

Table S 1 Relative contents of volatile compounds of grape wines from different varieties using HS-SPME-GC-MS.

No.	Compound	Relative time	Relative content (%)																
			Cabernet Sauvignon-A	Cabernet Sauvignon-B	Cabernet Sauvignon-C	Cabernet Sauvignon-D	Cabernet Sauvignon-E	Cabernet Gernischt-A	Cabernet Gernischt-B	Shiraz-A	Shiraz-B	Merlot-A	Merlot-B	Merlot-C	Merlot-D	Pinot Noir-A	Pinot Noir-B	Tempranillo	Chardonnay
	Alcohols	Total content	58.16	28.84	39.03	55.96	40.35	51.13	38.08	44.46	21.92	75.44	74.61	19.70	35.14	35.76	32.26	66.57	6.44
1	1-Butanol, 3-methyl-	4.184	50.48±8.01b	-	1.75±0.19e	46.50±6.29b	1.69±0.42e	46.04±7.16b	7.88±1.15e	36.18±6.02c	2.54±0.48e	67.38±7.17a	64.37±8.23a	-	-	26.41±5.29d	27.54±6.74cd	62.19±7.95a	-
2	2,3-Butanediol	5.778	-	3.73±0.72ab	-	-	-	-	5.32±2.18a	-	2.22±0.80bc	-	-	1.18±0.55cd	2.78±0.78bc	-	0.18±0.09d	-	-
3	1-Hexanol	8.965	1.07±0.57c	1.55±0.66c	14.06±2.61a	0.77±0.26c	10.67±2.32b	1.34±0.51c	-	1.94±0.44c	2.14±0.67c	0.29±0.14c	2.08±0.77c	1.85±0.39c	1.19±0.29c	-	0.76±0.26c	-	-
4	1-Propanol, 3-(methylthio)-	13.577	-	0.15±0.07a	-	-	-	-	-	-	-	-	-	-	0.18±0.12a	-	-	-	-
5	Eucalyptol	15.462	-	-	-	-	-	-	-	-	-	-	-	0.53±0.21a	0.61±0.38a	-	-	-	-
6	Benzyl Alcohol	15.850	0.11±0.08de	0.49±0.24bc	0.30±0.19bcde	0.16±0.12de	1.27±0.25a	0.09±0.05de	0.52±0.26b	0.07±0.04e	0.24±0.11bcde	-	0.33±0.18bcde	0.23±0.11cde	0.32±0.12bcde	0.37±0.08bcd	0.13±0.06de	-	-
7	1-Octanol	17.372	-	-	-	-	-	-	-	-	-	-	0.17±0.10a	-	-	0.36±0.25a	0.23±0.14a	-	-
8	Phenylethyl Alcohol	18.960	6.26±1.78d	22.92±5.63a	22.93±7.35a	8.57±2.04cd	27.01±4.68a	3.71±0.61d	24.36±8.12a	6.63±1.59d	14.82±3.98bc	7.77±1.18cd	7.74±2.11cd	15.93±2.51b	30.07±6.08a	8.62±1.63cd	3.20±0.52d	4.18±1.57d	6.44±1.60d
9	1-Nonanol	21.279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13±0.28	-	-
10	1-Undecanol	24.829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06±1.02	-	-
11	Nerolidol	34.146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03±0.02a	0.14±0.08a	-
	Esters	Total content	40.06	70.89	57.81	41.83	44.27	48.33	59.83	54.39	72.86	23.66	23.86	75.50	63.54	62.92	66.86	31.42	70.05
12	Butanoic acid, ethyl ester	6.230	0.46±0.20b	-	-	-	-	0.43±0.15b	-	0.24±0.12b	0.50±0.18b	-	-	0.62±0.22b	0.49±0.14b	0.87±0.24b	0.50±0.17b	3.71±1.43a	-
13	Propanoic acid, 2-hydroxy-, ethyl ester	6.676	2.87±0.40b	-	-	-	-	1.62±0.62bc	-	0.85±0.49c	-	2.07±1.10bc	-	-	-	-	1.42±0.41c	-	4.25±0.97a
14	Ethyl 2-methylbutyrate	8.168	-	-	-	-	-	0.13±0.54a	-	0.11±0.26a	-	-	-	-	-	-	-	-	-
15	Ethyl isovalerate	8.275	0.55±0.25b	-	-	-	-	0.70±0.32b	-	0.64±0.30b	1.68±0.45b	-	-	-	4.25±1.77a	1.40±0.41b	-	-	-
16	Isoamyl acetate	9.262	3.60±0.72a	-	-	-	-	4.35±0.66a	-	2.19±0.39b	-	-	-	-	-	-	2.27±0.46b	-	-
17	Butyrolactone	10.808	-	0.15±0.07bc	0.20±0.14ab	-	-	-	0.20±0.03ab	-	0.37±0.16a	-	-	0.25±0.09ab	0.06±0.04cd	-	0.02±0.01d	-	-

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18	Hexanoic acid, ethyl ester	14.471	10.85±3.46bcd	12.36±2.67bcd	12.55±1.66bcd	8.15±3.05de	8.16±2.48de	12.85±3.87bcd	12.39±2.21bcd	11.26±2.32bcd	18.86±3.01a	1.35±0.33f	-	16.05±5.03ab	15.93±2.69ab	14.16±2.14abc	9.35±2.91cd	3.12±1.12de	8.09±2.97de
19	Acetic acid, hexyl ester	15.047	0.18±0.31a	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11±1.24a	-	-
20	Ethyl hex-2-enoate	16.284	0.06±0.03c	0.58±0.35a	-	0.20±0.08bc	-	0.12±0.10bc	-	0.29±0.09abc	0.39±0.31abc	-	-	0.43±0.22ab	-	0.43±0.14ab	0.12±0.04bc	-	-
21	2-Furancarboxylic acid, ethyl ester	16.503	-	-	-	-	0.38±0.16a	-	-	-	0.09±0.06b	-	0.07±0.14b	0.23±0.23ab	-	-	-	-	-
22	Isoamyl lactate	17.253	-	-	-	-	-	-	0.48±0.16a	0.18±0.08b	-	-	0.14±0.06b	-	-	0.25±0.13b	0.08±0.21b	-	-
23	Ethyl sorbate	18.246	5.81±1.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Heptanoic acid, ethyl ester	18.454	-	-	-	-	-	0.18±0.13a	-	0.31±0.81a	-	-	-	-	-	-	0.21±1.09a	-	-
25	Ethyl methyl succinate	18.756	-	0.13±2.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Octanoic acid, methyl ester	19.436	0.32±0.15a	-	-	-	-	0.20±0.19a	-	0.30±1.37a	-	-	-	-	-	-	0.28±0.66a	-	-
27	Hexanoic acid, 2-methylpropyl ester	20.440	-	-	-	-	-	-	-	0.04±3.21	-	-	-	-	-	-	-	-	-
28	Benzoic acid, ethyl ester	21.136	0.03±0.74a	0.09±0.09a	-	-	-	-	-	0.03±0.69a	-	-	-	-	-	0.12±0.46a	-	-	-
29	Butanedioic acid, diethyl ester	21.630	8.72±4.49de	29.60±9.25a	14.65±3.89bcde	9.49±3.12de	25.20±12.95ab	4.99±0.36de	20.54±11.99abc	7.37±2.90de	20.47±4.05abc	5.41±0.81de	8.43±1.59de	14.16±7.16cde	15.97±3.91bcd	8.72±2.72de	5.19±2.19de	4.14±1.13e	9.24±3.94de
30	Methyl salicylate	21.980	0.32±0.14b	0.51±0.07b	-	-	-	0.13±0.12b	-	-	-	-	1.89±0.87a	0.61±0.26b	0.34±0.16b	2.15±0.70a	0.15±0.13b	-	-
31	Octanoic acid, ethyl ester	22.248	-	24.40±5.60ab	23.94±7.94abc	19.14±5.86abcd	-	21.95±8.85abcd	20.73±5.27abcd	24.47±11.47abc	24.16±5.84abc	8.42±4.83d	9.14±3.14cd	31.95±16.95a	20.65±5.35abcd	26.97±4.97a	32.03±8.74a	11.20±2.78bcd	26.60±7.40a
32	Benzeneacetic acid, ethyl ester	23.830	0.05±0.03fg	0.09±0.14defg	0.19±0.58cd	0.08±1.02defg	0.48±0.71a	0.03±1.21fg	0.19±2.74cd	0.06±0.87efg	0.29±3.57bc	0.03±0.72fg	0.16±1.53de	0.14±1.17def	0.32±3.65b	0.17±0.63d	0.02±1.32g	-	-
33	Isopentyl hexanoate	24.020	-	0.09±1.03ab	-	0.06±0.27b	-	0.06±2.36b	-	0.19±4.51a	-	-	-	0.16±5.14ab	0.10±7.02ab	0.13±3.11ab	0.20±0.56a	-	-
34	Hexanoic acid, 2-methylbutyl ester	24.121	-	-	-	-	-	0.02±2.15a	-	0.06±0.85a	-	-	-	-	-	-	0.05±0.13a	-	-
35	Propanoic acid, 2-phenylethyl ester	24.131	-	-	-	-	-	-	-	-	-	-	0.47±4.58	-	-	-	-	-	-

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36	Acetic acid, 2-phenylethyl ester	24.252	-	-	-	-	-	0.12±1.15b	0.98±0.18a	-	-	0.06±1.78b	-	-	0.98±0.58a	0.57±0.36ab	-	-	-
37	Ethyl salicylate	24.601	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17±5.41	-	-	-
38	Ethyl 2-hydroxybenzoate	24.704	0.06±2.63a	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02±3.12a	-	-
39	Pentanedioic acid, diethyl ester	25.011	-	-	-	-	-	-	-	-	0.10±4.25a	-	-	-	0.13±0.68a	-	-	-	-
40	Propyl octanoate	25.495	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05±6.62	-	-
41	Nonanoic acid, ethyl ester	25.625	0.06±1.02bc	-	-	0.07±2.16bc	-	0.07±0.74bc	0.13±0.54bc	0.07±0.44bc	0.11±3.26bc	0.02±4.21c	-	0.30±0.57a	0.13±2.71bc	0.15±0.63b	0.17±5.74b	-	-
42	Whiskey lactone	26.416	-	-	-	-	-	-	0.11±7.42	-	-	-	-	-	-	-	-	-	-
43	Decanoic acid, methyl ester	26.559	0.04±0.54b	-	-	-	-	0.04±0.85b	-	0.03±0.32b	0.09±3.14b	-	-	0.28±6.51a	-	0.05±4.74b	0.09±2.64b	-	-
44	<i>n</i> -Caprylic acid isobutyl ester	27.338	-	-	-	-	-	0.01±0.25b	-	0.03±0.08b	-	-	-	-	-	-	0.06±0.08a	-	-
45	Ethyl 9-decenoate	28.509	-	-	0.18±2.01b	0.17±1.43b	0.77±3.56a	-	0.14±0.27b	-	0.25±0.62b	-	0.16±5.11b	0.48±0.73ab	0.21±0.43b	0.34±0.17b	-	-	-
46	Decanoic acid, ethyl ester	28.913	6.06±3.06cd	2.89±1.11cd	6.01±3.12cd	4.27±2.73cd	7.35±4.35c	0.09±0.15d	3.90±1.90cd	5.47±3.37cd	5.50±0.81cd	6.24±1.93cd	2.75±1.25cd	8.77±3.77bc	3.06±0.94cd	6.09±2.09cd	13.76±3.12b	6.34±3.09	21.38±9.38
47	Succinic acid, ethyl 3-pentyl ester	29.845	-	-	-	-	1.09±0.41a	-	-	-	-	-	0.56±1.37a	0.89±0.48a	0.58±0.27a	-	-	-	-
48	Isopentyl octanoate	30.489	-	-	-	-	-	0.10±0.14b	-	0.12±0.23ab	-	-	-	-	-	-	0.21±1.57a	-	-
49	Dodecanoic acid, ethyl ester	35.008	-	-	-	0.11±0.19b	0.56±1.25b	0.10±0.13b	-	0.01±0.36b	-	0.06±0.44b	0.03±1.20b	0.11±0.87b	0.25±0.15b	0.13±0.58b	0.45±0.36b	2.49±1.13a	0.42±3.27b
50	Decanoic acid, 3-methylbutyl ester	36.233	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05±6.47	-
51	Tetradecanoic acid, ethyl ester	39.135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09±3.28	-
52	Dibutyl phthalate	40.359	-	-	0.09±1.02b	0.09±5.23b	0.28±0.68a	0.04±0.71b	0.04±1.43b	-	-	-	0.06±3.43b	0.07±0.54b	0.09±2.58b	0.05±8.11b	-	-	-
53	Hexadecanoic acid, methyl	41.144	-	-	-	-	-	-	-	0.07±0.17ab	-	-	-	-	-	-	0.03±0.81b	0.15±0.63a	0.07±0.09ab

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54	ester Hexadecanoic acid, ethyl ester	42.084	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02±1.06b	0.13±0.54a	-
55	Methyl oleate	43.439	0.02±9.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hydrocarbon	Total content	0.40	0.00	0.39	0.17	0.56	0.26	0.25	0.63	2.64	0.37	0.41	1.73	1.07	0.72	0.32	0.33	0.15
56	<i>p</i> -Xylene	8.654	-	-	-	-	-	-	-	-	0.59±2.68	-	-	-	-	-	-	-	-
57	<i>p</i> -Cymene	15.374	0.16±0.37b	-	-	-	-	0.13±0.09b	-	0.15±0.28b	0.66±0.34a	-	0.03±0.14b	0.57±0.43a	0.38±0.17ab	-	0.09±0.74b	-	-
58	<i>S</i> -(-)-Limonene	15.499	0.03±1.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	Benzene, 1,2,4,5-tetramethyl-	20.357	-	-	-	-	-	0.03±0.27	-	-	-	-	-	-	-	-	-	-	-
60	Naphthalene	21.493	-	-	-	-	-	-	-	0.07±0.54a	-	-	-	-	-	-	0.05±0.33a	-	-
61	α -terpinene	23.247	0.04±0.78b	-	0.09±1.02b	-	-	-	-	0.05±1.64b	-	-	-	0.50±3.15a	-	0.07±0.41b	0.03±0.27b	-	-
62	4-Carene	24.341	0.07±0.25a	-	-	-	-	0.03±0.87a	-	0.09±0.07a	-	-	-	-	-	-	-	-	-
63	Bicyclo[2.2.1]hept-2-ene, 1,7,7-trimethyl-	24.567	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06±0.53	-	-
64	Cyclodecane	24.708	-	-	-	-	-	-	-	-	-	-	-	-	0.35±1.25	-	-	-	-
65	Naphthalene, 2-methyl-	25.429	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02±0.42	-	-
66	1,2-Dihydro-1,6-trimethyl-naphthalene	27.486	0.09±0.25d	-	0.30±1.02bcd	0.17±0.41cd	0.56±0.24b	0.07±0.31d	0.25±0.17bcd	0.27±0.81bcd	1.39±0.52a	0.30±0.36bcd	0.34±0.26bcd	0.52±0.66bc	0.34±0.74bcd	0.43±0.62bcd	0.07±0.19d	0.33±0.85bcd	0.15±0.38cd
67	d-Longifolene	29.073	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04±0.65	-	-	-
68	Eicosane	32.101	0.01±0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	l-Calamenene	32.747	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07±0.23	-	-	-
70	1,6-dimethyl-4-propan-2-yl-naphthalene	36.879	-	-	-	-	-	-	-	-	-	-	0.04±0.04a	0.14±0.11a	-	0.03±0.03a	-	-	-
71	1,2,3-trimethyl-4-prop-1-enyl-naphthalene	37.018	-	-	-	-	-	-	-	-	-	0.07±0.31	-	-	-	-	-	-	-

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72	Eicosane, 9-octyl-	37.296	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08±0.11	-	-	-
	Acids	Total content	1.23	0.00	1.03	1.93	7.83	0.14	0.43	0.36	1.78	0.25	0.20	2.77	-	0.16	0.27	0.49	23.24
73	Acetic acid	3.731	-	-	-	-	-	-	-	-	-	-	-	1.61±0.52	-	-	-	-	-
74	Hexanoic acid	14.114	0.24±0.24b	-	-	-	-	0.14±0.08b	-	0.36±0.35b	-	-	-	-	-	-	0.15±0.11b	-	1.88±1.02a
75	Sorbic Acid	18.080	0.99±0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	Octanoic Acid	21.416	-	-	1.03±0.17c	1.62±0.61c	6.46±3.56b	-	-	-	1.78±0.73c	0.25±0.25c	-	0.89±0.38c	-	-	0.12±0.09c	0.49±0.16c	11.78±4.22a
77	Decanoic acid	28.218	-	-	-	0.31±0.25b	1.37±0.49b	-	0.43±0.12b	-	-	-	0.20±0.20b	0.27±0.17b	-	0.16±0.05b	-	-	9.58±4.52a
	Aldehydes and ketones	Total content	0.08	0.28	1.37	0.00	1.42	0.00	0.05	0.04	0.59	0.28	0.33	0.19	-	0.19	0.02	0.00	0.00
78	Benzaldehyde	12.669	0.08±0.05b	0.28±0.13b	1.37±1.00a	-	1.42±0.77a	-	-	-	0.59±0.47a b	-	0.33±0.14b	-	-	0.14±0.09b	-	-	-
79	β -Cyclocitral	22.991	-	-	-	-	-	-	-	0.04±0.04a	-	-	-	-	-	0.05±0.03a	-	-	-
80	A-Ionone	25.013	-	-	-	-	-	-	-	-	-	0.28±0.17	-	-	-	-	-	-	-
81	beta-Damascen one	28.557	-	-	-	-	-	-	0.05±0.04b	-	-	-	-	0.19±0.07a	-	-	0.02±0.02b	-	-
	Phenols	Total content	0.05	0.08	0.37	0.12	5.58	0.14	1.35	0.10	0.19	0.00	0.61	0.12	0.25	0.25	0.22	1.19	0.14
82	Phenol, 3-ethyl- Phenol,	21.160	-	-	-	-	3.49±2.54a	0.05±0.03b	1.06±0.71ab	-	-	-	0.35±0.25b	-	-	-	-	-	-
83	2,4-bis(1,1-dim ethylethyl)-	32.523	0.05±0.03c	0.08±0.06c	0.37±0.19c	0.12±0.09c	2.09±1.09a	0.09±0.06c	0.29±0.16c	0.10±0.02c	0.19±0.07c	-	0.26±0.25c	0.12±0.06c	0.25±0.16c	0.25±0.33c	0.22±0.07c	1.19±0.86b	0.14±0.08c
	Other compounds	Total content	0.04	-	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	-	-	-	0.00	0.05	0.00	0.00
84	Nerol oxide	20.530	0.04±10.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	1-Isopropyl-2- Methoxy-4-Me thylbenzene	23.473	-	-	-	-	-	-	-	0.04±4.87	-	-	-	-	-	-	-	-	-
86	Geranyl ethyl ether	25.340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05±2.47	-	-

227 Note: Each value is expressed as mean \pm SD (n=3) and data in the same row with different letters are significantly different ($P < 0.05$).

“-” means not detected or does not exist