	57.32 ± 2.74	33.1 ± 4.7 b	0.8 ± 0.1 b	55.6 a	9875.1 ± 1386.1 b	11 ± 1.6 a
	STD-UV-B	83.7 ± 0.75	nd	nd	1.87 ± 0.17	44.6 ± 0.88	0.34 ± 0.11	53.16 ± 0.97	37 ± 3.9 ab	0.7 ± 0.1 b	51.7 b	11015 ± 1158.7	7.8 ± 1.4 b
	LRW-UV-B	79.5 ± 4.4	3.15 ± 7.05	nd	1.57 ± 0.36	42.6 ± 2.86	0.26 ± 0.07	57.6 ± 4.01	40.8 ± 4.5 a	0.7 ± 0.1 b	55.1 a	12154 ± 1330.5 a	8.0 ± 1.1 b
	<i>Significance</i>	ns	*	ns	ns	ns	ns	ns	***	*	***	***	***

Each value represents the mean of 5 replicates (±) standard deviation in units of mg/g skin tannin extract. STD (Shaded/Control); LRW (Leaf Removal West); STD-UV-B (STD with decreased UV-B radiation); LRW-UV-B (LRW with decreased UV-B radiation). ^aPercent composition of proanthocyanidin subunits (in moles) C, (+)-catechin; EC, (-)-epicatechin; ECG, (-)-epicatechin-3-O-gallate. mDP, mean degree of polymerization; %G, percentage galloylation; avMM, average molecular mass ; nd, not detected. Different letters indicate significant differences at (p ≤ 0.05, 0.01, and 0.001, respectively; ns: not significant).

Table S8. Compositional and structural characterization of skin extracts during ripening in 2011/2012 vintage done by phloroglucinolysis (Blancquaert, 2015).

DAA	Treatment	Terminal units ^a			Extension units ^a				mDP	%G	%P	avMM	Proanthocyanidins
		C	EC	ECG	C	EC	ECG	EGC					
26	Standard (Control)	89.4 ± 7.8	8.4 ± 5.8	1.3 ± 0.3	1.3 ± 0	42.7 ± 1.4	1.3 ± 0.1	54.7 ± 1.4	46.1 ± 11.9 a	53.4 ± 1.6 a	1.3 ± 0.1 bc	13751.6 ± 3575.3 a	22.6 ± 4.4 a
	Leaf Removal West	94.4 ± 1.5	4.2 ± 2.1	1.4 ± 0.7	1.4 ± 0.1	41.8 ± 2.0	1.1 ± 0.1	55.3 ± 1.6	47.3 ± 6.6 a	54.4 ± 1.9 a	1.2 ± 0.2 c	14105.8 ± 1995.3 a	22.8 ± 2.2 a
	LR (-UV-B,-PAR)	62.6 ± 2.3	4.8 ± 0.7	32.6 ± 2.6	1.4 ± 0.1	44.6 ± 1.4	1.1 ± 0.1	52.9 ± 1.5	28 ± 2.2 b	51.0 ± 1.5 b	2.2 ± 0.1 a	8387.6 ± 653.4 b	23.4 ± 2.1 a
	LR (-UV-B, 2xUHI)	92.6 ± 1.2	5.6 ± 1.4	1.7 ± 0.3	1.5 ± 0.1	43.5 ± 0.9	1.4 ± 0.1	53.6 ± 1.0	51.7 ± 6.8 a	52.5 ± 1.1 ab	1.4 ± 0.1 b	15429.4 ± 2024.2 a	19.8 ± 2.7 a
<i>Significance</i>		***	ns	***	ns	ns	ns	ns	**	***	*	**	ns
33	Standard (Control)	90.8 ± 1.3	7.3 ± 1.1	1.8 ± 0.3	1.3 ± 0.1	40.6 ± 1.8	1.2 ± 0.1	56.9 ± 2.0	55.7 ± 4.5 a	55.9 ± 2.0 a	1.2 ± 0.1 b	16656.2 ± 1347.5 a	17.1 ± 3.8 a
	Leaf Removal West	91.2 ± 1.2	6.9 ± 1.7	1.9 ± 0.5	1.4 ± 0.2	40.3 ± 1.4	1.2 ± 0.1	57.1 ± 1.5	51.7 ± 6.9 a	56.0 ± 1.3 a	1.2 ± 0.1 b	15447.5 ± 2043.8 a	16.3 ± 4.7 a
	LR (-UV-B,-PAR)	53.7 ± 2.3	3.8 ± 0.5	42.5 ± 2.7	1.6 ± 0.1	41.6 ± 1.6	1.2 ± 0	55.7 ± 1.6	32 ± 1.7 b	53.9 ± 1.6 a	2.5 ± 0.1 a	9619.9 ± 507.2 b	14.9 ± 3.0 a
	LR (-UV-B, 2xUHI)	90.4 ± 1.8	7.1 ± 0.4	2.5 ± 1.0	1.4 ± 0.2	41.0 ± 1.7	1.4 ± 0.1	56.2 ± 1.7	56.4 ± 7.7 a	55.2 ± 1.8 a	1.4 ± 0.1 b	16848.1 ± 2315.1 a	14.9 ± 3.4 a
<i>Significance</i>		***	ns	***	ns	ns	ns	ns	***	ns	***	***	
40	Standard (Control)	91.3 ± 2.18	8.5 ± 1.6	1.6 ± 0.6	1.2 ± 0.1	39.5 ± 1.7	1.0 ± 0	58.3 ± 1.7	47.3 ± 0.7 b	57.1 ± 1.7 a	1.0 ± 0 b	14124 ± 199.7 b	24.5 ± 2.9 a
	Leaf Removal West	90.6 ± 1.8	7.6 ± 1.7	1.7 ± 0.8	1.2 ± 0.1	39.3 ± 1.6	1.1 ± 0.1	58.4 ± 1.6	46.8 ± 2.5 b	57.2 ± 1.6 a	1.1 ± 0.1 b	13978.2 ± 749.5 b	23.4 ± 2.2 a
	LR (-UV-B,-PAR)	53.0 ± 1.7	4.1 ± 1.4	42.9 ± 2.3	1.3 ± 0	40.5 ± 1.3	1.1 ± 0.1	57.1 ± 1.3	34.4 ± 1.6 c	55.4 ± 1.2 a	2.3 ± 0.2 a	10341.4 ± 476.5 c	16.2 ± 1.8 b
	LR (-UV-B, 2xUHI)	91.9 ± 1.6	6.5 ± 1.4	1.6 ± 0.5	1.2 ± 0.1	40.0 ± 1.1	1.2 ± 0.1	57.6 ± 1.2	54.0 ± 3.0 a	56.5 ± 1.3 a	1.2 ± 0 b	16127.3 ± 895.0 a	17.9 ± 1.9 b
<i>Significance</i>		***	ns	***	ns	ns	ns	ns	***	ns	***	***	***
47	Standard (Control)	96.2 ± 1.0	3.2 ± 1.1	0.6 ± 0.1	1.4 ± 0.1	38.5 ± 1.0	0.5 ± 0.1	59.6 ± 1.0	51.5 ± 5.1 a	58.5 ± 1.0 ab	0.5 ± 0 c	15362.9 ± 1532.6 a	14.0 ± 2.5 ab
	Leaf Removal West	95.7 ± 1.2	3.7 ± 1.3	0.7 ± 0.2	1.3 ± 0.1	37.3 ± 2.3	0.4 ± 0.2	61.0 ± 2.4	44.1 ± 3.6 b	59.5 ± 2.2 a	0.4 ± 0.2 c	13164.0 ± 1078.8 b	15.7 ± 2.5 a
	LR (-UV-B,-PAR)	70.1 ± 11.2	2.3 ± 0.7	2.3 ± 0.3	1.4 ± 0.2	38.5 ± 1.6	0.5 ± 0.4	59.3 ± 1.8	36.6 ± 4.9 b	57.9 ± 1.9 ab	1.6 ± 0.4 a	10972.0 ± 1466.0 c	11.3 ± 1.9 b
	LR (-UV-B, 2xUHI)	93.7 ± 1.1	4.2 ± 0.8	2.1 ± 0.9	1.3 ± 0.1	40.0 ± 1.7	1.2 ± 0.1	57.5 ± 1.8	55.1 ± 5.8 a	56.5 ± 1.8 b	1.2 ± 0.1 b	16460.3 ± 1750.1 a	14.2 ± 2.8 ab

Significance		***	ns	ns	ns	ns	***	ns	**	ns	***	***	ns
54	Standard (Control)	97.0 ± 0.8	2.5 ± 0.9	0.5 ± 0.1	1.2 ± 0.1	36.4 ± 1.3	0.3 ± 0.1	62.0 ± 1.4	45.5 ± 2.2 a	60.7 ± 1.4 a	0.3 ± 0.1 b	13576.9 ± 649.5 a	18.1 ± 4.5 ab
	Leaf Removal West	88.5 ± 4.0	10.8 ± 4.4	0.7 ± 0.4	1.3 ± 0.1	36.9 ± 1.0	0.4 ± 0.1	61.6 ± 1.0	40.1 ± 3.9 b	60.1 ± 0.8 a	0.3 ± 0.1 b	11950.9 ± 1171.1 b	19.8 ± 2.5 a
	LR (-UV-B,-PAR)	87.2 ± 4.0	1.8 ± 0.8	14.5 ± 4.5	1.3 ± 0.1	36.8 ± 1.7	0.2 ± 0.1	61.6 ± 1.9	39.5 ± 1.5 b	60.1 ± 1.8 a	0.5 ± 0.1 a	11772.3 ± 444.8 b	18.4 ± 2.8 ab
	LR (-UV-B, 2xUHI)	96.7 ± 0.5	2.6 ± 0.4	0.7 ± 0.3	1.2 ± 0.1	38.3 ± 2.0	0.4 ± 0	60.2 ± 2.2	48.6 ± 5.2 a	59.0 ± 2.2 a	0.3 ± 0.1 b	14472.7 ± 1574.2 a	15.6 ± 1.5 b
Significance		ns	ns	***	ns	ns	ns	ns	**	ns	**	**	ns
68	Standard (Control)	67.6 ± 3.3	28.3 ± 2.0	4.1 ± 1.5	1.2 ± 0.1	37.7 ± 0.5	0.7 ± 0.1	60.5 ± 0.6	39.4 ± 1.7 a	58.9 ± 0.6 a	0.8 ± 0.1 a	11761.6 ± 486.4 a	13.0 ± 1.3 ab
	Leaf Removal West	72.7 ± 4.8	24.6 ± 4.6	2.8 ± 1.1	1.1 ± 0.1	37.8 ± 0.6	0.6 ± 0.2	60.5 ± 0.4	38.5 ± 4.2 ab	58.9 ± 0.3 a	0.6 ± 0.2 a	11481.3 ± 1250.0 ab	15.3 ± 0.6 a
	LR (-UV-B,-PAR)	63.9 ± 9.3	19.3 ± 4.2	18.8 ± 4.1	1.5 ± 0.1	37.8 ± 2.0	0.2 ± 0.1	60.5 ± 1.9	32.9 ± 3.6 b	58.7 ± 1.8 a	0.8 ± 0.3 a	9813.3 ± 1058.8 b	12.6 ± 3.0 b
	LR (-UV-B, 2xUHI)	75.2 ± 10.8	22.4 ± 9.9	2.4 ± 1.1	1.3 ± 0.1	37.7 ± 1.1	0.7 ± 0.1	60.3 ± 1.2	41.2 ± 5.7 a	58.8 ± 1.2 a	0.7 ± 0.2 a	12303.1 ± 1676.7 a	11.8 ± 1.1 b
Significance		ns	ns	***	***	ns	***	ns	*	ns	ns	*	ns
82	Standard (Control)	76.0 ± 1.0	20.6 ± 1.1	3.4 ± 0.8	1.2 ± 0.1	37.8 ± 1.0	0.4 ± 0.1	60.7 ± 1.0	42.7 ± 1.3 a	59.3 ± 1.0 a	0.4 ± 0.1 b	12729.7 ± 403.5 a	13.9 ± 2.6 a
	Leaf Removal West	76.8 ± 2.5	20.5 ± 2.5	2.7 ± 0.2	1.2 ± 0.1	37.5 ± 1.6	0.4 ± 0	60.9 ± 1.6	39.2 ± 2.5 b	59.3 ± 1.6 a	0.5 ± 0 b	11682.9 ± 738.6 b	14.1 ± 1.9 a
	LR (-UV-B,-PAR)	65.3 ± 2.6	19.8 ± 2.6	14.9 ± 2.8	1.1 ± 0	38.4 ± 2.0	0.3 ± 0.1	60.1 ± 2.0	33.6 ± 2.4 c	58.3 ± 1.9 a	0.8 ± 0.2 a	10033.1 ± 710.1 c	14.1 ± 2.2 a
	LR (-UV-B, 2xUHI)	74.7 ± 2.6	18.5 ± 2.2	6.8 ± 2.0	1.1 ± 0	37.2 ± 2.0	0.5 ± 0.1	61.1 ± 1.9	44.6 ± 1.4a	59.7 ± 1.8 a	0.7 ± 0.2 a	13302.7 ± 401.5 a	13.2 ± 0.9 a
Significance		ns	ns	***	ns	ns	ns	ns	***	ns	**	***	ns
96	Standard (Control)	86.0 ± 3.3	32.9 ± 18.4	7.9 ± 7.0	1.1 ± 0.1	40.1 ± 0.9	0.7 ± 0.1	58.1 ± 1.1	53.7 ± 5.0 a	57.0 ± 1.0 a	0.8 ± 0.1 a	16031.4 ± 1488.8 a	10.2 ± 1.7 a
	Leaf Removal West	61.2 ± 4.4	35.1 ± 5.2	3.7 ± 1.2	1.1 ± 0	39.1 ± 0.9	0.6 ± 0.1	59.2 ± 0.9	34.3 ± 4.3 c	57.5 ± 0.7 a	0.7 ± 0.1 a	10232.4 ± 1295.9 c	9.6 ± 1.4 a
	LR (-UV-B,-PAR)	51.3 ± 4.9	36.1 ± 4.2	12.6 ± 1.7	1.0 ± 0.1	38.1 ± 2.2	0.3 ± 0.1	60.7 ± 2.4	30.4 ± 5.2 c	58.6 ± 2.5 a	0.7 ± 0.2 a	9068.2 ± 1559.4 c	9.9 ± 1.6 a
	LR (-UV-B, 2xUHI)	65.3 ± 5.6	30.7 ± 6.4	4.0 ± 1.5	1.0 ± 0.1	38.9 ± 0.8	0.5 ± 0.1	59.5 ± 0.8	42.4 ± 6.0 b	58.1 ± 0.8 a	0.6 ± 0.1 a	12662.7 ± 1783.8 b	10.7 ± 1.8 a
Significance		*	***	***	ns	ns	***	ns	***	ns	Ns	***	ns
110	Standard (Control)	83.3 ± 3.3	11.4 ± 2.5	5.3 ± 1.4	1.2 ± 0.1	36.9 ± 1.1	0.6 ± 0	61.5 ± 1.1	46.8 ± 2.1 a	60.1 ± 1.0 a	0.6 ± 0.2 b	13982.9 ± 633.5 a	8.6 ± 1.2 c
	Leaf Removal West	73.4 ± 13.4	18.9 ± 9.7	7.7 ± 7.0	1.3 ± 0.1	36.8 ± 1.1	0.6 ± 0	61.4 ± 1.1	40.6 ± 7.5 ab	59.8 ± 1.3 ab	0.8 ± 0.3 b	12131.6 ± 2240.2 ab	10.9 ± 0.9 b
	LR (-UV-B,-PAR)	51.2 ± 7.6	32.0 ± 5.0	16.8 ± 6.1	1.2 ± 0	37.6 ± 1.5	0.6 ± 0.1	60.6 ± 1.3	29.7 ± 7.4 c	58.4 ± 1.0 bc	1.2 ± 0.4 a	8872.2 ± 2202.4 c	13.1 ± 1.7 a
	LR (-UV-B, 2xUHI)	63.8 ± 7.0	29.2 ± 8.6	7.0 ± 1.7	1.2 ± 0.1	38.6 ± 0.7	0.6 ± 0	59.6 ± 0.7	37.8 ± 4.8 bc	58.0 ± 0.5 c	0.8 ± 0.1 b	11284.6 ± 1424.4 bc	13.3 ± 1.0 a

<i>Significance</i>		***	*	***	ns	ns	ns	ns	**	*	*	**	***
130	Standard (Control)	61.9 ± 1.9	31.7 ± 5.6	4.1 ± 0.9	1.2 ± 0	42.6 ± 1.6	0.7 ± 0	56 ± 1.5	34.9 ± 1.9 ab	54.3 ± 1.4 a	0.7 ± 0 b	10393.2 ± 559.2 ab	9.2 ± 0.6 ab
	Leaf Removal West	72.3 ± 13.0	20.3 ± 9.5	7.4 ± 7.8	1.3 ± 0.1	41.7 ± 2.5	0.6 ± 0.1	56.5 ± 2.6	40.4 ± 9.0 a	55.0 ± 2.6 a	0.7 ± 0.3 b	12030.6 ± 2684.6 a	8.8 ± 1.2 a
	LR (-UV-B,-PAR)	54.0 ± 8.0	32.2 ± 7.7	18.5 ± 4.7	1.3 ± 0.2	40.5 ± 3.4	0.5 ± 0.2	59.2 ± 12.5	28.6 ± 1.2 b	54.4 ± 2.5 a	1.2 ± 0.3 a	8528 ± 351.3 b	10.8 ± 1.6 bc
	LR (-UV-B, 2xUHI)	54.0 ± 3.8	43.2 ± 4.0	2.8 ± 0.6	1.2 ± 0	41.8 ± 1.8	0.6 ± 0.1	57.1 ± 2.7	33.8 ± 2.3 ab	54.8 ± 1.8 a	0.7 ± 0.1 b	10065.3 ± 683.7 ab	8.5 ± 0.8 c
<i>Significance</i>		***	***	***	ns	ns	ns	*	ns	*	*	*	***

Each value represents the mean of 5 replicates (\pm) standard deviation in units of mg/g skin tannin extract.). STD (Shaded/Control); LRW (Leaf Removal West); LR (-UV-B,-PAR) (Leaf removal with decreased UV-B radiation and 2xOp50 UV-sheets added on both sides of the bunch zone); LR-UV-B, 2xUHI (Leaf removal with decreased UV-B radiation and 2xUHI UV-sheets added on both sides of the bunch zone). ^aPercent composition of proanthocyanidin subunits (in moles) C, (+)-catechin; EC, (-)-epicatechin; ECG, (-)-epicatechin-3-O-gallate; EGC, (-)-epigallocatechin. mDP, mean degree of polymerization; %G, percentage galloylation; avMM, average molecular mass ; nd, not detected. Different letters indicate significant differences at ($p \leq 0.05, 0.01$, and 0.001 , respectively; ns: not significant).

Table S9. Concentration and content of flavonols in 2010/2011(Blancquaert, 2015).

		Concentration (mg/g skin)				Total flavonol content (mg/berry)
DAA	Treatment	Quercetin-rutinoside	Quercetin-galactoside	Quercetin-glucoside	Quercetin-glucuronide	
13	Standard (Control)	0.01 ± 0	0.00 ± 0	0.01 ± 0	0.16 ± 0.03 b	0.011 ± 0.004 a
	Leaf Removal West	0.02 ± 0.01	0.01 ± 0.01	0.03 ± 0.01	0.28 ± 0.08 a	0.0003 ± 0 b
	STD-UV-B	0.01 ± 0.01	0.01 ± 0.01	0.03 ± 0.03	0.21 ± 0.10 ab	0.014 ± 0.005 a
	LRW-UV-B	0.01 ± 0	0.00 ± 0	0.01 ± 0	0.16 ± 0.03 b	0.0003 ± 0 b
<i>Significance</i>		ns	ns	ns	*	***
17	Standard (Control)	0.01 ± 0.01	0.01 ± 0	0.01 ± 0.01	0.23 ± 0.06	0.015 ± 0.004 a
	Leaf Removal West	0.03 ± 0.02	0.01 ± 0.01	0.05 ± 0.05	0.33 ± 0.25	0.0 ± 0 b
	STD-UV-B	0.02 ± 0	0.01 ± 0	0.03 ± 0.01	0.25 ± 0.05	0.017 ± 0.005 a
	LRW-UV-B	0.01 ± 0.01	0.01 ± 0	0.01 ± 0.01	0.23 ± 0.06	0.0000 ± 0 b
<i>Significance</i>		ns	ns	ns	ns	***
22	Standard (Control)	0.01 ± 0 b	0.00 ± 0 b	0.01 ± 0 b	0.15 ± 0.03 b	0.010 ± 0.002 a
	Leaf Removal West	0.03 ± 0.02 a	0.01 ± 0.01 a	0.06 ± 0.05 a	0.38 ± 0.16 a	0 ± 0 b
	STD-UV-B	0.01 ± 0.01 b	0.00 ± 0 b	0.02 ± 0.01 b	0.14 ± 0.07 b	0 ± 0 b
	LRW-UV-B	0.01 ± 0 b	0.00 ± 0 b	0.01 ± 0 b	0.15 ± 0.03 b	0.010 ± 0.006 a
<i>Significance</i>		**	**	**	***	***
48	Standard (Control)	0.03 ± 0.01 b	0.01 ± 0 b	0.05 ± 0.02	0.35 ± 0.08 b	0.038 ± 0.011 a
	Leaf Removal West	0.05 ± 0.01 a	0.03 ± 0 a	0.12 ± 0.03	0.54 ± 0.13 a	0.0 ± 0 c
	STD-UV-B	0.01 ± 0.01 c	0.00 ± 0 c	0.02 ± 0.01	0.16 ± 0.05 c	0.016 ± 0 b
	LRW-UV-B	0.01 ± 0 c	0.01 ± 0 c	0.03 ± 0.01	0.15 ± 0.04 bc	0.0 ± 0.006 c
<i>Significance</i>		***	***	***	***	***
62	Standard (Control)	0.02 ± 0.01 b	0.04 ± 0.02 a	0.25 ± 0.07 b	0.34 ± 0.07 b	0.055 ± 0.019 a
	Leaf Removal West	0.04 ± 0.01 a	0.06 ± 0.02 a	0.36 ± 0.14 a	0.63 ± 0.19 a	0 ± 0 c

	STD-UV-B	0.01 ± 0.01 b	0.00 ± 0 b	0.07 ± 0.02 c	0.15 ± 0.05 c	0.024 ± 0.007 b
	LRW-UV-B	0.01 ± 0 b	0.01 ± 0.01 b	0.08 ± 0.03 c	0.15 ± 0.05 c	0 ± 0 c
	<i>Significance</i>	***	***	***	***	***
76	Standard (Control)	0.01 ± 0 b	0.04 ± 0 b	0.26 ± 0.02 b	0.32 ± 0.03 b	0.083 ± 0.021 a
	Leaf Removal West	0.04 ± 0.02 a	0.09 ± 0.02 a	0.52 ± 0.11 a	0.59 ± 0.11 a	0 ± 0 c
	STD-UV-B	0.01 ± 0 b	0.00 ± 0.01 c	0.09 ± 0.01 c	0.19 ± 0.04 c	0.034 ± 0.004 b
	LRW-UV-B	0.01 ± 0 b	0.00 ± 0 c	0.10 ± 0.03 c	0.20 ± 0.07 c	0 ± 0 c
	<i>Significance</i>	***	***	***	***	***
90	Standard (Control)	0.01 ± 0 b	0.04 ± 0	0.26 ± 0.02 b	0.32 ± 0.03 b	0.085 ± 0.005 a
	Leaf Removal West	0.03 ± 0.01 a	0.09 ± 0.03	0.51 ± 0.21 a	0.56 ± 0.15 a	0.00 ± 0 c
	STD-UV-B	0.01 ± 0.01 b	0.00 ± 0	0.08 ± 0.02 c	0.24 ± 0.08 bc	0.043 ± 0.012 b
	LRW-UV-B	0.01 ± 0.01 b	0.00 ± 0	0.07 ± 0.02 c	0.18 ± 0.05 c	0.00 ± 0 c
	<i>Significance</i>	**	***	***	***	***
116	Standard (Control)	0.01 ± 0.01 b	0.04 ± 0.02 b	0.24 ± 0.09 b	0.28 ± 0.07 b	0.08 ± 0.02 a
	Leaf Removal West	0.02 ± 0 a	0.10 ± 0.02 a	0.63 ± 0.14 a	0.49 ± 0.06 a	0.0 ± 0 c
	STD-UV-B	0.00 ± 0 c	0.00 ± 0 c	0.05 ± 0.01 c	0.13 ± 0.04 c	0.024 ± 0.005 b
	LRW-UV-B	0.01 ± 0 c	0.00 ± 0 c	0.06 ± 0.02 c	0.15 ± 0.02 c	0.0 ± 0 c
	<i>Significance</i>	***	***	***	***	***

Each value represents the mean of 5 replicates ± standard deviation in concentration (mg/g skin) and content (mg/berry). Treatments: STD (Shaded/Control); LRW (Leaf Removal West); STD-UV-B (STD with decreased UV-B radiation); LRW-UV-B (LRW with decreased UV-B radiation). Different letters indicate significant differences at ($p \leq 0.05$, 0.01, and 0.001, respectively; ns: not significant).

Table S10. Concentration and content of flavonols in 2011/2012 (Blancquaert, 2015).

		Concentration (mg/g skin)				Total flavonol content (mg/berry)
DAA	Treatment	Quercetin-rutinoside	Quercetin-galactoside	Quercetin-glucoside	Quercetin-glucuronide	
26	Standard (Control)	0.01 ± 0.01 b	0.01 ± 0 b	0.02 ± 0.01 b	0.20 ± 0.08 b	0.015 ± 0.008 b
	Leaf Removal West	0.03 ± 0.01 a	0.01 ± 0 a	0.04 ± 0.01 a	0.34 ± 0.06 a	0.027 ± 0.006 a
	LR (-UV-B, 2xOp50)	0.00 ± 0 b	0.002 ± 0.001 c	0.01 ± 0 b	0.12 ± 0.01 c	0.009 ± 0.002 b
	LR(-UV-B, 2xUHI)	0.01 ± 0 b	0.003 ± 0.002 bc	0.01 ± 0.01 b	0.14 ± 0.04bc	0.009 ± 0.003 b
<i>Significance</i>		***	***	***	***	***
33	Standard (Control)	0.02 ± 0.01 b	0.01 ± 0 b	0.03 ± 0.01 b	0.24 ± 0.05 b	0.020 ± 0.005 b
	Leaf Removal West	0.06 ± 0.02 a	0.03 ± 0.01 a	0.07 ± 0.02 a	0.55 ± 0.12 a	0.053 ± 0.012 a
	LR (-UV-B, 2xOp50)	0.01 ± 0 c	0.003 ± 0.001 b	0.02 ± 0.01 b	0.13 ± 0.05 c	0.010 ± 0.004 b
	LR(-UV-B, 2xUHI)	0.01 ± 0 c	0.003 ± 0.001 b	0.02 ± 0 b	0.13 ± 0.04 c	0.012 ± 0.004 b
<i>Significance</i>		***	***	***	***	***
40	Standard (Control)	0.05 ± 0.02 b	0.02 ± 0.01 b	0.06 ± 0.02 b	0.39 ± 0.13 b	0.039 ± 0.015 b
	Leaf Removal West	0.10 ± 0.01 a	0.04 ± 0 a	0.12 ± 0.01 a	0.70 ± 0.07 a	0.071 ± 0.007 a
	LR (-UV-B, 2xOp50)	0.01 ± 0.01 c	0.01 ± 0 c	0.02 ± 0.01 c	0.16 ± 0.06 c	0.015 ± 0.005 c
	LR(-UV-B, 2xUHI)	0.01 ± 0.01 c	0.004 ± 0 c	0.02 ± 0.01 c	0.15 ± 0.04 c	0.014 ± 0.004 c
<i>Significance</i>		***	***	***	***	***
47	Standard (Control)	0.04 ± 0.01 b	0.02 ± 0 b	0.06 ± 0.01 b	0.36 ± 0.06 b	0.036 ± 0.005 b
	Leaf Removal West	0.11 ± 0.01 a	0.04 ± 0 a	0.15 ± 0.04 a	0.87 ± 0.11 a	0.084 ± 0.008 a
	LR (-UV-B, 2xOp50)	0.01 ± 0 c	0.003 ± 0 c	0.01 ± 0 c	0.11 ± 0.02 c	0.010 ± 0.001 c
	LR(-UV-B, 2xUHI)	0.01 ± 0 c	0.004 ± 0 c	0.02 ± 0.01 c	0.14 ± 0.03 c	0.012 ± 0.002 c
<i>Significance</i>		***	***	***	***	***
54	Standard (Control)	0.06 ± 0.02 b	0.03 ± 0.01 b	0.11 ± 0.03 b	0.55 ± 0.17 b	0.052 ± 0.018 b
	Leaf Removal West	0.12 ± 0.01 a	0.06 ± 0 a	0.17 ± 0.04 a	0.96 ± 0.07 a	0.099 ± 0.008 a

	LR (-UV-B, 2xOp50)	$0.01 \pm 0.01 \text{ c}$	$0.01 \pm 0 \text{ c}$	$0.02 \pm 0.01 \text{ c}$	$0.18 \pm 0.10 \text{ c}$	$0.017 \pm 0.009 \text{ c}$
	LR(-UV-B, 2xUHI)	$0.01 \pm 0 \text{ c}$	$0.01 \pm 0 \text{ c}$	$0.03 \pm 0 \text{ c}$	$0.16 \pm 0.02 \text{ c}$	$0.015 \pm 0.001 \text{ c}$
	<i>Significance</i>	***	***	***	***	***
68	Standard (Control)	$0.03 \pm 0.01 \text{ b}$	$0.05 \pm 0.01 \text{ b}$	$0.21 \pm 0.06 \text{ b}$	$0.47 \pm 0.11 \text{ b}$	$0.086 \pm 0.042 \text{ b}$
	Leaf Removal West	$0.08 \pm 0.01 \text{ a}$	$0.09 \pm 0.03 \text{ a}$	$0.41 \pm 0.12 \text{ a}$	$0.94 \pm 0.13 \text{ a}$	$0.212 \pm 0.037 \text{ a}$
	LR (-UV-B, 2xOp50)	$0.01 \pm 0.01 \text{ c}$	$0.02 \pm 0.01 \text{ c}$	$0.10 \pm 0.07 \text{ bc}$	$0.28 \pm 0.15 \text{ c}$	$0.081 \pm 0.036 \text{ b}$
	LR(-UV-B, 2xUHI)	$0.02 \pm 0 \text{ c}$	$0.02 \pm 0.01 \text{ c}$	$0.04 \pm 0.05 \text{ c}$	$0.10 \pm 0.06 \text{ d}$	$0.082 \pm 0.024 \text{ b}$
	<i>Significance</i>	***	***	***	***	***
82	Standard (Control)	$0.03 \pm 0.01 \text{ b}$	$0.06 \pm 0.03 \text{ b}$	$0.21 \pm 0.13 \text{ b}$	$0.50 \pm 0.23 \text{ b}$	$0.107 \pm 0.041 \text{ b}$
	Leaf Removal West	$0.09 \pm 0.03 \text{ a}$	$0.15 \pm 0.02 \text{ a}$	$0.56 \pm 0.21 \text{ a}$	$1.25 \pm 0.46 \text{ a}$	$0.20 \pm 0.035 \text{ a}$
	LR (-UV-B, 2xOp50)	$0.01 \pm 0.01 \text{ b}$	$0.05 \pm 0.04 \text{ b}$	$0.19 \pm 0.11 \text{ b}$	$0.41 \pm 0.13 \text{ b}$	$0.058 \pm 0.027 \text{ c}$
	LR(-UV-B, 2xUHI)	$0.02 \pm 0.01 \text{ b}$	$0.05 \pm 0.02 \text{ b}$	$0.24 \pm 0.07 \text{ bb}$	0.46 ± 0.07	$0.030 \pm 0.010 \text{ c}$
	<i>Significance</i>	***	***	***	***	***
96	Standard (Control)	$0.02 \pm 0.01 \text{ b}$	$0.07 \pm 0.03 \text{ b}$	$0.36 \pm 0.16 \text{ b}$	$0.33 \pm 0.11 \text{ b}$	$0.107 \pm 0.041 \text{ b}$
	Leaf Removal West	$0.04 \pm 0 \text{ a}$	$0.14 \pm 0.03 \text{ a}$	$0.68 \pm 0.15 \text{ a}$	$0.68 \pm 0.06 \text{ a}$	$0.200 \pm 0.035 \text{ a}$
	LR (-UV-B, 2xOp50)	$0.01 \pm 0 \text{ c}$	$0.04 \pm 0.01 \text{ c}$	$0.15 \pm 0.10 \text{ c}$	$0.27 \pm 0.12 \text{ bc}$	0.058 ± 0.027
	LR(-UV-B, 2xUHI)	$0.01 \pm 0 \text{ c}$	$0.02 \pm 0.01 \text{ c}$	$0.09 \pm 0.06 \text{ c}$	$0.17 \pm 0.06 \text{ c}$	$0.030 \pm 0.010 \text{ c}$
	<i>Significance</i>	***	***	***	***	***
110	Standard (Control)	$0.01 \pm 0 \text{ b}$	$0.06 \pm 0.02 \text{ b}$	$0.30 \pm 0.09 \text{ b}$	$0.31 \pm 0.03 \text{ bc}$	$0.084 \pm 0.019 \text{ b}$
	Leaf Removal West	$0.04 \pm 0.01 \text{ a}$	$0.13 \pm 0.05 \text{ a}$	$0.73 \pm 0.14 \text{ a}$	$0.63 \pm 0.12 \text{ a}$	$0.205 \pm 0.042 \text{ a}$
	LR (-UV-B, 2xOp50)	$0.01 \pm 0 \text{ b}$	$0.05 \pm 0.01 \text{ b}$	$0.25 \pm 0.05 \text{ b}$	$0.40 \pm 0.06 \text{ b}$	$0.083 \pm 0.016 \text{ b}$
	LR(-UV-B, 2xUHI)	$0.01 \pm 0 \text{ b}$	$0.005 \pm 0 \text{ c}$	$0.18 \pm 0.14 \text{ b}$	$0.30 \pm 0.06 \text{ c}$	$0.054 \pm 0.023 \text{ b}$
	<i>Significance</i>	***	***	***	***	***
130	Standard (Control)	$0.01 \pm 0.01 \text{ b}$	$0.04 \pm 0.01 \text{ b}$	$0.29 \pm 0.09 \text{ b}$	$0.27 \pm 0.06 \text{ b}$	$0.080 \pm 0.020 \text{ b}$
	Leaf Removal West	$0.02 \pm 0 \text{ a}$	$0.09 \pm 0.02 \text{ a}$	$0.52 \pm 0.06 \text{ a}$	$0.40 \pm 0.07 \text{ a}$	$0.149 \pm 0.017 \text{ a}$

	LR (-UV-B, 2xOp50)	0.007 ± 0bc	0.03 ± 0.01 b	0.17 ± 0.07 c	0.20 ± 0.05bc	0.054 ± 0.021 c
	LR(-UV-B, 2xUHI)	0.005 ± 0 c	0.00 ± 0 c	0.11 ± 0.05 c	0.17 ± 0.04 c	0.038 ± 0.009 c
<i>Significance</i>		***	***	***	***	***

Each value represents the mean of 5 replicates (\pm) standard deviation in concentration (mg/g skin) and content (mg/berry). Treatments: STD (Shaded/Control); LRW (Leaf Removal West); LR-UV-B, 2xOp50 (Leaf removal with decreased UV-B radiation and 2xOp50 UV-sheets added on both sides of the bunch zone); LR-UV-B, 2xUHI (Leaf removal with decreased UV-B radiation and 2xUHI UV-sheets added on both sides of the bunch zone). Different letters indicate significant differences at ($p \leq 0.05$, 0.01, and 0.001, respectively; ns: not significant).