

Supplementary Materials

Application of Vine-Shoot Chips during Winemaking and Aging of Malbec and Bonarda Wines

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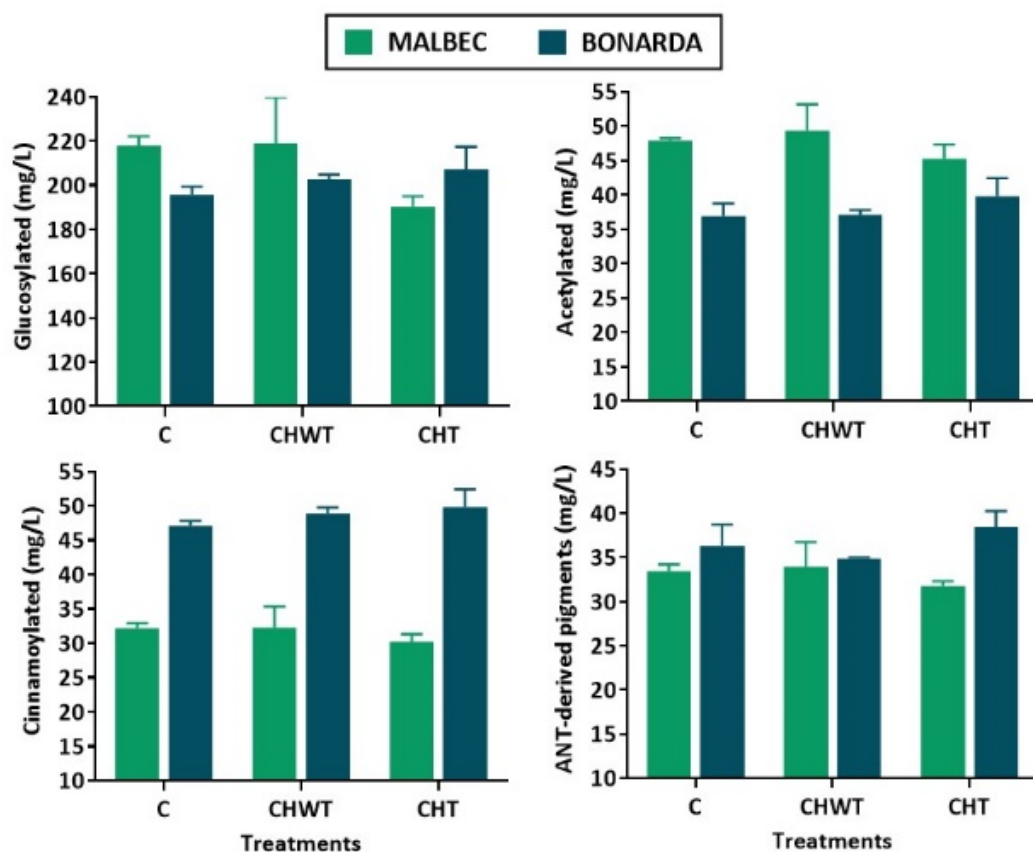


Figure S1. Anthocyanins and derived pigments of Malbec and Bonarda wines obtained applying different vine-shoot treatments during winemaking. C, control; CHWT, untoasted vine-shoot chips; CHT, toasted vine-shoot chips; ANT-derived pigments (pyranoanthocyanins + flavanol-anthocyanin adducts).

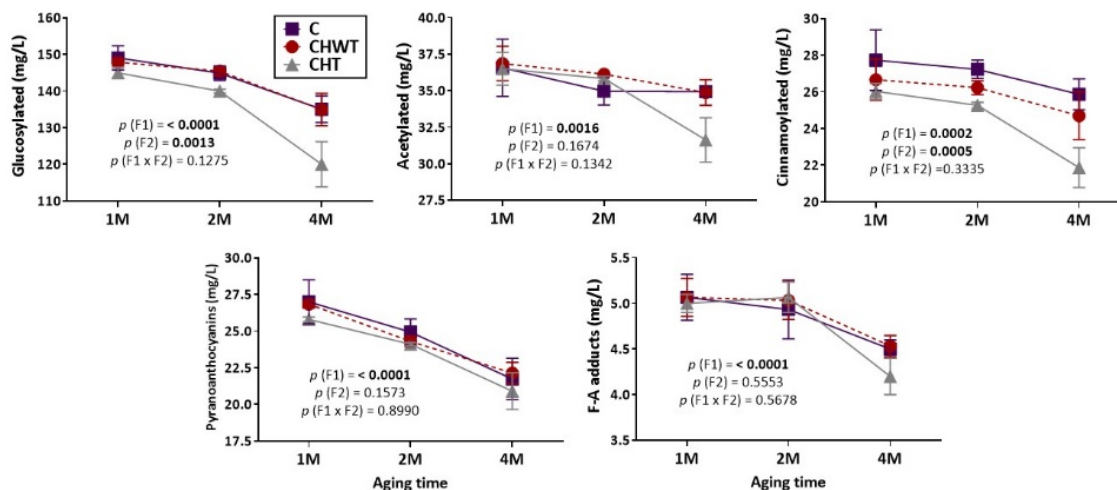


Figure S2. Anthocyanins and derived pigments of Malbec wines obtained applying different vine-shoot treatments during aging. Significant p -values by two-way ANOVA (Tukey HSD test, $p < 0.05$) are shown in bold. F1, aging time; F2, vine-shoot treatments; C, control; CHWT, untoasted vine-shoot chips; CHT, toasted vine-shoot chips; 1M, 30 days; 2M, 60 days; 4M, 120 days; F-A, flavanol-anthocyanin adducts.

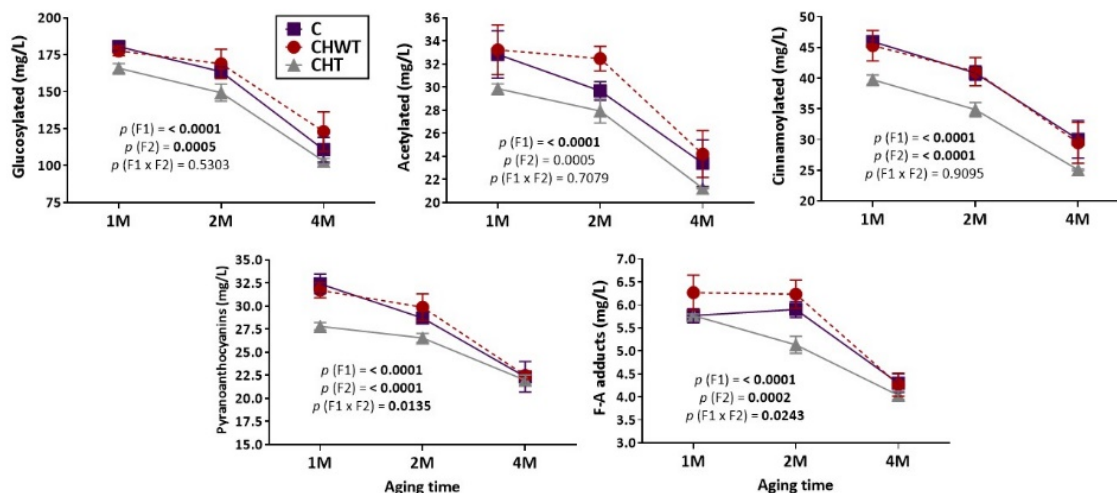


Figure S3. Anthocyanins and derived pigments of Bonarda wines obtained applying different vine-shoot treatments during aging. Significant p -values by two-way ANOVA (Tukey HSD test, $p < 0.05$) are shown in bold. F1, aging time; F2, vine-shoot treatments; C, control; CHWT, untoasted vine-shoot chips; CHT, toasted vine-shoot chips; 1M, 30 days; 2M, 60 days; 4M, 120 days; F-A, flavanol-anthocyanin adducts.

Table S1. Concentration (mg/L) of individual anthocyanins of Malbec wines obtained applying vine-shoot chips during aging (Experiment B).

Compound	1M			2M			4M			Two-way ANOVA		
	C	CHWT	CHT	C	CHWT	CHT	C	CHWT	CHT	F1	F2	F1 × F2
Dp-3-gl	4.17* ± 0.52	4.00 ± 0.12	4.16 ± 0.12	4.09 ± 0.08 ab	4.03 ± 0.10 a	4.34 ± 0.14 b	3.86 ± 0.18	3.92 ± 0.31	3.88 ± 0.22	0.0628	0.4625	0.6912
Cy-3-gl	1.86 ± 0.35	2.18 ± 0.35	2.08 ± 0.35	1.68 ± 0.13	2.04 ± 0.30	2.00 ± 0.23	1.55 ± 0.08	1.56 ± 0.02	1.53 ± 0.20	0.0017	0.1590	0.6962
Pt-3-gl	8.79 ± 1.14	8.36 ± 0.42	8.20 ± 0.18	8.11 ± 0.46	8.42 ± 0.15	8.69 ± 0.56	8.16 ± 0.23	8.21 ± 0.49	7.86 ± 0.80	0.3428	0.9263	0.4725
Pn-3-gl	7.61 ± 0.67	7.98 ± 1.49	7.50 ± 0.52	8.10 ± 0.37 b	7.16 ± 0.15 a	7.03 ± 0.24 a	5.91 ± 0.55	6.41 ± 0.89	5.60 ± 0.76	0.0002	0.2921	0.4626
Mv-3-gl	126.60 ± 0.93	125.37 ± 2.75	123.04 ± 2.42	122.87 ± 1.53 b	123.76 ± 1.07 b	117.90 ± 0.22 a	115.53 ± 2.90	114.84 ± 4.17	101.10 ± 8.77	<0.0001	0.0004	0.0693
Dp-3-acgl	3.13 ± 0.15	3.26 ± 0.07	3.15 ± 0.16	2.65 ± 0.74	2.81 ± 0.27	2.65 ± 0.05	2.83 ± 0.03	2.83 ± 0.10	2.67 ± 0.21	0.0049	0.5704	0.9751
Cy-3-acgl	3.19 ± 0.24	3.18 ± 0.06	3.29 ± 0.19	3.16 ± 0.05	3.20 ± 0.22	3.15 ± 0.05	3.14 ± 0.23	2.90 ± 0.11	2.80 ± 0.22	0.0069	0.5524	0.2403
Pt-3-acgl	5.62 ± 0.37	5.63 ± 0.13	5.45 ± 0.73	4.98 ± 0.20 a	5.71 ± 0.30 b	5.69 ± 0.10 b	4.85 ± 0.19	5.10 ± 0.23	4.69 ± 0.34	0.0008	0.1425	0.1558
Pn-3-acgl	6.24 ± 0.47	6.34 ± 0.78	5.91 ± 0.41	5.51 ± 1.27	5.76 ± 0.38	4.43 ± 0.73	2.88 ± 0.72	2.22 ± 0.12	2.12 ± 0.38	<0.0001	0.0679	0.4858
Mv-3-acgl	18.38 ± 1.80	18.44 ± 1.83	18.69 ± 0.73	18.68 ± 1.49	18.64 ± 0.86	19.91 ± 0.95	21.26 ± 0.35	21.83 ± 0.86	19.36 ± 1.56	0.0029	0.8652	0.1319
Dp-3-cmgl	2.98 ± 0.70	3.33 ± 0.83	3.23 ± 0.54	2.93 ± 0.20 a	3.10 ± 0.23 ab	3.59 ± 0.27 b	3.19 ± 0.17	3.14 ± 0.04	2.93 ± 0.29	0.8361	0.5639	0.4162
Mv-3-cfgl	2.04 ± 0.27	1.99 ± 0.17	1.88 ± 0.19	1.96 ± 0.24	1.81 ± 0.15	1.60 ± 0.08	1.62 ± 0.06 b	1.53 ± 0.08 ab	1.38 ± 0.06 a	<0.0001	0.0135	0.8781
Pt-3-cmgl	3.20 ± 0.08	3.13 ± 0.10	2.98 ± 0.12	3.26 ± 0.09	3.23 ± 0.15	3.08 ± 0.11	3.11 ± 0.08	2.99 ± 0.11	2.74 ± 0.21	0.0017	0.0011	0.7603
Mv-3-cis-cmgl	2.37 ± 0.17	2.35 ± 0.16	2.47 ± 0.17	2.24 ± 0.08	2.34 ± 0.06	2.31 ± 0.02	2.36 ± 0.10	2.29 ± 0.16	2.20 ± 0.14	0.1520	0.9957	0.3517
Pn-3-cmgl	3.57 ± 0.34	3.32 ± 0.20	3.30 ± 0.18	3.56 ± 0.10 b	3.20 ± 0.03 a	3.19 ± 0.04 a	3.30 ± 0.13	3.15 ± 0.21	2.91 ± 0.25	0.0164	0.0036	0.7882
Mv-3-trans-cmgl	13.60 ± 0.46 b	12.51 ± 0.12 a	12.17 ± 0.04 a	13.26 ± 0.43 c	12.54 ± 0.15 b	11.47 ± 0.03 a	12.30 ± 0.44 b	11.63 ± 0.86 ab	9.71 ± 0.96 a	<0.0001	<0.0001	0.1378
10-H-pyrmv-3-acgl	2.39 ± 0.40	2.35 ± 0.44	2.31 ± 0.44	2.44 ± 0.05 b	2.04 ± 0.18 a	2.25 ± 0.11 ab	2.24 ± 0.25	2.23 ± 0.10	2.35 ± 0.15	0.7230	0.5113	0.6925
10-C-pyrpt-3-gl	7.91 ± 0.57	8.03 ± 0.12	7.54 ± 0.30	7.15 ± 0.30	6.99 ± 0.40	6.56 ± 0.18	5.71 ± 0.73	5.68 ± 0.31	4.95 ± 1.05	<0.0001	0.0508	0.9597
10-C-pyrpn-3-gl	2.18 ± 0.06	2.14 ± 0.11	2.19 ± 0.05	2.30 ± 0.03 b	2.10 ± 0.02 a	2.09 ± 0.07 a	2.16 ± 0.03	2.19 ± 0.06	2.13 ± 0.14	0.9668	0.0713	0.0531
10-C-pyrmv-3-gl	5.40 ± 0.36	5.61 ± 0.43	5.20 ± 0.38	4.84 ± 0.18	4.87 ± 0.20	4.87 ± 0.10	4.11 ± 0.01	4.39 ± 0.17	4.03 ± 0.38	<0.0001	0.1652	0.7371
10-C-pyrmv-3-acgl	4.00 ± 0.16	4.04 ± 0.13	3.83 ± 0.15	3.55 ± 0.48	3.74 ± 0.20	3.58 ± 0.17	2.89 ± 0.43	3.06 ± 0.06	2.92 ± 0.30	<0.0001	0.3909	0.9635
10-HP-pyrmv-3-gl	1.75 ± 0.14	1.59 ± 0.02	1.59 ± 0.01	1.64 ± 0.03 b	1.56 ± 0.04 ab	1.54 ± 0.03 a	1.51 ± 0.08	1.51 ± 0.12	1.46 ± 0.11	0.0033	0.0322	0.5336
10-MHP-pyrmv-3-gl	1.19 ± 0.07	1.12 ± 0.02	1.13 ± 0.04	1.08 ± 0.03 a	1.07 ± 0.04 a	1.18 ± 0.02 b	1.20 ± 0.07	1.15 ± 0.08	1.17 ± 0.08	0.0919	0.1528	0.2115
10-HP-pyrmv-3-acgl	1.25 ± 0.11	1.06 ± 0.06	1.09 ± 0.03	1.05 ± 0.02 a	1.05 ± 0.02 a	1.11 ± 0.01 b	1.03 ± 0.02	1.00 ± 0.03	0.99 ± 0.03	0.0001	0.0084	0.0040
10-HP-pyrmv-3-cmgl	0.93 ± 0.04 ☉	0.93 ± 0.03	0.93 ± 0.01 ☉	0.88 ± 0.01 a	0.88 ± 0.02 a	0.92 ± 0.01 b	0.92 ± 0.01 b	0.90 ± 0.01 ab	0.89 ± 0.01 a	0.0024	0.6505	0.0695
Mv-3-gl-Cat	1.66 ± 0.05 ☉	1.77 ± 0.16	1.77 ± 0.04 ☉	1.68 ± 0.10	1.91 ± 0.18	1.90 ± 0.17	1.79 ± 0.04	1.79 ± 0.11	1.70 ± 0.19 ☉	0.2589	0.1766	0.3664
Mv-3-gl-ethyl-Cat	3.42 ± 0.31 ☉	3.30 ± 0.19	3.23 ± 0.20 ☉	3.27 ± 0.18	3.12 ± 0.10	3.15 ± 0.11	2.69 ± 0.09	2.72 ± 0.06	2.49 ± 0.14 ☉	<0.0001	0.1455	0.7387

* Mean ± SD (n = 3). Different letters in the same row for each aging time indicate significant differences among treatments (Tukey HSD test, $p < 0.05$). Significant p -values are shown in bold. Aging time (F1): 1M, 30 days; 2M, 60 days; 4M, 120 days. Vine-shoot treatment (F2): C, control; CHWT, untoasted vine-shoot chips; CHT, toasted vine-shoot chips. Abbreviations: Dp, delphinidin; Cy, cyanidin; Pt, petunidin; Pn, peonidin; Mv, malvidin; 3-gl, 3-glucoside; 3-acgl, 3-(6"-acetyl)-glucoside; 3-cfgl, 3-(6"-caffeoyl)-glucoside; 3-cmgl, 3-(6"-p-coumaroyl)-glucoside; 10-H, vitisin B structures; 10-C, vitisin A structures; pypt, pyranopetunidin; pyrpn, pyranopeonidin; pyrmv, pyranomalvidin; 10-HP, p-hydroxyphenyl; 10-MHP, methoxy-hydroxyphenyl or guaiaacyl; Cat, catechin.

Table S2. Concentration (mg/L) of individual anthocyanins of Bonarda wines obtained applying vine-shoot chips during aging (Experiment B).

Compound	1M			2M			4M			Two-way ANOVA		
	C	CHWT	CHT	C	CHWT	CHT	C	CHWT	CHT	F1	F2	F1 x F2
Dp-3-gl	15.43 * ± 1.03	14.52 ± 1.46	14.72 ± 0.66	15.79 ± 1.17 b	15.25 ± 0.69 b	12.44 ± 0.23 a	9.69 ± 0.65	9.56 ± 0.31	8.64 ± 0.26	<0.0001	0.0012	0.0334
Cy-3-gl	5.36 ± 0.48	4.78 ± 0.17	4.54 ± 0.39	4.75 ± 0.23	4.69 ± 0.28	4.38 ± 0.31	3.58 ± 0.26	3.86 ± 0.28	3.34 ± 0.03	<0.0001	0.0079	0.1902
Pt-3-gl	23.32 ± 0.87	20.69 ± 2.02	20.90 ± 0.54	22.71 ± 1.54 b	21.64 ± 0.15 b	17.59 ± 1.03 a	14.19 ± 0.73 ab	14.44 ± 0.74 b	12.68 ± 0.37 a	<0.0001	<0.0001	0.0092
Pn-3-gl	16.50 ± 1.12	15.62 ± 0.33	14.51 ± 0.78	14.75 ± 0.71	14.64 ± 0.72	12.92 ± 1.07	9.27 ± 0.93	9.92 ± 0.71	8.73 ± 0.10	<0.0001	0.0015	0.3974
Mv-3-gl	119.96 ± 1.57 ab	122.08 ± 5.32 b	111.16 ± 3.98 a	105.54 ± 0.83	112.63 ± 9.12	102.02 ± 7.90	73.99 ± 5.78	85.26 ± 11.49	69.65 ± 2.94	<0.0001	0.0025	0.7699
Dp-3-acgl	3.52 ± 0.50	3.20 ± 0.72	3.44 ± 0.63	2.97 ± 0.14	3.20 ± 0.29	2.89 ± 0.05	2.32 ± 0.35	2.36 ± 0.14	2.30 ± 0.16	0.0001	0.9449	0.7413
Cy-3-acgl	3.70 ± 0.35	3.57 ± 0.22	3.31 ± 0.37	3.71 ± 0.25	3.85 ± 0.13	3.61 ± 0.01	3.21 ± 0.17	3.10 ± 0.08	2.95 ± 0.18	<0.0001	0.0645	0.7661
Pt-3-acgl	4.37 ± 0.68	4.63 ± 0.32	4.10 ± 0.08	4.76 ± 0.34 ab	5.19 ± 0.03 b	4.43 ± 0.18 a	3.97 ± 0.24	3.73 ± 0.23	3.65 ± 0.07	<0.0001	0.0161	0.3133
Pn-3-acgl	6.52 ± 1.17	6.20 ± 1.22	5.25 ± 0.55	5.13 ± 0.81	5.15 ± 0.83	4.31 ± 0.79	2.90 ± 0.40	2.76 ± 0.31	2.26 ± 0.05	<0.0001	0.0490	0.9574
Mv-3-acgl	14.74 ± 2.02	15.63 ± 1.90	13.75 ± 1.15	13.10 ± 0.61 a	15.10 ± 0.13 b	12.69 ± 0.84 a	10.96 ± 0.98	12.23 ± 1.81	10.06 ± 0.51	<0.0001	0.0070	0.9598
Dp-3-cmgl	3.72 ± 0.54	3.78 ± 0.66	3.24 ± 0.34	3.55 ± 0.44	3.79 ± 0.58	2.79 ± 0.24	2.88 ± 0.48	2.66 ± 0.02	2.54 ± 0.13	0.0010	0.0233	0.5460
Mv-3-cfgl	3.55 ± 0.06	3.41 ± 0.09	3.48 ± 0.08	3.48 ± 0.20	3.24 ± 0.26	3.00 ± 0.14	2.94 ± 0.36	2.78 ± 0.11	2.71 ± 0.17	<0.0001	0.0274	0.4458
Pt-3-cmgl	5.92 ± 0.60	6.03 ± 0.31	5.48 ± 0.13	5.27 ± 0.62	5.37 ± 0.58	4.47 ± 0.32	3.69 ± 0.27	3.60 ± 0.32	3.20 ± 0.04	<0.0001	0.0074	0.8339
Mv-3-cis-cmgl	3.61 ± 0.10	3.55 ± 0.24	3.28 ± 0.15	3.20 ± 0.07 b	3.15 ± 0.04 b	2.79 ± 0.02 a	2.59 ± 0.22	2.56 ± 0.20	2.36 ± 0.04	<0.0001	0.0003	0.8582
Pn-3-cmgl	5.41 ± 0.27 b	5.15 ± 0.28 ab	4.65 ± 0.33 a	4.95 ± 0.30 b	4.84 ± 0.25 b	4.20 ± 0.19 a	3.76 ± 0.40	3.57 ± 0.31	3.16 ± 0.05	<0.0001	0.0001	0.9558
Mv-3-trans-cmgl	23.75 ± 0.35 b	23.36 ± 1.73 b	19.64 ± 0.68 a	20.42 ± 0.42	20.66 ± 2.08	17.60 ± 1.44	14.21 ± 1.39	14.32 ± 2.38	11.09 ± 0.32	<0.0001	0.0001	0.9487
10-H-pyrmv-3-acgl	3.17 ± 0.58	2.95 ± 0.42	2.73 ± 0.36	3.14 ± 0.66	3.75 ± 0.38	3.02 ± 0.31	3.00 ± 0.33	2.90 ± 0.19	2.86 ± 0.12	0.1129	0.2350	0.3844
10-C-pyrpt-3-gl	9.42 ± 1.35	9.89 ± 1.34	6.86 ± 1.15	6.74 ± 0.26	7.94 ± 1.14	6.70 ± 1.28	5.02 ± 0.54	5.54 ± 0.81	4.84 ± 0.38	<0.0001	0.0090	0.1689
10-C-pyrpn-3-gl	3.02 ± 0.22	2.89 ± 0.20	2.91 ± 0.03	2.97 ± 0.04 b	2.86 ± 0.12 ab	2.73 ± 0.08 a	2.25 ± 0.14	2.20 ± 0.09	2.26 ± 0.04	<0.0001	0.1326	0.5294
10-C-pyrmv-3-gl	7.06 ± 1.01	6.72 ± 0.65	6.43 ± 0.84	6.45 ± 0.23 b	5.65 ± 0.32 a	5.34 ± 0.27 a	4.09 ± 0.34	4.26 ± 0.26	4.30 ± 0.41	<0.0001	0.1702	0.3464
10-C-pyrmv-3-acgl	4.71 ± 0.41	4.44 ± 0.31	4.10 ± 0.19	4.80 ± 0.22 b	4.73 ± 0.36 b	4.08 ± 0.11 a	3.29 ± 0.19	3.23 ± 0.15	3.38 ± 0.19	<0.0001	0.0093	0.0556
10-HP-pyrmv-3-gl	1.61 ± 0.04	1.56 ± 0.08	1.51 ± 0.04	1.54 ± 0.10	1.60 ± 0.11	1.54 ± 0.02	1.40 ± 0.16	1.31 ± 0.05	1.36 ± 0.09	0.0001	0.4917	0.5366
10-MHP-pyrmv-3-gl	1.26 ± 0.02	1.17 ± 0.05	1.17 ± 0.10	1.15 ± 0.02 a	1.27 ± 0.03 b	1.16 ± 0.03 a	1.26 ± 0.14	1.15 ± 0.06	1.13 ± 0.08	0.8016	0.1333	0.0680
10-HP-pyrmv-3-acgl	1.20 ± 0.03	1.14 ± 0.03	1.15 ± 0.10	1.04 ± 0.02 a	1.13 ± 0.02 b	1.06 ± 0.02 a	1.09 ± 0.08	0.99 ± 0.04	0.97 ± 0.03	<0.0001	0.0924	0.0195
10-HP-pyrmv-3-cmgl	0.94 ± 0.02	0.93 ± 0.02	0.93 ± 0.04	0.89 ± 0.02 a	0.95 ± 0.01 b	0.91 ± 0.01 a	0.91 ± 0.03	0.90 ± 0.01	0.88 ± 0.01	0.0035	0.1381	0.0250
Mv-3-gl-Cat	2.34 ± 0.07 a	2.79 ± 0.05 b	2.51 ± 0.09 a	2.38 ± 0.32 b	2.90 ± 0.01 c	1.66 ± 0.10 a	1.78 ± 0.07	1.89 ± 0.27	1.60 ± 0.11 ☉	<0.0001	<0.0001	0.0001
Mv-3-gl-ethyl-Cat	3.44 ± 0.12	3.44 ± 0.31	3.25 ± 0.08	3.52 ± 0.15	3.34 ± 0.29	3.48 ± 0.23	2.52 ± 0.16	2.41 ± 0.07	2.43 ± 0.10 ☉	<0.0001	0.4234	0.6661

* Mean ± SD (n = 3). Different letters in the same row for each aging time indicate significant differences among treatments (Tukey HSD test, $p < 0.05$). Significant p -values are shown in bold. Aging time (F1): 1M, 30 days; 2M, 60 days; 4M, 120 days. Vine-shoot treatment (F2): C, control; CHWT, untoasted vine-shoot chips; CHT, toasted vine-shoot chips. Abbreviations: Dp, delphinidin; Cy, cyanidin; Pt, petunidin; Pn, peonidin; Mv, malvidin; 3-gl, 3-glucoside; 3-acgl, 3-(6"-acetyl)-glucoside; 3-cfgl, 3-(6"-caffeoyl)-glucoside; 3-cmgl, 3-(6"-p-coumaroyl)-glucoside; 10-H, vitisin B structures; 10-C, vitisin A structures; pypt, pyranopetunidin; pyrpn, pyranopeonidin; pyrmv, pyranomalvidin; 10-HP, p-hydroxyphenyl; 10-MHP, methoxy-hydroxyphenyl or guaiacyl; Cat, catechin.

Table S3. Relative Contributions (%) of top 20 Malbec descriptors to the first and second MFA axes.

Malbec 1M			
Descriptor	Dim.1	Descriptor	Dim.2
Wood_J6	6.570	Astringency_J6	9.084
Fruity_J6	5.841	Herbaceous_J6	8.400
Coffee_J5	5.135	Astringency_J5	6.897
Wood_J5	4.989	Herbaceous_J5	6.378
Fruity_J5	4.435	Wood_J4	5.325
Coffee_J2	3.713	Astringency_J4	5.325
Fullness_J4	3.655	Bitter_J4	5.325
Color.intensity_J2	3.528	Fruity_J2	4.704
Bitter_J2	3.502	Bitter_J3	3.238
Toasted_J4	3.291	Fruity_J7	3.047
Jam_J4	3.291	Aromatic.intensity_J7.1	3.047
Astringency_J3	3.079	Fullness_J7	3.047
Aromatic.intensity_J4	3.016	Color.intensity_J7	2.751
Herbaceous_J2	2.908	Astringency_J1	2.650
Herbaceous_J3	2.760	Color.intensity_J1	2.529
Color.intensity_J3	2.721	Acidity_J7.1	2.386
Aromatic.intensity_J2	2.664	Herbaceous_J1	2.161
Fruity_J3	2.556	Color.intensity_J3	2.147
Acidity_J7	2.405	Fruity_J6	1.696
Fruity_J7.1	2.381	Aromatic.intensity_J4	1.511
Malbec 2M			
Descriptor	Dim.1	Descriptor	Dim.2
Floral_J3	5.049	Fruity_J3	5.560
Toasted_J3	4.935	Fullness_J5	5.421
Astringency_J3	4.766	Wood_J2	5.325
Dark.Fruit_J5	3.966	Astringency_J2	5.325
Rubber_J2	3.764	Bitter_J3	4.859
Color.intensity_J5	3.198	Smoke_J2	4.736
Astringency_J5	3.198	Bitter_J4	4.018
Spicy_J2	3.141	Color.intensity_J1	3.985
Fruity_J2	3.141	Fullness_J4	3.934
Wood_J1	2.916	Aromatic.intensity_J4	3.780
Fruity_J1	2.835	Coffee_J5	3.772
Aromatic.intensity_J1	2.835	Toasted_J4	3.240
Coffee_J1	2.835	Chocolate_J4	3.240
Aromatic.intensity_J5	2.760	Fruity_J6	3.000
Smoke_J5	2.760	Fruity_J4	2.796
Spicy_J5	2.760	Color.intensity_J2	2.630
Toasted_J6	2.723	Color.intensity_J6	2.589
Spicy_J6	2.723	Fullness_J1	2.535
Coffee_J6	2.723	Astringency_J1	2.535
Astringency_J6	2.723	Bitter_J1	2.535
Malbec 4M			
Descriptor	Dim.1	Descriptor	Dim.2
Spicy_J1	3.363	Fullness_J2	5.631
Astringency_J1	3.322	Wood_J2	5.059
Aromatic.intensity_J2	3.217	Bitter_J2	5.059
Wood_J1	2.985	Color.intensity_J2	4.885
Fruity_J1	2.985	Bitter_J1	3.213
Spicy_J2	2.202	Color.intensity_J3	3.110
Spicy_J3	2.143	Astringency_J3	3.110
Fruity_J3	2.125	Spicy_J2	2.319
Aromatic.intensity_J3	1.977	Fullness_J3	2.128
Wood_J3	1.977	Aromatic.intensity_J2	0.723
Fruity_J3.1	1.977	Fruity_J1	0.671
Bitter_J3	1.977	Wood_J1	0.671
Bitter_J1	1.368	Fruity_J3.1	0.444
Fullness_J3	0.906	Aromatic.intensity_J3	0.444
Color.intensity_J2	0.570	Wood_J3	0.444
Wood_J2	0.460	Bitter_J3	0.444
Bitter_J2	0.460	Fruity_J3	0.211
Color.intensity_J3	0.282	Spicy_J3	0.183
Astringency_J3	0.282	Astringency_J1	0.140
Fullness_J2	0.096	Spicy_J1	0.075

Table S4. Relative Contributions (%) of top 20 Bonarda descriptors to the first and second MFA axes.

Bonarda 1M			
Descriptor	Dim.1	Descriptor	Dim.2
Color.intensity_J7	7.019	Color.intensity_J3	7.215
Jam_J3	5.304	Color.intensity_J4	7.215
Jam_J4	5.304	Astringency_J7	6.711
wood_J2	4.704	Color.intensity_J2	5.385
Wood_J3	4.562	Fruity_J7	5.258
wood_J4	4.562	Fruity_J2	5.032
Wood_J1	4.540	Astringency_J5	4.690
Color.intensity_J1	4.520	Fullness_J5	4.690
Fruity_J5	4.404	Bitter_J7	3.994
Bitter_J7	3.773	Astringency_J3	3.855
Aromatic.intensity_J2	3.691	Astringency_J4	3.855
Astringency_J3	3.641	Chocolate_J5	3.848
Astringency_J4	3.641	Astringency_J2	3.683
Fruity_J1	3.322	Wood_J3	2.873
Fruity_J7	2.588	wood_J4	2.873
Fruity_J8	2.470	Color.intensity_J8	2.631
Wood_J8	2.470	Aromatic.intensity_J8	2.631
Astringency_J8	2.470	Toasted_J8	2.631
Fullness_J8	2.470	Bitter_J8	2.631
Astringency_J1	2.262	Astringency_J1	2.434
Bonarda 2M			
Descriptor	Dim.1	Descriptor	Dim.2
Smoke_J2	7.194	chocolate_J2	11.936
Astringency_J5	3.789	Dark.Fruit_J2	7.268
Floral_J5	3.736	Bitter_J5	5.697
Fruity_J3	3.615	Coffee_J3	4.331
Dark.Fruit_J2	3.567	Astringency_J6	3.995
Jam_J3	3.458	Bitter_J6	3.995
Toasted_J5	2.738	Rubber_J6	3.995
Toasted_J4	2.719	Fullness_J6	3.782
Spicy_J4	2.719	Bitter_J1	3.360
Chocolate_J4	2.719	Color.intensity_J3	3.307
Bitter_J4	2.719	Aromatic.Intensity_J3	3.307
Astringency_J4	2.719	Astringency_J3	3.307
Bitter_J3	2.648	Color.intensity_J7	2.974
Spicy_J6	2.480	Color.intensity_J5	2.825
Fruity_J5	2.397	Color.Intensity_J1	2.679
Coffee_J6	2.279	Coffee_J7	2.417
Wood_J6.1	2.279	Fruity_J5	2.316
Jam_J6	2.233	Fruity_J4	2.237
Wood_J1	2.139	Rubber_J1	2.196
Fruity_J1	2.139	Astringency_J1	2.046
Bonarda 4M			
Descriptor	Dim.1	Descriptor	Dim.2
Dark.fruit_J7	4.936	Aromatic.intensity_J1	8.357
Wood_J7	4.868	Astringency_J1	7.059
Astringency_J7	4.654	Sweet_J3	5.966
Toasted_J1	3.819	Astringency_J6	5.584
Wood_J1	3.288	Color.intensity_J4	4.817
Floral_J5	3.132	Spicy_J4	4.817
Toasted_J5	3.074	Fruity_J1	4.594
Bitter_J5	3.074	Wood_J4	3.997
Smoke_J3	3.069	Spicy	3.332
Dark.fruit_J3	3.012	Astringency_J8	3.332
Bitter_J3	3.012	Aromatic.intensity_J6	3.074
Dark.fruit_J6	2.794	Fruity_J4	2.648
Color.intensity_J6	2.742	Bitter_J4	2.648
Astringency_J5	2.599	Fullness_J4	2.648
Fruity_J5	2.500	Jam_J4	1.888
Wood_J3	2.450	Wood_J1	1.817
Wood_J6	2.442	Fruity_J5	1.776
Astringency_J3	2.440	Astringency_J3	1.760
Aroma.intensity_J4	2.359	Wood_J3	1.740
Aromatic.intensity_J2	2.281	Fruity_J8	1.707