

# Measurement of the effect of accelerated aging on the aromatic compounds of Gewürztraminer and Teroldego wines, using a SPE-GC-MS /MS protocol

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## Supplementary Figure and Tables

**Figure S1.** Elution tests from cartridges MI (1<sup>st</sup> extraction) and MII (2<sup>nd</sup> extraction) with 3 aliquots of DCM solvent (1,2,3) Cartridge B= Bond Elut ENV; I= Isolute® ENV+; L= LiChrolut® EN; W= white wine; M=medium spike

**Table S1.** Comparison of cartridges; percentage of compounds found in the 2<sup>nd</sup> and 3<sup>rd</sup> solvent fractions (dichloromethane) considering 100% the content of the 1<sup>st</sup> fraction. Descriptive statistics, one-way Anova analysis and post-hoc test (Tukey test  $p < 0.05$ ) (N= 7 wine sample; 4 white and 3 red)

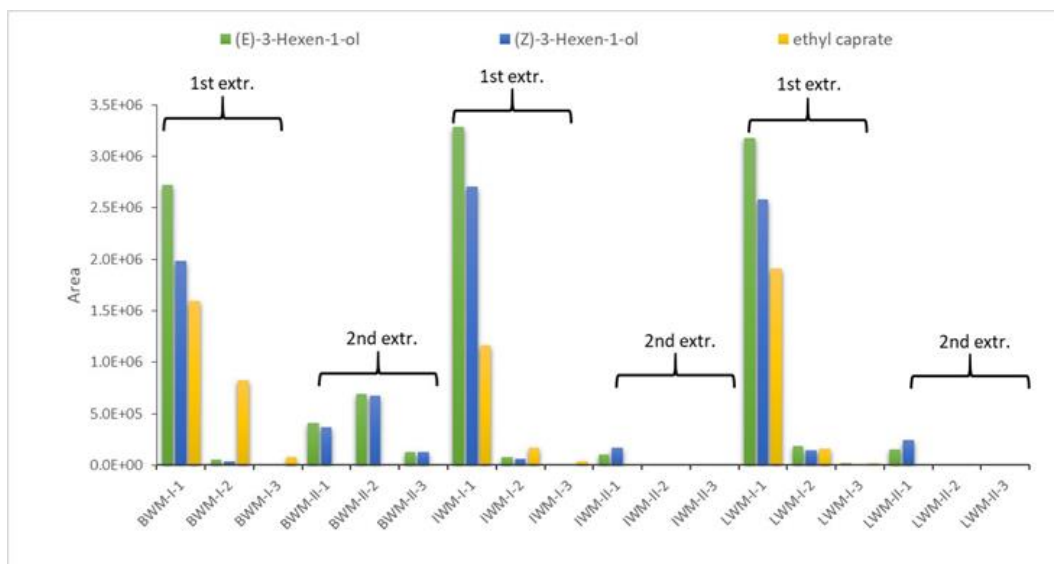
**Table S2:** Recovery, intraday and interday precision for red and white wines, in red compounds with unacceptable values.

**Table S3.** Repeatability of the accelerated aging treatment of two different Gewürztraminer wines (A, B) kept for 4 days at T equal to 40 °C and then analyzed following the validated SPE-GC-MS/MS method.

**Table S4.** Descriptive statistics of the measured volatile compounds and one-way Anova analysis and post-hoc test results for the Gewürztraminer wines.

**Table S5.** Descriptive statistics of the measured volatile compounds and one-way Anova analysis results for the Teroldego wines.

**Table S6:** basic enological analysis of commercial wines used for accelerating aging



**Figure S1.** Elution tests from cartridges M<sub>I</sub> (1<sup>st</sup> extraction) and M<sub>II</sub> (2<sup>nd</sup> extraction) with 3 aliquots of DCM solvent (1,2,3) Cartridge B= Bond Elut ENV; I= Isolute® ENV+; L= LiChrolut® EN; W= white wine; M=medium spike

**Table S1.** comparison of cartridges; percentage of compounds found in the 2<sup>nd</sup> and 3<sup>rd</sup> solvent fractions (dichloromethane) considering 100% the content of the 1<sup>st</sup> fraction. Descriptive statistics and one-way Anova analysis and post-hoc test (Tukey test  $p < 0.05$ ) (N= 7 wine sample; 4 white and 3 red)

Compounds			Bond Elut ENV				Isolute® ENV+				LiChrolut® EN			
	F	Significance	N	Mean	Std. Dev.	Tukey	N	Mean	Std. Dev.	Tukey	N	Mean	Std. Dev.	Tukey
butyl acetate	3.81	0.041	7	4.83	3.78	a	7	2.40	3.09	a,b	7	0.55	1.23	b
isobutanol	7.18	<0.01	7	29.69	25.38	a	7	2.37	1.15	b	7	5.08	4.22	b
1-hexanol	4.03	0.035	7	17.39	2.87	a	7	12.29	8.05	a,b	7	8.74	5.05	b
<i>trans</i> -3-Hexen-1-ol	9.10	<0.01	7	13.23	7.88	a	7	3.75	1.97	b	7	3.28	2.61	b
<i>cis</i> -3-Hexen-1-ol	9.08	<0.01	7	13.66	8.64	a	7	3.38	1.39	b	7	3.13	2.63	b
methionol	9.09	<0.01	7	15.53	10.16	a	7	2.51	1.11	b	7	4.43	3.11	b
benzyl alcohol	6.18	<0.01	7	15.38	9.77	a	7	5.24	1.95	b	7	5.31	4.03	b
ethyl caprate	10.40	<0.01	7	78.87	27.69	a	7	31.81	32.33	b	7	17.44	16.56	b

**Table S2.** recovery, intraday and interday precision for red and white wines, in red compounds with unacceptable values.

	RED WINE			WHITE WINE		
	Recovery % (n=10)	CV % INTRADAY (n=5)	CV% INTERDAY (n= 5)	Recovery % (n=10)	CV % INTRADAY (n=5)	CV% INTERDAY (n= 5)
Isobutyl acetate	87.5	6.1	1.9	88.7	1.1	3.7
Ethyl butyrate	86.5	5.7	2.0	81.3	0.6	3.1
Ethyl 2-methylbutyrate	93.1	7.2	4.8	91.2	2.6	3.7
Ethyl isovalerate	87.9	6.3	2.2	88.1	1.5	4.0
Butyl acetate	90.8	6.3	2.2	92.5	1.5	3.2
Isobutanol	-26.8	5.9	7.2	-31.2	2.3	9.9
Isopentyl acetate	83.4	5.2	2.3	56.7	0.7	2.4
Ethyl valerate	90.4	6.0	2.2	91.9	1.4	4.0
1,8-Cineole	96.1	6.2	1.7	93.2	1.7	2.0
Ethyl capronate	83.7	5.2	1.7	63.7	0.9	2.9
Hexyl acetate	90.4	5.4	2.7	86.9	1.1	2.8
Acetoin	-1.2	24.8	24.2	1.1	3.3	7.2
Ethyl heptanoate	85.6	5.9	1.9	83.0	1.5	4.5
Ethyl lactate	-384.8	4.9	2.1	-75.6	2.0	2.7
1-Hexanol	58.5	4.8	1.9	52.9	0.4	1.9
cis Rose oxide	96.6	5.8	2.2	93.0	1.3	2.3
trans-3-Hexen-1-ol	79.5	4.9	5.3	95.8	1.4	2.9
trans Rose oxide	97.2	6.0	2.4	92.9	1.4	2.6
cis-3-Hexen-1-ol	71.2	4.6	6.2	90.5	1.6	2.7
Ethyl caprylate	78.7	5.3	3.2	67.7*	1.2	4.4
Furfurylthiol	59.5*	9.3	16.0	71.4	2.4	10.5
Linalool oxide A	97.7	6.0	2.4	99.4	1.0	1.0
Linalool oxide B	96.9	6.2	2.6	98.8	1.2	1.3
2-sec-Butyl-3-methoxypyrazine	95.5	6.1	2.2	92.2	1.6	2.0
Benzaldehyde	76.1	6.0	3.3	60.3*	4.9	7.8
Linalool	98.4	5.9	2.3	94.5	0.6	1.0
Ethyl leucate	94.9	5.2	1.6	97.9	1.0	1.2
Isobutyric acid	6.2	5.3	4.1	6.6	2.0	2.2
Terpinen-4-ol	96.0	6.3	2.2	94.5	1.4	1.8
Butyric acid	6.5	5.4	4.7	0.8	1.5	2.3
Ethyl caprate	63.6	7.6	5.1	62.4*	2.1	5.0
Benzylmercaptan	68.8	7.7	9.8	79.8	2.2	7.9
Phenylacetaldehyde	27.8	16.3	39.6	54.2	5.1	15.2
Safranal	94.8	5.9	2.5	91.6	1.4	2.8
Isovaleric acid	9.0	4.7	4.2	29.1	1.8	2.9
Diethyl succinate	-17.8	4.9	2.6	46.2	0.8	1.8
$\alpha$ -Terpineol	97.9	6.3	2.6	93.8	1.5	1.7
Methionol	-3.3	5.4	5.3	10.4	2.7	7.3
Valeric acid	50.9	5.1	11.1	78.2	2.7	3.1

	RED WINE			WHITE WINE		
	Recovery % (n=10)	CV % INTRADAY (n=5)	CV% INTERDAY (n= 5)	Recovery % (n=10)	CV % INTRADAY (n=5)	CV% INTERDAY (n= 5)
$\beta$ -Citronellol	95.5	5.6	2.7	92.8	1.4	2.4
TDN	69.9	7.1	3.5	62.6	2.8	6.7
Ethyl phenylacetate	96.9	6.3	2.6	95.3	0.8	1.5
Methyl salicylate	95.7	6.3	2.5	95.0	1.4	1.5
Nerol	94.9	6.0	3.7	91.3	1.7	2.8
Phenylethyl acetate	92.9	5.9	2.4	82.4	0.6	1.5
$\beta$ -Damascone	90.3	6.3	3.2	78.8	1.4	1.7
Hexanoic acid	-2.1	5.4	2.5	-48.3	0.7	1.7
$\beta$ -Damascenone	87.7	6.0	3.0	74.3	1.4	3.6
Ethyl laurate	62.7*	9.5	8.0	44.4	5.4	15.7
Geraniol	91.9	5.8	3.3	87.6	1.1	2.0
Guaiacol	85.9	6.3	3.4	98.4	1.5	3.0
Benzyl alcohol	60.9*	5.0	3.8	66.7	1.8	3.4
trans-whiskey lactone	96.6	5.9	3.4	93.0	1.5	3.0
2-Phenylethanol	-135.6	5.7	4.6	6.2	1.0	2.1
$\gamma$ -octalactone	96.6	6.4	3.2	96.2	1.4	1.6
$\beta$ -ionone	92.7	5.4	3.8	88.0	1.7	1.8
cis-whiskey lactone	95.5	5.5	2.7	95.3	1.7	2.4
Benzothiazole	93.5	6.6	2.0	94.9	2.8	2.7
4-Ethyl guaiacol	95.6	6.5	3.2	90.7	1.4	1.3
Octanoic acid	60.3*	5.6	2.0	72.3*	0.9	1.6
$\gamma$ -Nonalactone	93.8	5.6	3.2	89.9	1.8	1.8
Ethyl cinnamate	93.2	5.5	4.6	89.6	1.6	1.3
Nonanoic acid	89.7	5.0	5.8	89.4	3.4	2.9
$\gamma$ -decalactone	91.4	5.2	3.8	89.2	2.0	2.5
4-Ethyl-phenol	86.7	6.2	2.4	92.3	3.5	3.4
Eugenol	94.5	6.0	3.9	92.6	1.5	1.1
4-Vinylguaiacol	82.6	6.3	4.0	82.8	1.1	1.9
$\delta$ -decalactone	61.0	5.0	5.4	59.6	2.0	2.9
2-Aminoacetophenone	88.8	6.3	3.6	89.3	2.3	2.0
Decanoic acid	94.7	3.2	3.4	72.3*	2.2	3.4
Geranic acid	89.0	5.0	3.7	81.3	2.8	4.3
Menthallactone	92.9*	5.7	4.3	73.5	2.0	1.5
$\gamma$ -dodecalactone	82.7	5.3	4.0	82.3	2.4	2.6
Zingerone	83.1	3.7	4.8	87.1	3.0	4.2

\*Compounds where recovery is improved by increasing the split (1:150)

**Table S3.** repeatability of the accelerated aging treatment of two different Gewürztraminer wines (A, B) kept for 4 days at T equal to 40 °C and then analyzed following the validated SPE-GC-MS/MS method.

	Gewürztraminer A (40°C 4 days)								Gewürztraminer B (40°C 4 days)							
	GW A1	GW A2	GW A3	GW A4	GW A5				GW B1	GW B2	GW B3	GW B4	GW B5			
Compounds						<i>mean</i>	<i>Std dev.</i>	<i>cv%</i>						<i>mean</i>	<i>Std dev.</i>	<i>cv%</i>
isobutyl acetate	58.3	56.2	55.5	55.5	56.8	56.5	1.2	2.1	46.9	46.5	46.7	46.7	46.6	46.7	0.2	0.3
ethyl butyrate	551	516	514	510	522	523	16.4	3.1	459	461	455	459	458	458	2.3	0.5
ethyl 2-methylbutyrate	3.7	3.4	3.4	3.4	3.5	3.5	0.1	3.4	3.4	3.4	3.3	3.3	3.3	3.3	0.0	0.9
ethyl isovalerate	6.4	6.0	6.0	5.9	6.1	6.1	0.2	3.2	6.3	6.3	6.2	6.2	6.2	6.2	0.0	0.6
butyl acetate	189	179	188	176	183	183	5.6	3.0	178.3	177.6	173.4	180.0	176.7	177.2	2.4	1.4
ethyl valerate	1.7	1.6	1.6	1.6	1.6	1.6	0.1	3.7	1.4	1.4	1.4	1.4	1.4	1.4	0.0	0.9
1,8-cineole	n.d.	n.d.	n.d.	n.d.	n.d.				0.008	0.010	0.011	0.009	0.007	0.009	0.001	16.2
ethyl capronate	647	595	604	592	599	607	22.6	3.7	528	530	523	525	525	526	2.8	0.5
hexyl acetate	36.0	32.7	33.0	32.9	32.9	33.5	1.4	4.2	28.3	28.3	28.1	28.0	28.0	28.1	0.1	0.5
ethyl heptanoate	1.9	1.8	1.8	1.8	1.8	1.8	0.1	4.1	1.5	1.5	1.5	1.5	1.5	1.5	0.0	0.9
cis rose oxide	5.5	5.0	5.0	5.0	5.0	5.1	0.2	4.3	5.1	5.2	5.1	5.0	5.1	5.1	0.1	1.1
trans-3-Hexen-1-ol	42.7	39.6	39.1	39.2	40.3	40.2	1.5	3.7	39.3	39.1	38.9	39.5	39.1	39.2	0.2	0.6
trans rose oxide	1.2	1.1	1.1	1.1	1.1	1.1	0.0	4.5	0.9	0.8	0.8	0.8	0.8	0.8	0.0	1.3
cis-3-Hexen-1-ol	19.6	18.1	18.0	18.1	18.3	18.4	0.7	3.5	18.0	17.7	17.7	18.1	17.9	17.9	0.2	0.9
ethyl caprylate	838	753	808	780	777	791	32.6	4.1	669	665	647	648	660	658	9.7	1.5
furfurylthiol	3.9	3.9	3.9	3.9	3.9	3.9	0.0	0.3	3.9	3.9	3.9	3.9	3.9	3.9	0.0	0.3
linalool oxide A	13.7	12.6	11.9	12.8	12.4	12.7	0.7	5.4	17.4	17.7	17.0	16.5	16.9	17.1	0.4	2.5
linalool oxide B	8.0	7.3	6.9	7.4	7.1	7.4	0.4	5.6	9.9	10.3	9.9	9.3	9.8	9.8	0.3	3.5
benzaldehyde	16.1	14.5	15.0	14.7	14.9	15.0	0.6	4.2	15.4	16.1	15.4	15.7	15.0	15.5	0.4	2.6
linalool	169	156	152	156	153	157	6.9	4.4	197	197	195	194	194	196	1.7	0.9
ethyl leucate	24.2	22.3	21.7	22.6	22.3	22.6	1.0	4.2	25.7	25.7	25.4	25.3	25.4	25.5	0.2	0.7
terpinen-4-ol	1.7	1.3	1.4	1.5	1.4	1.5	0.1	9.2	1.8	1.9	2.0	1.9	1.8	1.9	0.1	3.8
ethyl caprate	262	242	284	262	266	263	14.9	5.6	213	212	201	201	209	207	5.9	2.9
benzylmercaptan	2.4	2.4	2.4	2.4	2.4	2.4	0.0	0.1	2.4	2.4	2.4	2.4	2.4	2.4	0.0	0.1
phenylacetaldehyde	5.7	4.7	4.5	3.9	4.0	4.6	0.7	15.8	3.4	4.3	3.9	3.9	4.1	3.9	0.3	8.3
safranal	0.2	0.2	0.2	0.2	0.2	0.2	0.0	4.0	0.2	0.2	0.2	0.2	0.2	0.2	0.0	2.6
diethyl succinate	1158	1074	1104	1072	1068	1095	37.7	3.4	1085	1089	1060	1087	1085	1081	12.0	1.1
α-terpineol	53	49	48	49	48	50	2.1	4.3	66	66	65	64	65	66	0.8	1.2
valeric acid	25.1	23.7	24.6	22.8	24.1	24.1	0.9	3.7	23.6	23.0	24.5	24.0	23.9	23.8	0.5	2.3
β-citronellol	170	155	154	158	154	158	6.6	4.2	151	149	145	147	148	148	2.3	1.6
TDN	1.0	0.9	0.8	1.0	0.9	0.9	0.1	8.0	1.8	2.0	1.7	1.4	1.7	1.7	0.2	13.1

	Gewürztraminer A (40°C 4 days)								Gewürztraminer B (40°C 4 days)							
	GW A1	GW A2	GW A3	GW A4	GW A5				GW B1	GW B2	GW B3	GW B4	GW B5			
Compounds						<i>mean</i>	<i>Std dev.</i>	<i>cv%</i>						<i>mean</i>	<i>Std dev.</i>	<i>cv%</i>
nerol	86.2	79.4	77.6	81.5	76.8	80.3	3.8	4.7	65.1	63.5	64.8	61.8	62.9	63.6	1.4	2.1
ethyl phenylacetate	4.0	3.6	3.6	3.7	3.6	3.7	0.2	4.3	4.1	4.1	4.1	4.0	4.0	4.1	0.0	1.0
methyl salicylate	2.1	1.9	1.8	1.9	1.8	1.9	0.1	7.2	2.0	2.0	1.9	1.8	1.9	1.9	0.1	3.7
phenylethyl acetate	125	114	114	116	113	116	4.8	4.1	113	112	111	110	111	112	1.0	0.9
β-damascenone	3.6	3.2	3.2	3.2	3.2	3.3	0.2	5.7	4.4	4.4	4.2	4.2	4.4	4.3	0.1	2.3
ethyl laurate	8.0	7.9	10.1	9.1	9.2	8.9	0.9	10.5	9.1	8.2	8.5	9.2	8.3	8.7	0.5	5.3
geraniol	323	304	307	308	307	310	7.3	2.4	265	270	262	264	269	266	3.6	1.3
guaiacol	0.6	0.6	0.6	0.5	0.5	0.6	0.0	6.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	3.7
benzyl alcohol	104	95	96	95	95	97	3.8	3.9	95.9	94.2	93.3	95.2	94.2	94.6	1.0	1.1
trans-whiskey lactone	0.2	0.1	0.1	0.2	0.2	0.2	0.0	14.1	0.1	0.2	0.2	0.2	0.2	0.2	0.0	11.8
cis-whiskey lactone	0.4	0.3	0.3	0.3	0.3	0.3	0.0	11.6	0.4	0.3	0.3	0.4	0.3	0.3	0.0	12.3
4-ethyl guaiaicol	0.2	0.2	0.2	0.2	0.2	0.2	0.01	3.1	0.2	0.2	0.2	0.2	0.2	0.2	0.0	4.1
γ-nonalactone	11.3	10.5	10.6	10.7	10.6	10.7	0.3	3.0	10.7	11.1	10.9	11.1	11.0	11.0	0.1	1.3
octanoic acid	4415	4011	4301	3966	4021	4143	201.6	4.9	4005	4036	3819	4042	4012	3983	93.0	2.3
ethyl cinnamate	1.7	1.6	1.6	1.6	1.6	1.6	0.1	3.8	1.6	1.6	1.6	1.6	1.6	1.6	0.0	0.9
γ-decalactone	1.5	1.5	1.5	1.5	1.4	1.5	0.0	2.2	1.5	1.4	1.5	1.5	1.4	1.5	0.1	3.8
4-ethyl-phenol	0.5	0.5	0.5	0.5	0.5	0.5	0.0	6.2	0.5	0.5	0.5	0.5	0.5	0.5	0.0	4.5
eugenol	8.6	8.0	7.6	8.1	7.9	8.0	0.3	4.2	8.0	7.9	7.8	7.7	8.0	7.9	0.1	1.6
4-vinylguaiaicol	1017	951	957	962	947	967	28.6	3.0	912	906	896	896	905	903	7.0	0.8
δ-decalactone	7.4	6.4	6.3	6.6	6.3	6.6	0.4	6.7	8.2	8.4	7.9	7.5	8.4	8.1	0.4	4.7
2-aminoacetophenone	0.1	0.1	0.1	0.1	0.1	0.1	0.01	8.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	7.2
decanoic acid	2001	1773	1862	1888	1860	1877	82.0	4.4	1901	1850	1847	1875	1889	1872	23.6	1.3
geranic acid	804	740	739	749	733	753	29.1	3.9	760	739	744	730	746	744	11.0	1.5
γ-dodecalactone	21.1	20.0	18.5	15.7	20.5	19.2	2.2	11.2	19.9	19.6	19.3	14.0	19.4	18.4	2.5	13.4
zingerone	24.5	22.2	21.9	22.6	22.6	22.8	1.0	4.6	22.1	21.8	21.8	22.5	21.8	22.0	0.3	1.4

**Table S4.** Descriptive statistics of the measured volatile compounds and one-way Anova analysis and post-hoc test results for the Gewürztraminer wines.

Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
isobutyl acetate	control (t0)	7	46.15	9.79	13.06	<.001	a
	2.5 weeks (t1)	7	30.83	6.70			b
	5 weeks (t2)	7	24.85	7.30			b
ethyl butyrate	control (t0)	7	393.66	73.50	0.07	0.93	a
	2.5 weeks (t1)	7	402.39	43.76			a
	5 weeks (t2)	7	391.90	47.97			a
ethyl 2-methylbutyrate	control (t0)	7	9.77	4.74	6.22	0.01	a
	2.5 weeks (t1)	7	21.22	9.28			b
	5 weeks (t2)	7	26.20	11.44			b
ethyl isovalerate	control (t0)	7	19.15	10.36	6.01	0.01	a
	2.5 weeks (t1)	7	43.71	20.19			b
	5 weeks (t2)	7	54.00	24.58			b
butyl acetate	control (t0)	7	2.56	1.66	4.78	0.02	a
	2.5 weeks (t1)	7	1.33	0.77			ab
	5 weeks (t2)	7	0.82	0.37			b
ethyl valerate	control (t0)	7	1.64	0.40	0.39	0.68	a
	2.5 weeks (t1)	7	1.81	0.42			a
	5 weeks (t2)	7	1.79	0.36			a
1,8-cineole	control (t0)	7	0.04	0.02	15.83	<.001	a
	2.5 weeks (t1)	7	2.20	1.10			b
	5 weeks (t2)	7	3.57	1.73			b
ethyl capronate	control (t0)	7	791.56	135.67	6.51	0.01	a
	2.5 weeks (t1)	7	627.62	81.73			b
	5 weeks (t2)	7	592.29	106.82			b
ethyl capronate	control (t0)	7	780.97	153.35	4.66	0.02	a
	2.5 weeks (t1)	7	625.96	97.12			ab
	5 weeks (t2)	7	585.61	122.52			a
hexyl acetate	control (t0)	7	71.55	46.09	8.15	0.00	a
	2.5 weeks (t1)	7	26.30	13.01			b
	5 weeks (t2)	7	14.09	8.28			b
ethyl heptanoate	control (t0)	7	1.20	0.35	5.64	0.01	a
	2.5 weeks (t1)	7	0.85	0.26			b
	5 weeks (t2)	7	0.75	0.17			b
1-hexanol	control (t0)	7	1335.66	232.54	0.12	0.89	a
	2.5 weeks (t1)	7	1394.51	312.85			a
	5 weeks (t2)	7	1406.93	322.72			a
<i>cis</i> rose oxide	control (t0)	7	4.20	1.38	1.95	0.17	a
	2.5 weeks (t1)	7	3.38	1.32			a
	5 weeks (t2)	7	2.87	1.11			a
<i>trans</i> -3-hexen-1-ol	control (t0)	7	73.41	34.06	0.18	0.83	a
	2.5 weeks (t1)	7	67.15	27.67			a
	5 weeks (t2)	7	63.88	27.25			a
<i>trans</i> rose oxide	control (t0)	7	0.60	0.30	5.77	0.01	a
	2.5 weeks (t1)	7	0.32	0.11			b
	5 weeks (t2)	7	0.28	0.09			b
<i>cis</i> -3-hexen-1-ol	control (t0)	7	33.87	19.17	0.08	0.92	a
	2.5 weeks (t1)	7	31.11	17.12			a
	5 weeks (t2)	7	30.15	16.81			a
ethyl caprylate	control (t0)	7	821.61	152.47	51.41	<.001	a
	2.5 weeks (t1)	7	346.53	56.29			b
	5 weeks (t2)	7	305.86	84.70			b
linalool oxide A	control (t0)	7	17.34	4.35	65.47	<.001	a
	2.5 weeks (t1)	7	171.92	35.63			b
	5 weeks (t2)	7	228.77	50.51			c
linalool oxide B	control (t0)	7	8.89	1.78	69.47	<.001	a
	2.5 weeks (t1)	7	102.64	21.24			b
	5 weeks (t2)	7	135.69	29.21			c
benzaldehyde	control (t0)	7	3.67	2.06	6.76	0.01	a
	2.5 weeks (t1)	7	8.32	3.90			b
	5 weeks (t2)	7	10.91	4.73			b
linalool	control (t0)	7	214.83	110.40	11.58	<.001	a



Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
	2.5 weeks (t1)	7	84.68	37.73			b
	5 weeks (t2)	7	44.59	27.41			b
ethyl leuc ate	control (t0)	7	50.97	15.77	8.94	0.00	a
	2.5 weeks (t1)	7	88.02	23.54			b
	5 weeks (t2)	7	99.97	27.03			b
terpinen-4-ol	control (t0)	7	2.47	0.60	34.02	<.001	a
	2.5 weeks (t1)	7	8.28	1.61			b
	5 weeks (t2)	7	7.40	1.76			b
ethyl caprate	control (t0)	7	171.99	57.81	38.79	<.001	a
	2.5 weeks (t1)	7	35.04	13.16			b
	5 weeks (t2)	7	25.63	10.87			b
phenylacetaldehyde	control (t0)	7	19.62	5.00	7.43	0.00	a
	2.5 weeks (t1)	7	17.00	3.32			b
	5 weeks (t2)	7	32.38	12.46			b
safranal	control (t0)	7	0.14	0.01	126.53	<.001	a
	2.5 weeks (t1)	7	0.89	0.13			b
	5 weeks (t2)	7	1.13	0.16			c
diethyl succinate	control (t0)	7	3601.42	1693.79	17.08	<.001	a
	2.5 weeks (t1)	7	6777.60	1658.75			b
	5 weeks (t2)	7	9009.75	1860.68			c
α-terpineol	control (t0)	7	90.14	36.59	20.13	<.001	a
	2.5 weeks (t1)	7	319.94	90.05			b
	5 weeks (t2)	7	294.31	84.25			b
valeric acid	control (t0)	7	24.44	4.34	0.66	0.53	a
	2.5 weeks (t1)	7	24.35	2.67			a
	5 weeks (t2)	7	22.55	3.11			a
β-citronellol	control (t0)	7	69.38	31.32	12.44	<.001	a
	2.5 weeks (t1)	7	25.49	17.25			b
	5 weeks (t2)	7	15.47	10.45			b
TDN	control (t0)	7	0.87	0.30	25.51	<.001	a
	2.5 weeks (t1)	7	13.19	4.75			b
	5 weeks (t2)	7	13.35	4.42			b
ethyl phenylacetate	control (t0)	7	7.41	1.90	14.97	<.001	a
	2.5 weeks (t1)	7	13.71	3.34			b
	5 weeks (t2)	7	16.37	3.87			b
methyl salicylate	control (t0)	7	1.15	0.46	3.70	0.05	a
	2.5 weeks (t1)	7	1.86	0.61			a
	5 weeks (t2)	7	1.74	0.48			a
nerol	control (t0)	7	66.66	65.18	6.48	0.01	a
	2.5 weeks (t1)	7	6.11	5.29			b
	5 weeks (t2)	7	1.52	2.60			b
phenylethyl acetate	control (t0)	7	221.58	75.64	15.76	<.001	a
	2.5 weeks (t1)	7	114.09	32.53			b
	5 weeks (t2)	7	80.15	22.05			b
β-damascenone	control (t0)	7	2.39	0.54	4.60	0.02	a
	2.5 weeks (t1)	7	3.32	0.89			ab
	5 weeks (t2)	7	3.56	0.81			b
ethyl laurate	control (t0)	7	2.50	1.81	13.35	<.001	a
	2.5 weeks (t1)	7	n.d. <sup>#</sup>				b
	5 weeks (t2)	7	n.d. <sup>#</sup>				b
geraniol	control (t0)	7	166.18	138.86	8.17	0.00	a
	2.5 weeks (t1)	7	20.40	9.46			b
	5 weeks (t2)	7	11.23	6.90			b
guaiacol	control (t0)	7	0.92	0.49	6.37	0.01	a
	2.5 weeks (t1)	7	1.99	0.58			b
	5 weeks (t2)	7	2.43	1.19			b
benzyl alcohol	control (t0)	7	127.25	43.31	0.25	0.78	a
	2.5 weeks (t1)	7	113.89	33.86			a
	5 weeks (t2)	7	116.98	32.25			a
<i>trans</i> -whiskey lactone	control (t0)	7	0.34	0.40	4.99	0.02	a
	2.5 weeks (t1)	7	n.d. <sup>#</sup>				b
	5 weeks (t2)	7	n.d. <sup>#</sup>				b
γ-octalactone	control (t0)	7	1.68	0.75	14.55	<.001	a
	2.5 weeks (t1)	7	3.96	1.25			b
	5 weeks (t2)	7	1.29	0.93			b

Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
β-ionone	control (t0)	7	0.01	0.01	0.50	0.61	a
	2.5 weeks (t1)	7	0.01	0.02			a
	5 weeks (t2)	7	n.d. <sup>#</sup>				a
cis-whiskey lactone	control (t0)	7	0.61	0.61	1.51	0.25	a
	2.5 weeks (t1)	7	0.32	0.55			a
	5 weeks (t2)	7	1.86	2.93			a
benzothiazole	control (t0)	7	0.22	0.17	12.05	<.001	a
	2.5 weeks (t1)	7	0.72	0.14			b
	5 weeks (t2)	7	0.85	0.38			b
4-ethyl guaiacol	control (t0)	7	0.28	0.13	1.16	0.34	a
	2.5 weeks (t1)	7	0.30	0.13			a
	5 weeks (t2)	7	0.39	0.14			a
γ-nonolactone	control (t0)	7	8.79	4.35	0.26	0.77	a
	2.5 weeks (t1)	7	8.29	4.04			a
	5 weeks (t2)	7	9.93	4.66			a
octanoic acid	control (t0)	7	7576.39	1572.40	0.85	0.44	a
	2.5 weeks (t1)	7	8691.09	1856.72			a
	5 weeks (t2)	7	7807.36	1618.77			a
ethyl cinnamate	control (t0)	7	0.90	0.26	2.41	0.12	a
	2.5 weeks (t1)	7	0.68	0.20			a
	5 weeks (t2)	7	0.68	0.17			a
nonanoic acid	control (t0)	7	49.34	13.25	25.21	<.001	a
	2.5 weeks (t1)	7	87.77	14.45			b
	5 weeks (t2)	7	93.16	9.56			b
γ-decalactone	control (t0)	7	1.63	0.46	0.03	0.97	a
	2.5 weeks (t1)	7	1.65	0.40			a
	5 weeks (t2)	7	1.59	0.35			a
4-ethyl-phenol	control (t0)	7	0.39	0.24	2.33	0.13	a
	2.5 weeks (t1)	7	0.64	0.26			a
	5 weeks (t2)	7	0.68	0.31			a
eugenol	control (t0)	7	5.28	1.38	0.92	0.42	a
	2.5 weeks (t1)	7	6.07	1.23			a
	5 weeks (t2)	7	6.12	1.29			a
4-vinylguaiacol	control (t0)	7	700.24	231.39	16.18	<.001	a
	2.5 weeks (t1)	7	329.56	64.24			b
	5 weeks (t2)	7	307.97	73.73			b
δ-decalactone	control (t0)	7	7.95	1.73	23.59	<.001	a
	2.5 weeks (t1)	7	18.66	3.53			b
	5 weeks (t2)	7	17.79	4.01			b
2-aminoacetophenone	control (t0)	7	0.23	0.04	9.29	0.00	a
	2.5 weeks (t1)	7	0.43	0.12			ab
	5 weeks (t2)	7	0.62	0.26			b
decanoic acid	control (t0)	7	1978.96	743.38	0.22	0.81	a
	2.5 weeks (t1)	7	2212.56	885.89			a
	5 weeks (t2)	7	1964.76	727.51			a
geranic acid	control (t0)	7	352.73	136.06	1.46	0.26	a
	2.5 weeks (t1)	7	451.49	89.15			a
	5 weeks (t2)	7	397.14	94.10			a
γ-dodecalactone	control (t0)	7	51.93	39.39	0.46	0.64	a
	2.5 weeks (t1)	7	37.64	33.87			a
	5 weeks (t2)	7	37.36	22.42			a
zingerone	control (t0)	7	24.37	6.21	0.73	0.50	a
	2.5 weeks (t1)	7	27.99	6.12			a
	5 weeks (t2)	7	27.79	6.61			a

\*Means within conditions that do not share a letter are significantly different (significance value below 0,05). #n.d: not detected (was considered zero for the Anova).

**Table S5.** Descriptive statistics of the measured volatile compounds and one-way Anova analysis results for the Teroldego wines.

Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
isobutyl acetate	control (t0)	7	57.09	2.93	0.12	0.89	a
	2.5 weeks (t1)	7	56.44	6.87			a
	5 weeks (t2)	7	58.07	8.20			a
ethyl butyrate	control (t0)	7	182.22	38.92	0.31	0.74	a
	2.5 weeks (t1)	7	191.12	42.55			a
	5 weeks (t2)	7	199.58	43.03			a
ethyl 2-methylbutyrate	control (t0)	7	13.41	5.49	6.23	0.01	a
	2.5 weeks (t1)	7	23.06	8.94			ab
	5 weeks (t2)	7	29.99	11.12			b
ethyl isovalerate	control (t0)	7	21.66	6.74	10.89	<.001	a
	2.5 weeks (t1)	7	38.28	11.43			b
	5 weeks (t2)	7	49.74	14.43			b
butyl acetate	control (t0)	7	1.43	0.38	0.25	0.78	a
	2.5 weeks (t1)	7	1.27	0.46			a
	5 weeks (t2)	7	1.29	0.51			a
isopentyl acetate	control (t0)	7	931.22	234.89	13.97	<.001	a
	2.5 weeks (t1)	7	606.01	99.56			b
	5 weeks (t2)	7	526.56	63.45			b
ethyl valerate	control (t0)	7	1.41	0.92	0.02	0.98	a
	2.5 weeks (t1)	7	1.38	0.89			a
	5 weeks (t2)	7	1.48	0.91			a
1,8-cineole	control (t0)	7	0.02	0.02	22.91	<.001	a
	2.5 weeks (t1)	7	0.05	0.02			b
	5 weeks (t2)	7	0.09	0.02			c
ethyl capronate	control (t0)	7	258.90	50.06	7.33	0.01	a
	2.5 weeks (t1)	7	192.08	29.14			b
	5 weeks (t2)	7	195.91	26.06			b
hexyl acetate	control (t0)	7	10.46	6.01	4.02	0.04	a
	2.5 weeks (t1)	7	6.96	3.68			ab
	5 weeks (t2)	7	4.13	1.69			b
ethyl heptanoate	control (t0)	7	0.80	0.27	7.30	0.01	a
	2.5 weeks (t1)	7	0.47	0.15			b
	5 weeks (t2)	7	0.47	0.13			b
<i>trans</i> -3-Hexen-1-ol	control (t0)	7	36.41	13.04	0.24	0.79	a
	2.5 weeks (t1)	7	33.13	11.51			a
	5 weeks (t2)	7	32.27	11.04			a
<i>cis</i> -3-Hexen-1-ol	control (t0)	7	145.56	52.57	0.30	0.74	a
	2.5 weeks (t1)	7	130.04	42.82			a
	5 weeks (t2)	7	128.07	41.85			a
ethyl caprylate	control (t0)	7	267.43	63.98	50.58	<.001	a
	2.5 weeks (t1)	7	89.76	14.10			b
	5 weeks (t2)	7	85.23	13.81			b
linalool oxide A	control (t0)	7	4.18	2.98	11.22	<.001	a
	2.5 weeks (t1)	7	11.73	4.65			b
	5 weeks (t2)	7	14.65	4.91			b
linalool oxide B	control (t0)	7	2.33	1.65	12.04	<.001	a
	2.5 weeks (t1)	7	6.78	2.64			b
	5 weeks (t2)	7	8.43	2.77			b
benzaldehyde	control (t0)	7	11.51	8.36	0.09	0.92	a
	2.5 weeks (t1)	7	13.66	11.58			a
	5 weeks (t2)	7	13.45	11.21			a
linalool	control (t0)	7	11.88	1.40	99.44	<.001	a
	2.5 weeks (t1)	7	4.66	1.41			b
	5 weeks (t2)	7	2.94	0.90			c
ethyl leuc ate	control (t0)	7	99.79	27.80	2.71	0.09	a
	2.5 weeks (t1)	7	126.16	27.80			a
	5 weeks (t2)	7	133.57	29.93			a
terpinen-4-ol	control (t0)	7	0.67	0.59	0.06	0.94	a
	2.5 weeks (t1)	7	0.64	0.45			a
	5 weeks (t2)	7	0.58	0.34			a

Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
ethyl caprate	control (t0)	7	57.14	32.92	16.66	<.001	a
	2.5 weeks (t1)	7	6.34	3.96			b
	5 weeks (t2)	7	5.27	2.81			b
phenylacetaldehyde	control (t0)	7	30.42	5.29	4.24	0.03	a
	2.5 weeks (t1)	7	47.35	15.69			ab
	5 weeks (t2)	7	43.23	10.57			b
safranal	control (t0)	7	0.14	0.01	268.33	<.001	a
	2.5 weeks (t1)	7	0.77	0.07			b
	5 weeks (t2)	7	0.99	0.10			c
α-terpineol	control (t0)	7	4.87	1.22	70.47	<.001	a
	2.5 weeks (t1)	7	12.32	1.27			b
	5 weeks (t2)	7	12.41	1.58			b
valeric acid	control (t0)	7	18.05	6.81	0.14	0.87	a
	2.5 weeks (t1)	7	20.32	8.74			a
	5 weeks (t2)	7	19.03	8.36			a
β-citronellol	control (t0)	7	16.69	4.75	22.98	<.001	a
	2.5 weeks (t1)	7	8.74	2.55			b
	5 weeks (t2)	7	4.95	1.93			b
TDN	control (t0)	7	0.36	0.18	27.84	<.001	a
	2.5 weeks (t1)	7	4.37	1.82			b
	5 weeks (t2)	7	5.84	1.64			b
ethyl phenylacetate	control (t0)	7	9.24	2.56	6.81	0.01	a
	2.5 weeks (t1)	7	13.55	3.56			ab
	5 weeks (t2)	7	16.18	4.31			b
methyl salicylate	control (t0)	7	3.25	1.65	0.03	0.97	a
	2.5 weeks (t1)	7	3.46	1.64			a
	5 weeks (t2)	7	3.43	1.65			a
nerol	control (t0)	7	4.34	3.32	12.00	<.001	a
	2.5 weeks (t1)	7	n.d. <sup>#</sup>				b
	5 weeks (t2)	7	n.d. <sup>#</sup>				b
phenylethyl acetate	control (t0)	7	119.77	49.75	3.06	0.07	a
	2.5 weeks (t1)	7	84.76	27.76			a
	5 weeks (t2)	7	75.66	21.76			a
β-damascenone	control (t0)	7	2.41	0.41	8.57	0.00	a
	2.5 weeks (t1)	7	3.52	0.73			b
	5 weeks (t2)	7	3.67	0.68			b
ethyl laurate	control (t0)	7	1.37	0.60	35.80	<.001	a
	2.5 weeks (t1)	7	n.d. <sup>#</sup>				b
	5 weeks (t2)	7	n.d. <sup>#</sup>				b
geraniol	control (t0)	7	6.88	2.57	28.78	<.001	a
	2.5 weeks (t1)	7	1.82	0.64			b
	5 weeks (t2)	7	0.95	0.68			b
guaiacol	control (t0)	7	5.21	2.24	30.67	<.001	a
	2.5 weeks (t1)	7	19.77	4.99			b
	5 weeks (t2)	7	25.32	6.63			b
benzyl alcohol	control (t0)	7	218.86	113.95	0.02	0.98	a
	2.5 weeks (t1)	7	207.95	106.24			a
	5 weeks (t2)	7	216.21	108.05			a
trans-whiskey lactone	control (t0)	7	6.59	8.33	0.00	1.00	a
	2.5 weeks (t1)	7	6.50	8.24			a
	5 weeks (t2)	7	6.73	8.50			a
γ-octalactone	control (t0)	7	0.76	0.16	2.54	0.11	a
	2.5 weeks (t1)	7	1.00	0.25			a
	5 weeks (t2)	7	0.96	0.21			a
β-ionone	control (t0)	7	0.13	0.05	2.57	0.10	a
	2.5 weeks (t1)	7	0.10	0.03			a
	5 weeks (t2)	7	0.09	0.02			a
cis-whiskey lactone	control (t0)	7	14.26	20.59	0.00	1.00	a
	2.5 weeks (t1)	7	14.12	20.28			a
	5 weeks (t2)	7	14.47	20.91			a
benzothiazole	control (t0)	7	0.48	0.52	1.88	0.18	a
	2.5 weeks (t1)	7	0.96	0.52			a
	5 weeks (t2)	7	0.91	0.52			a
4-ethyl guaiacol	control (t0)	7	2.42	3.63	0.00	1.00	a
	2.5 weeks (t1)	7	2.53	3.78			a

Compound	Condition	Number of samples	Mean (µg/L)	Std. Deviation (µg/L)	F	Significance	Post Hoc Tests*
γ-nonalactone	5 weeks (t2)	7	2.60	3.87	0.37	0.70	a
	control (t0)	7	8.49	3.67			a
	2.5 weeks (t1)	7	9.61	4.09			a
	5 weeks (t2)	7	10.34	4.41			a
octanoic acid	control (t0)	7	2311.98	490.36	1.20	0.32	a
	2.5 weeks (t1)	7	2697.27	463.49			a
	5 weeks (t2)	7	2446.87	460.68			a
ethyl cinnamate	control (t0)	7	0.94	0.49	0.48	0.63	a
	2.5 weeks (t1)	7	0.72	0.43			a
	5 weeks (t2)	7	0.77	0.41			a
nonanoic acid	control (t0)	7	85.52	15.14	3.01	0.08	a
	2.5 weeks (t1)	7	102.42	15.33			a
	5 weeks (t2)	7	101.30	12.61			a
γ-decalactone	control (t0)	7	0.79	0.29	0.11	0.89	a
	2.5 weeks (t1)	7	0.74	0.22			a
	5 weeks (t2)	7	0.73	0.25			a
4-ethyl-phenol	control (t0)	7	35.76	69.53	0.00	1.00	a
	2.5 weeks (t1)	7	38.56	74.95			a
	5 weeks (t2)	7	37.10	72.00			a
eugenol	control (t0)	7	5.67	3.03	0.11	0.90	a
	2.5 weeks (t1)	7	6.28	3.22			a
	5 weeks (t2)	7	6.41	3.25			a
4-vinylguaiacol	control (t0)	7	7.30	2.08	29.44	<.001	a
	2.5 weeks (t1)	7	12.91	2.62			b
	5 weeks (t2)	7	17.16	2.49			c
δ-decalactone	control (t0)	7	6.79	1.04	4.24	0.03	a
	2.5 weeks (t1)	7	8.35	1.98			ab
	5 weeks (t2)	7	9.55	2.12			b
2-aminoacetophenone	control (t0)	7	0.27	0.06	7.24	0.01	a
	2.5 weeks (t1)	7	0.22	0.01			b
	5 weeks (t2)	7	0.19	0.03			b
decanoic acid	control (t0)	7	701.71	304.99	0.08	0.93	a
	2.5 weeks (t1)	7	701.40	304.63			a
	5 weeks (t2)	7	648.00	270.72			a
geranic acid	control (t0)	7	34.98	4.22	3.94	0.04	a
	2.5 weeks (t1)	7	39.45	4.39			ab
	5 weeks (t2)	7	33.56	3.64			b
γ-dodecalactone	control (t0)	7	29.43	6.61	7.69	0.00	a
	2.5 weeks (t1)	7	18.18	5.00			b
	5 weeks (t2)	7	19.67	5.77			b
zingerone	control (t0)	7	1.03	0.70	0.23	0.80	a
	2.5 weeks (t1)	7	0.84	0.47			a
	5 weeks (t2)	7	0.88	0.46			a

\*Means within conditions that do not share a letter are significantly different (significance value below 0,05). #n.d: not detected (was considered zero for the Anova).

**Table S6:** basic enological analysis of commercial wines used for accelerating aging

Wine	Cultivar	pH	Total acidity (g/L)	Volatile acidity (g/L)	Alcool (%)	Sugars (g/L)
G1	Gewürztraminer	3.4	6.17	0.3	14.68	8.84
G2	Gewürztraminer	3.7	5.27	0.41	15.27	7.52
G3	Gewürztraminer	3.7	5.43	0.22	14	4.3
G4	Gewürztraminer	3.6	5.64	0.51	14.63	4.43
G5	Gewürztraminer	3.7	5.95	0.18	14.33	6.38
G6	Gewürztraminer	3.9	5.77	0.2	15.42	9.43
G7	Gewürztraminer	3.7	5.21	0.21	15.08	5.55
T1	Teroldego	3.9	5.63	0.3	12.56	2.9
T2	Teroldego	4.0	5.37	0.36	12.71	4.64
T3	Teroldego	3.9	5.59	0.33	13.47	2.59
T4	Teroldego	3.9	5.64	0.38	12.82	2.12
T5	Teroldego	4.1	5.14	0.57	13.06	3.1
T6	Teroldego	3.8	6.18	0.38	13.17	0.51
T7	Teroldego	3.9	5.44	0.39	13.34	0.76