

**Table S1.** Release of 3-MH and 4-MMP by 80 wine yeast strains in SGJ-thiol media.

<sup>a</sup> Clade	<sup>b</sup> Origin and usage	AWRI number	3-MH (ng L <sup>-1</sup> )	4-MMP (ng L <sup>-1</sup> )	Genotype <i>IRC7</i>
Wine	Wine isolate, Australia 1947	170	429	253	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Wine isolate, Australia 1949	213	181	217	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Grape isolate, Australia 1949	228	428	347	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Wine isolate, USA 1937	266	571	429	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
?	<b>AWRI350 (Maurivin)<sup>Both</sup></b>	350	260	202	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Other	Cider and wine yeast, Switzerland	735	189	150	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Isolate of AWRI792	793	340	403	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>AWRI796 (Maurivin)<sup>Both</sup></b>	796	713	266	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Wine isolate, Penfolds B, Australia 1979	833	407	242	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>Lalvin ICV D254 (Lallemand)<sup>Both</sup></b>	1483	357	260	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>Lalvin ICV D47 (Lallemand)<sup>Both</sup></b>	1488	431	189	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>Uvaferm BDX (Lallemand)<sup>Red</sup></b>	1491	408	238	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>Lalvin T73 (Lallemand)<sup>Red</sup></b>	1497	640	388	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Wolf	1709	605	414	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Australia; wine	1712	498	334	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	Australia, pre1980	1716	424	245	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine		1778	462	328	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	France	1781	419	265	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>
Wine	<b>Uvaferm 43 (Lallemand)<sup>Restart</sup></b>	1833	502	294	<i>IRC7<sup>S</sup> / IRC7<sup>S</sup></i>

<sup>a</sup> Clade	<sup>b</sup> Origin and usage	AWRI number	3-MH (ng L <sup>-1</sup> )	4-MMP (ng L <sup>-1</sup> )	Genotype <i>IRC7</i>
Wine	<b>Lalvin ICV D21 (Lallemand)<sup>Both</sup></b>	2077	527	421	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Lalvin CY3079 (Lallemand)<sup>White</sup></b>	2078	439	171	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Enoferm T306 (Lallemand)<sup>Both</sup></b>	2079	480	259	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Uvaferm HPS (Lallemand)<sup>Red</sup></b>	2255	284	350	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
PDM	<b>NT116 (Anchor Yeast)<sup>Both</sup></b>	2776	580	242	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Actiflore Rose (Laffort)<sup>Rose</sup></b>	2851	584	503	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Fermicru VR5 (Oenobrand)<sup>Red</sup></b>	2874	381	355	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i>
Wine	<b>Lalvin Rhone 2323 (Lallemand)<sup>Red</sup></b>	1490	495	249	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, Australia, 1988	1686	507	405	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, Australia	1742	391	394	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, France	1756	571	445	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, France	1759	1067	351	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, Canada 1961; Tokay	724	460	283	<i>IRC7<sup>S</sup></i> Y56stop / <i>IRC7<sup>S</sup></i> Y56stop
Wine	<b>Lalvin RC212 (Lallemand)<sup>Red</sup></b>	1485	612	350	<i>IRC7<sup>S</sup></i> Y56stop / <i>IRC7<sup>S</sup></i> Y56stop
Wine	<b>Lalvin BM45 (Lallemand)<sup>Both</sup></b>	1486	582	321	<i>IRC7<sup>S</sup></i> Y56stop / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, Australia	1736	463	391	<i>IRC7<sup>S</sup></i> Y56stop / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, France	1757	563	404	<i>IRC7<sup>S</sup></i> D139N/ <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate	1787	751	357	<i>IRC7<sup>S</sup></i> D139N/ <i>IRC7<sup>S</sup></i> Y56stop
Other	<b>Collection Cepage Pinot (Oenobrand)<sup>Red</sup></b>	2865	131	201	<i>IRC7<sup>S</sup></i> G304D / <i>IRC7<sup>S</sup></i> Y56stop
Wine	Wine isolate, Blastocel Grand Cru	2013	534	405	<i>IRC7<sup>S</sup></i> / <i>IRC7<sup>S</sup></i> P146A

<sup>a</sup> Clade	<sup>b</sup> Origin and usage	AWRI number	3-MH (ng L <sup>-1</sup> )	4-MMP (ng L <sup>-1</sup> )	Genotype <i>IRC7</i>
Wine	<b>Zymaflore F15 (Laffort)<sup>Red</sup></b>	2852	722	448	IRC7 <sup>S</sup> P146A / IRC7 <sup>S</sup> P146A
Wine	<b>Collection Cepage Syrah (Oenobrand)<sup>Red</sup></b>	2867	771	383	IRC7 <sup>S</sup> P146A / IRC7 <sup>S</sup> P146A
Wine		896	538	373	IRC7 <sup>S</sup> D139N / IRC7 <sup>S</sup> D139N
Wine	<b>Collection Cepage Chardonnay (Oenobrand)<sup>White</sup></b>	2863	562	407	IRC7 <sup>S</sup> D139N / IRC7 <sup>S</sup> D139N
Wine	Australia	1017	1364	3455	IRC7 <sup>S</sup> / IRC7 <sup>L</sup>
Wine	<b>Vin13 (Anchor Yeast)<sup>White</sup></b>	1537	1005	2157	IRC7 <sup>S</sup> / IRC7 <sup>L</sup>
PDM	<b>NT112 (Anchor Yeast)<sup>Red</sup></b>	2878	747	1904	IRC7 <sup>S</sup> / IRC7 <sup>L</sup>
Wine	Australia 2004; wine	1482	1062	1432	IRC7 <sup>S</sup> Y56stop/ IRC7 <sup>L</sup>
Wine	<b>Lalvin Rhone 2056 (Lallemand)<sup>Both</sup></b>	1487	1190	3579	IRC7 <sup>S</sup> Y56stop/ IRC7 <sup>L</sup>
PDM	Lalvin EC-1118 (Lallemand) <sup>Both</sup>	838	508	504	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	Avise sparkling wine yeast, Petaluma	1001	658	690	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	<b>Lalvin DV10 (Lallemand)<sup>Both</sup></b>	1429	590	550	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	<b>Platinum (Maurivin)<sup>Both</sup></b>	1638	1290	928	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM		1795	514	546	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	<b>Lalvin QA23 (Lallemand)<sup>White</sup></b>	2260	463	526	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
Wine	<b>Zymaflore VL1 (Laffort)<sup>White</sup></b>	2858	1155	1305	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	<b>Vin2000 (Anchor Yeast)<sup>White</sup></b>	2881	412	613	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
PDM	<b>Maurivin Elegance (Maurivin)<sup>White</sup></b>	2910	413	493	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A
Wine		947	409	238	IRC7 <sup>S</sup> P146A / IRC7 <sup>L</sup> T185A P146R
Wine	<b>Zymaflore X16 (Laffort)<sup>White</sup></b>	2860	923	1031	IRC7 <sup>S</sup> P146A / IRC7 <sup>L</sup> T185A

<sup>a</sup> Clade	<sup>b</sup> Origin and usage	AWRI number	3-MH (ng L <sup>-1</sup> )	4-MMP (ng L <sup>-1</sup> )	Genotype <i>IRC7</i>
Other	CBS 7045 wine	1722	247	938	IRC7 <sup>S</sup> Y56stop A356V / IRC7 <sup>L</sup> T185A G77S
Wine	France	1758	635	696	IRC7 <sup>S</sup> Y56stop/ IRC7 <sup>L</sup> T185A K379E
Vin7	Germany; pre1968	740	679	273	IRC7 <sup>S</sup> / IRC7 <sup>L</sup> T185A P146R G321D
Wine	GF7	1776	840	275	IRC7 <sup>S</sup> T185A / IRC7 <sup>L</sup> T185A P146R
Other	UCD 48-41	934	2508	5298	IRC7 <sup>L</sup> / IRC7 <sup>L</sup>
Wine	<b>Maurivin UOA Maxithiol (Maurivin)</b> <sup>White</sup>	2914	2481	4690	IRC7 <sup>L</sup> / IRC7 <sup>L</sup>
Other	NCYC 761 (Palm wine)	1082	2226	4876	IRC7 <sup>L</sup> E374G / IRC7 <sup>L</sup> E374G
?	PW5 (Palm tree)	2829	2004	5215	IRC7 <sup>L</sup> E374G / IRC7 <sup>L</sup> E374G
Other		1729	1569	3014	IRC7 <sup>L</sup> / IRC7 <sup>L</sup> D47N
Wine	<b>Zymaflore VL3c (Laffort)</b> <sup>White</sup>	1688	1183	1869	IRC7 <sup>L</sup> T185A / IRC7 <sup>L</sup> T185A
Wine	<b>Maurivin Sauvignon (Maurivin)</b> <sup>White</sup>	2913	1125	2141	IRC7 <sup>L</sup> T185A / IRC7 <sup>L</sup> T185A
Other	England, pre1967; apple skin	739	183	489	IRC7 <sup>L</sup> T185A K43R / IRC7 <sup>L</sup> T185A K43R
Wine	<b>Lalvin 71B (Lallemand)</b> <sup>Both</sup>	149	170	308	IRC7 <sup>L</sup> T185A K43R / IRC7 <sup>L</sup> T185A K43R
Vin7	Australia 1940; sherry	81	295	278	IRC7 <sup>L</sup> T185A M106I W274R / IRC7 <sup>L</sup> T185A M106I / W274R
Vin7	Australia	722	634	223	IRC7 <sup>L</sup> T185A P146R / IRC7 <sup>L</sup> T185A P146R
Vin7	Australia 1971; wine	763	1061	263	IRC7 <sup>L</sup> T185A P146R / IRC7 <sup>L</sup> T185A G321D
Vin7	<b>Fermichamp (Oenobrand)</b> <sup>Restart</sup>	1899	544	316	IRC7 <sup>L</sup> T185A / IRC7 <sup>L</sup> T185A G253R
Vin7	Australia 1973; wine	778	1537	390	IRC7 <sup>L</sup> T185A / IRC7 <sup>L</sup> T185A G321D
PDM	<b>NT50 (Anchor Yeast)</b> <sup>Red</sup>	2880	839	871	IRC7 <sup>L</sup> T185A / IRC7 <sup>L</sup> T185A E323G
Wine	<b>Zymaflore X5 (Laffort)</b> <sup>White</sup>	2861	1643	2618	IRC7 <sup>L</sup> / IRC7 <sup>S</sup> T185A P146A
Other	NCYC 738, England 1972; brewery	1910	1009	1601	IRC7 <sup>L</sup> / IRC7 <sup>S</sup> T185A A356V

<sup>a</sup>Clade as described by Borneman et al. (2016). <sup>b</sup>Commercial strains in bold-face type. Recommended usage of strains by manufacturers (white = white winemaking, red = red winemaking, both = red and white winemaking, Rosé = Rosé winemaking, Restart = stuck or sluggish fermentations).

**Table S2.** Release of 3-MH and 4-MMP by wine yeast strains in SGJ-thiol media according to their clade (as described in Borneman et al., 2016).

Clade	no.	3-MH (ng L <sup>-1</sup> )	4-MMP (ng L <sup>-1</sup> )	<sup>a</sup> <i>IRC7</i> genotype
Wine	53 (68%)	666 ± 397 <sup>a</sup>	735 ± 960 <sup>b</sup>	74% s/s, 17% s/l / 9% l/l
PDM	11 (14%)	637 ± 254 <sup>a</sup>	715 ± 436 <sup>b</sup>	9% s/s, 82% s/l / 9% l/l
Vin7	6 (8%)	791 ± 441 <sup>a</sup>	290 ± 57 <sup>b</sup>	0% s/s, 16% s/l / 84% l/l
Other	8 (10%)	1008 ± 982 <sup>a</sup>	2071 ± 2083 <sup>a</sup>	25% s/s, 12% s/l / 63% l/l

Means with the same superscript letter are not significantly different from each other

(Tukey's test,  $P < 0.05$ ). <sup>a</sup>*IRC7* genotype: s/s refers to the homozygous short allele (*IRC7<sup>S</sup>* / *IRC7<sup>S</sup>*), l/l to the homozygous long or full-length allele (*IRC7<sup>L</sup>* / *IRC7<sup>L</sup>*), while s/l refers to heterozygous strains (*IRC7<sup>S</sup>* / *IRC7<sup>L</sup>*).

## References

Borneman AR, Forgan AH, Kolouchova R, Fraser JA, Schmidt SA. 2016. Whole Genome Comparison Reveals High Levels of Inbreeding and Strain Redundancy Across the Spectrum of Commercial Wine Strains of *Saccharomyces cerevisiae*. *G3 (Bethesda)* 6:957-71.