SUPPLEMENTARY DATA

Table S1. Summary of wine yeast strains used in laboratory-scale fermentations in this study.

Strain	Species	Commercially available	Winemaking properties / phenotype
AWRI1375	*S. uvarum*	No	High benzaldehyde and moderate H_2S producing strain
AWRI1493	*S. cerevisiae*	Yes	Moderate H_2S and low fruity thiol producing strain[1,2]
AWRI1616	*S. cerevisiae*	Yes	General purpose strain recommended for both white and red wine production. Low fruity thiol and H_2S producing strain[2]
AWRI1688	*S. cerevisiae*	Yes	High fruity thiol producing strain for white wine production. Moderate H_2S production[1,2]
AWRI1776	*S. cerevisiae*	No	Produces high amounts of negative LMWSCs, including H_2S[1,2]
AWRI2861	*S. cerevisiae*	Yes	High fruity thiol producing strain for white wine production. Low H_2S producing strain[1,2]
AWRI2865	*S. cerevisiae*	Yes	Low fruity thiol and H_2S producing strain[1,2]
AWRI2878	*S. cerevisiae*	Yes	Very low LMWSC-producing strain recommended for red wine production[1,2]. Produces high levels of SO_2.
AWRI2914	*S. cerevisiae*	Yes	High fruity thiol producing strain for white wine production. Moderate H_2S producer[1,2]
AWRI3442	*S. cerevisiae*	No	High-H_2S producing strain (derived from AWRI1616) through chemical mutagenesis with an inactivating mutation in *MET17* (unpublished).
AWRI778	*S. cerevisiae*	No	Low fruity thiol producer and moderate H_2S producing strain[1,2]
AWRI1742	*S. cerevisiae*	No	Wild isolate. Moderate H_2S and fruity thiol producing strain.
AWRI4234	*S. cerevisiae*	No	Spontaneous mutant derived from AWRI1742 with an active aromatic Ehrlich pathway, and a high production of benzaldehyde

[1]Cordente et al. 2022 (https://doi.org/10.3390/pr10030502); [2]Cordente et al. 2019 (https://doi.org/10.1128/aem.02684-18)

Low molecular weight sulfur compounds (LMWSCs)

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S2. Metabolite formation by 13 wine yeast strains after laboratory-scale fermentation of a synthetic grape must (SGM).

Strain	PMT (ngL^{-1})	Benzenoid compounds (μgL^{-1})			LMWSCs (μgL^{-1})					
		Benzaldehyde	Benzyl alcohol	Benzyl acetate	H_2S_f (µg)	H_2S	MeSH	EtSH	MeSAc	EtSAc
AWRI1375	5.3 ± 2.8	21.3 ± 4.8	10.2 ± 1.8	< LOD	34.1 ± 6.8	2.5 ± 0.8	2.6 ± 0.4	< LOD	4.8 ± 1.2	< LOD
AWRI1493	1.8 ± 0.6	9.0 ± 0.9	8.5 ± 0.8	< LOD	5.4 ± 1.8	1.7 ± 0.1	4.4 ± 0.2	< LOD	< LOD	< LOD
AWRI1616	1.2 ± 0.6	5.0 ± 1.0	6.0 ± 1.1	< LOD	3.1 ± 0.6	1.9 ± 0.2	3.1 ± 1.2	< LOD	5.9 ± 1.2	< LOD
AWRI1688	0.9 ± 0.5	2.8 ± 0.5	3.8 ± 0.9	< LOD	41.5 ± 2.1	1.8 ± 0.1	2.2 ± 0.2	< LOD	9.2 ± 0.3	< LOD
AWRI1776	1.8 ± 0.2	5.7 ± 1.6	13.5 ± 2.8	< LOD	0	37.1 ± 15	3.3 ± 0.3	2.4 ± 0.4	6.7 ± 0.8	< LOD
AWRI2861	2.7 ± 1.0	3.5 ± 0.4	3.6 ± 0.5	< LOD	0	3.6 ± 1.8	3.4 ± 0.3	< LOD	4.6 ± 0.9	< LOD
AWRI2865	4.4 ± 0.7	6.0 ± 0.8	4.9 ± 0.1	< LOD	10.7 ± 0.8	1.7 ± 0.1	4.0 ± 0.9	< LOD	< LOD	< LOD
AWRI2878	1.4 ± 0.7	4.2 ± 1.5	4.3 ± 2.5	< LOD	0	3.1 ± 0.9	2.6 ± 0.7	< LOD	< LOD	< LOD
AWRI2914	1.6 ± 0.2	4.2 ± 0.7	6.1 ± 0.2	< LOD	57.9 ± 3.2	1.9 ± 0.1	3.1 ± 0.2	< LOD	10.2 ± 0.2	< LOD
AWRI3442	1.2 ± 0.1	3.5 ± 1.3	6.3 ± 2.0	< LOD	111 ± 2.1	4.7 ± 1.9	2.8 ± 0.1	3.9 ± 0.6	36.5 ± 1.4	42.3 ± 6.7
AWRI778	1.1 ± 0.3	4.2 ± 3.4	4.4 ± 0.1	< LOD	2.8 ± 1.8	2.1 ± 0.4	3.0 ± 0.7	< LOD	4.9 ± 0.6	< LOD
AWRI1742	1.6 ± 0.3	5.9 ± 2.4	4.9 ± 1.7	< LOD	22.4 ± 0.1	1.9 ± 0.1	3.6 ± 0.6	< LOD	5.2 ± 0.6	< LOD
AWRI4234	3.7 ± 1.2	28.0 ± 6.8	32.1 ± 1.6	0.15 ± 0.0	15.9 ± 1.6	2.8 ± 1.5	1.9 ± 0.1	< LOD	5.0 ± 0.9	< LOD

Abbreviations of metabolites:

PMT (phenylmethanethiol); H_2S (hydrogen sulfide), H_2S_f (H_2S measured with gas detector tubes during fermentation); MeSH (methanethiol); EtSH (ethanethiol); MeSAc (methyl thioacetate); EtSAc (ethyl thioacetate). The polyfunctional thiols 4-MSP (4-methyl-4-sulfanylpentan-2-one), 3-SH (3-sulfanylhexan-1-ol) and 3-SHA (3-sulfanylhexyl acetate), as well as 2-FMT (2-furanmethanethiol), were below their limit of detection (LOD) in all the wines tested. LMWSCs (low molecular weight sulfur compounds).

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S3. Pearson correlation coefficients (R) between the concentrations of phenylmethanethiol (PMT), low molecular weight sulfur compounds (LMWSCs) (H_2S, MeSH and MeSAc) and benzenoid compounds (benzaldehyde and benzyl alcohol) after laboratory-scale fermentation of a synthetic grape must by 13 wine yeast strains. Two-tailed Pearson correlation analysis was conducted with $\alpha = 0.05$. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

	PMT	Benzaldehyde	Benzyl alcohol	H_2S_f	H_2S	MeSH	MeSAc
PMT	1						
Benzaldehyde	**0.693****	1					
Benzyl alcohol	0.387	**0.848*****	1				
H_2S_f	-0.130	-0.081	-0.084	1			
H_2S	-0.092	-0.086	0.210	-0.176	1		
MeSH	-0.001	-0.410	-0.433	-0.282	0.059	1	
MeSAc	-0.302	-0.190	-0.058	**0.898*****	0.049	-0.277	1

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S4. Metabolite formation by 13 wine yeast strains after laboratory-scale fermentation of Chardonnay (must MV)

Strain	Polyfunctional thiols (ngL^{-1})			Benzenoid compounds (μgL^{-1})			LMWSCs (μgL^{-1})					
	3-SH	3-SHA	PMT	Benzaldehyde	Benzyl alcohol	Benzyl acetate	H_2S_f (µg)	H_2S	MeSH	EtSH	MeSAc	EtSAc
AWRI1375	226 ± 4	29.1 ± 2.0	< LOD	9.2 ± 4.3	33.6 ± 4.5	0.23 ± 0.06	7.7 ± 2.8	2.6 ± 0.2	< LOD	< LOD	< LOD	< LOD
AWRI1493	125 ± 12	34.4 ± 2.1	2.4 ± 0.9	5.8 ± 1.3	41.0 ± 5.9	0.26 ± 0.04	7.2 ± 0.4	2.2 ± 0.1	2.0 ± 0.2	< LOD	6.8 ± 1.5	< LOD
AWRI1616	182 ± 22	26.9 ± 4.8	5.2 ± 1.5	4.6 ± 0.7	30.6 ± 2.0	0.20 ± 0.02	9.1 ± 0.4	2.7 ± 0.4	2.3 ± 0.2	< LOD	6.7 ± 1.7	< LOD
AWRI1688	255 ± 19	66.5 ± 5.7	< LOD	2.8 ± 0.9	27.8 ± 1.8	0.29 ± 0.06	38.3 ± 2.9	2.6 ± 0.3	0.7 ± 0.6	< LOD	7.6 ± 0.4	< LOD
AWRI1776	87 ± 1	40.5 ± 3.5	< LOD	3.7 ± 1.3	15.3 ± 4.8	0.14 ± 0.08	2.8 ± 1.4	35 ± 23	2.3 ± 0.4	< LOD	< LOD	< LOD
AWRI2861	319 ± 106	60.2 ± 7.6	0.9 ± 0.4	3.0 ± 1.0	32.1 ± 6.5	0.23 ± 0.07	9.3 ± 2.1	3.5 ± 1.9	1.0 ± 0.8	< LOD	7.4 ± 2.4	< LOD
AWRI2865	114 ± 3	14.4 ± 1.4	6.4 ± 2.1	6.9 ± 3.5	20.3 ± 7.7	0.10 ± 0.10	6.3 ± 1.7	2.6 ± 0.3	1.8 ± 0.2	< LOD	3.1 ± 1.7	< LOD
AWRI2878	109 ± 20	13.7 ± 2.7	< LOD	3.1 ± 2.1	25.7 ± 3.1	0.22 ± 0.20	0	6.7 ± 2.9	< LOD	< LOD	< LOD	< LOD
AWRI2914	363 ± 16	113 ± 8.3	2.1 ± 1.7	6.1 ± 4.7	26.5 ± 6.1	0.22 ± 0.12	28.5 ± 1.6	3.1 ± 0.3	1.7 ± 0.1	< LOD	11.5 ± 4.9	< LOD
AWRI3442	398 ± 22	80.9 ± 4.7	0.7 ± 0.0	8.7 ± 5.5	31.5 ± 9.6	0.08 ± 0.02	76.1 ± 3.5	7.7 ± 3.3	1.0 ± 0.8	1.5 ± 0.2	5.0 ± 0.2	9.9 ± 0.5
AWRI778	136 ± 2	17.2 ± 1.7	0.6 ± 0.2	5.5 ± 2.2	35.4 ± 6.9	0.06 ± 0.04	3.7 ± 1.0	2.2 ± 0.1	1.6 ± 0.1	< LOD	4.1 ± 0.5	< LOD
AWRI1742	240 ± 1	57.3 ± 5.2	3.7 ± 0.7	8.1 ± 1.0	20.4 ± 4.9	0.03 ± 0.03	39.7 ± 2.1	2.1 ± 0.1	1.9 ± 0.3	< LOD	10.0 ± 0.3	< LOD
AWRI4234	67 ± 5	31.1 ± 2.6	< LOD	20.8 ± 7.1	37.4 ± 17	0.37 ± 0.13	10.7 ± 0.8	2.4 ± 0.5	< LOD	< LOD	< LOD	< LOD

The polyfunctional thiol 4-MSP (4-methyl-4-sulfanylpentan-2-one) and 2-FMT (2-furanmethanethiol) were below their limit of detection (LOD) in all the wines tested. Low molecular weight sulfur compounds (LMWSCs).

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S5. Pearson correlation coefficients (R) between the concentrations of polyfunctional thiols (3-SH and 3-SHA), PMT, low molecular weight sulfur compounds (LMWSCs) (H_2S, MeSH and MeSAc) and benzenoid compounds (benzaldehyde, benzyl alcohol, and benzyl acetate) after laboratory-scale fermentation of Chardonnay (must MV) by 13 wine yeast strains. Two-tailed Pearson correlation analysis was conducted with $\alpha = 0.05$. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

	3-SH	3-SHA	PMT	Benzaldehyde	Benzyl alcohol	Benzyl acetate	H_2S_f	H_2S	MeSH	MeSAc
3-SH	1									
3-SHA	**0.836*** **	1								
PMT	-0.055	-0.138	1							
Benzaldehyde	-0.210	-0.077	-0.101	1						
Benzyl alcohol	-0.029	-0.114	-0.275	0.468	1					
Benzyl acetate	-0.135	0.034	-0.364	0.240	0.527	1				
H_2S_f	**0.744****	**0.691****	-0.050	0.096	-0.062	-0.276	1			
H_2S	-0.243	-0.009	-0.289	-0.219	-0.548	-0.180	-0.122	1		
MeSH	-0.022	0.108	**0.620***	-0.393	-0.400	-0.508	-0.024	0.301	1	
MeSAc	**0.623***	**0.698****	0.367	-0.343	-0.113	-0.166	0.437	-0.309	0.519	1

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S6. Pearson correlation coefficients (R) between the concentrations of PMT, low molecular weight sulfur compounds (LMWSCs) (H_2S, MeSH and MeSAc) and benzenoid compounds (benzaldehyde, benzyl alcohol, benzyl acetate and benzoic acid) after laboratory-scale fermentation of SGM with different benzaldehyde additions. Two-tailed Pearson correlation analysis was conducted with $\alpha = 0.05$. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

	PMT	Benzaldehyde	Benzyl alcohol	Benzyl acetate	Benzoic acid	H_2S_f	H_2S	MeSH	MeSAc
PMT	1								
Benzaldehyde	**0.554***	1							
Benzyl alcohol	0.008	-0.001	1						
Benzyl acetate	-0.076	-0.113	**0.893*****	1					
Benzoic acid	0.496	0.486	**0.624****	0.457	1				
H_2S_f	**0.852*****	**0.617***	-0.216	-0.287	0.216	1			
H_2S	**0.871*****	**0.729****	0.025	0.001	**0.586***	0.722**	1		
MeSH	**-0.861*****	**-0.549***	0.197	0.202	-0.157	-0.937***	**-0.759*****	1	
MeSAc	0.380	-0.030	-0.025	-0.220	0.072	0.552*	0.056	-0.416	1

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S7. Metabolite formation by 4 wine yeast strains (AWRI1616, 2865, 1375 and 3442) after laboratory-scale fermentation of a low YAN Chardonnay (must, AH) supplemented with different concentrations of inorganic nitrogen to achieve a final yeast assimilable nitrogen (YAN) concentration of either 250 or 350 mg N L^{-1}. The original must had a YAN content of 147 mg N L^{-1}.

Metabolite	AWRI1616			AWRI2865			AWRI1375			AWRI3442		
	Control	YAN250	YAN350	Control	YAN250	YAN350	Control	YAN250	YAN350	Control	YAN250	YAN350
Polyfunctional thiols (ngL^{-1})												
3-SH	577 ± 33^{a}	535 ± 59^{a}	631 ± 21^{a}	215 ± 23^{ab}	191 ± 12^{b}	243 ± 5.9^{a}	476 ± 70^{b}	665 ± 53^{a}	677 ± 24^{a}	526 ± 66^{a}	619 ± 52^{a}	504 ± 21^{a}
3-SHA	52.8 ± 5.0^{c}	84.2 ± 3.0^{b}	111 ± 10^{a}	18.7 ± 2.2^{b}	21.5 ± 0.7^{ab}	23.8 ± 0.8^{a}	30 ± 7.5^{b}	61 ± 7.8^{a}	67 ± 3.4^{a}	39 ± 8.4^{b}	72 ± 3.4^{a}	58 ± 7.4^{a}
PMT	0.8 ± 0.0^{c}	3.2 ± 0.8^{b}	6.2 ± 0.7^{a}	0.9 ± 0.2^{b}	1.4 ± 0.3^{b}	2.6 ± 0.2^{a}	0.7 ± 0.1^{b}	1.3 ± 0.7^{ab}	2.0 ± 0.2^{a}	0.5 ± 0.1^{b}	1.0 ± 0.2^{a}	0.9 ± 0.2^{ab}
Benzenoids (μgL^{-1})												
Benzaldehyde	2.8 ± 1.7^{a}	2.0 ± 1.1^{a}	1.8 ± 0.2^{a}	3.2 ± 0.4^{a}	1.7 ± 0.3^{b}	0.9 ± 0.2^{b}	7.9 ± 0.6^{a}	2.5 ± 0.5^{b}	1.5 ± 0.3^{b}	2.8 ± 1.1^{a}	1.7 ± 0.9^{a}	0.69 ± 0.6^{a}
Benzyl alcohol	33.4 ± 0.9^{a}	34.9 ± 0.7^{a}	33.9 ± 0.9^{a}	35.3 ± 2.8^{a}	35.5 ± 1.2^{a}	32.5 ± 0.6^{a}	30.4 ± 1.0^{a}	29.7 ± 0.6^{a}	29.9 ± 0.4^{a}	32.2 ± 0.1^{b}	34.0 ± 0.2^{a}	32.2 ± 1.0^{b}
Benzyl acetate	0.16 ± 0.03^{c}	0.29 ± 0.03^{b}	0.44 ± 0.04^{a}	0.25 ± 0.03^{b}	0.35 ± 0.02^{a}	0.40 ± 0.01^{a}	0.19 ± 0.04^{b}	0.28 ± 0.03^{a}	0.26 ± 0.01^{ab}	0.18 ± 0.02^{b}	0.27 ± 0^{a}	0.25 ± 0.02^{a}
LMWSCs (μgL^{-1})												
H_2S_f (µg)	23.8 ± 1.2^{a}	14.2 ± 1.1^{b}	6.8 ± 1.1^{c}	37.1 ± 3.1^{a}	24.0 ± 1.8^{b}	13.5 ± 2.1^{c}	53.7 ± 4.3^{a}	9.6 ± 2.0^{b}	5.6 ± 0^{b}	73.5 ± 0.7^{c}	97.1 ± 0.8^{b}	111.5 ± 2.1^{a}
H_2S	1.8 ± 0.1^{a}	1.9 ± 0.1^{a}	1.9 ± 0.2^{a}	1.7 ± 0.1^{a}	1.7 ± 0.1^{a}	1.7 ± 0.1^{a}	1.7 ± 0.1^{a}	1.5 ± 0.1^{a}	1.6 ± 0.1^{a}	1.9 ± 0.2^{b}	2.1 ± 0.5^{b}	5.2 ± 1.6^{a}
MeSH	<LOD	2.3 ± 0.1	2.2 ± 0.1	<LOD	<LOD	2.2 ± 0.1	<LOD	<LOD	<LOD	<LOD	<LOD	2.3 ± 0.2
EtSH	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	1.8 ± 0.2^{b}	2.5 ± 0.1^{a}
MeSAc	4.1 ± 0.1^{a}	3.3 ± 0.5^{b}	2.5 ± 0.2^{b}	3.4 ± 0.1^{a}	2.7 ± 0.3^{b}	2.6 ± 0.2^{b}	<LOD	<LOD	<LOD	3.5 ± 0.1^{b}	4.2 ± 0.1^{a}	4.1 ± 0.2^{a}
EtSAc	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	4.3 ± 0.1^{c}	7.4 ± 0.2^{b}	9.8 ± 0.3^{a}
Time to dryness (days)	11	11	10	12	12	11	14	12	11	12	11	10

The polyfunctional thiol 4-MSP and 2-FMT were below their limit of detection (LOD) in all the wines tested. LMWSCs (low molecular weight sulfur compounds). Means with the same letter are not significantly different from each other (Tukey's HSD test, $P < 0.05$) for each of the yeast strains.

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S8. Pearson correlation coefficients (R) between the concentrations of polyfunctional thiols (3-SH, 3-SHA), PMT, low molecular weight sulfur compounds (LMWSCs) (H_2S, MeSH, MeSAc) and benzenoid compounds (benzaldehyde, benzyl alcohol and benzyl acetate) after fermentation of a Chardonnay (must AH) with different amounts of nitrogen additions. Two-tailed Pearson correlation analysis was conducted with a = 0.05. *P < 0.05, ** P < 0.01, *** P < 0.001.

	3-SH	3-SHA	PMT	Benzaldehyde	Benzyl alcohol	Benzyl acetate	H_2S_f	H_2S	MeSH	MeSAc
3-SH	1									
3-SHA	**0.772****	1								
PMT	0.189	**0.690***	1							
Benzaldehyde	-0.005	-0.304	-0.312	1						
Benzyl alcohol	-0.503	-0.007	0.225	-0.320	1					
Benzyl acetate	-0.221	0.301	**0.795****	-0.488	0.280	1				
H_2S_f	0.035	-0.126	-0.521	0.039	0.020	-0.433	1			
H_2S	0.050	0.114	-0.148	-0.318	-0.008	-0.093	**0.687***	1		
MeSH	-0.041	0.417	**0.641***	-0.441	0.207	**0.585***	-0.042	0.472	1	
MeSAc	-0.241	0.027	-0.055	-0.430	**0.749****	-0.058	0.486	0.421	0.279	1

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S9. Metabolite formation by four wine yeast strains after laboratory-scale fermentation of a synthetic grape must supplemented with different concentrations of inorganic nitrogen to achieve a final yeast assimilable nitrogen (YAN) concentration of 100, 150, 250 or 350 mg N L^{-1}.

Metabolite	AWRI1616				AWRI2865				AWRI1375				AWRI3442			
	YAN100	YAN150	YAN250	YAN350	YAN100	YAN150	YAN250	YAN350	YAN100	YAN150	YAN250	YAN350	YAN100	YAN150	YAN250	YAN350
Polyfunctional thiols (ngL^{-1})																
3-SH	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
3-SHA	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
PMT	5.6 ± 1.3^{b}	8.4 ± 3.6^{b}	17.8 ± 5.7^{ab}	29.7 ± 22^{a}	3.5 ± 1.9^{c}	5.4 ± 1.4^{bc}	9.1 ± 2.1^{b}	30.4 ± 4.0^{a}	7.7 ± 2.2^{b}	10.4± 3.3^{b}	11.8 ± 4.0^{b}	21.6 ± 8.2a	12.8± 5.8^{a}	11.4± 2.8^{a}	7.9 ± 0.8^{a}	14.4 ± 7.3^{a}
Benzenoid compounds (μgL^{-1})																
Benzaldehyde	10.0 ± 2.2^{a}	7.0 ± 2.7^{ab}	5.6 ± 1.5^{b}	4.9 ± 1.7^{b}	9.9 ± 3.3^{a}	5.4 ± 1.9^{b}	3.5 ± 0.4^{b}	4.1 ± 0.6^{b}	46.0 ± 8.7^{a}	14.0 ± 5.2^{b}	12.8 ± 2.0^{b}	11.4 ± 1.5^{b}	6.2 ± 0.5^{a}	6.1 ± 2.8^{a}	3.2 ± 1.8^{a}	2.8 ± 1.2^{a}
Benzyl alcohol	3.5 ± 1.3^{a}	0.4 ± 0.3^{b}	0.9 ± 0.3^{b}	1.6 ± 0.5^{b}	8.7 ± 4.1^{a}	7.1 ± 4.4^{a}	5.7 ± 1.0^{a}	4.9 ± 2.6^{a}	2.0 ± 0.1^{a}	2.8 ± 0.4^{a}	2.0 ± 1.1^{a}	1.8 ± 0.1^{a}	6.0 ± 0.9^{a}	2.4 ± 1.1^{b}	1.2 ± 0.3^{b}	1.1 ± 0.2^{b}
Benzyl acetate	<LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
LMWSCs (μgL^{-1})																
H_2S_f (µg)	3.1 ± 3.2^{b}	9.5 ± 1.6^{a}	10.0 ± 1.7^{a}	1.6 ± 2.0^{b}	2.6 ± 0.8^{c}	7.1 ± 0.7^{b}	10.2 ± 0.3^{a}	0^{d}	78.4 ± 10.4^{b}	129 ± 18^{a}	104 ± 26^{ab}	23.5 ± 3.0^{c}	98.2 ± 7.5^{b}	97.1 ± 8.6^{b}	94.7 ± 5.8^{b}	116 ± 8.3^{a}
H_2S	1.6 ± 0.3^{a}	1.8 ± 0.3^{a}	1.5 ± 0.1^{a}	1.4 ± 0.1^{a}	1.1 ± 0.1^{b}	1.4 ± 0.3^{ab}	1.6 ± 0.3^{a}	1.2 ± 0.1^{ab}	1.6 ± 0.2^{bc}	2.4 ± 0.6^{ab}	2.7 ± 0.8^{a}	1.4 ± 0.1^{c}	26.5 ± 8.8^{a}	8.3 ± 4.9^{b}	4.8 ± 4.5^{b}	2.2 ± 0.9^{b}
MeSH	1.5 ± 0.1^{b}	2.5 ± 0.4^{ab}	2.9 ± 0.8^{ab}	4.5 ± 2.1^{a}	2.4 ± 0.4^{c}	5.6 ± 1.2^{b}	6.2 ± 0.9^{b}	9.0 ± 1.7^{a}	0.7 ± 0.7^{b}	1.7 ± 0.4^{a}	1.6 ± 0.1^{a}	2.0 ± 0.1^{a}	1.7 ± 0.2^{a}	2.2 ± 0.3^{a}	2.0 ± 0.3^{a}	2.3 ± 0.7^{a}
EtSH	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	1.5 ± 0.7	1.2 ± 0.2	<LOD	1.7 ± 0.5^{a}	1.2± 0.3^{ab}	0.9 ± 0.4^{b}	1.2 ± 0.2^{ab}
MeSAc	1.8 ± 1.7^{b}	5.9 ± 1.2^{a}	4.0 ± 2.1^{ab}	1.8 ± 1.2^{b}	<LOD	<LOD	<LOD	<LOD	5.2 ± 0.1^{b}	9.8 ± 1.5^{a}	8.7 ± 1.9^{a}	0.6 ± 1.4^{c}	18.0 ± 2.4^{a}	22.2 ± 8.1^{a}	17.2 ± 1.8^{a}	18.1 ± 2.2^{a}
EtSAc	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	3.2 ± 0.6^{b}	7.4 ± 2.3^{a}	6.0 ± 1.6^{a}	0.34 ± 0.4^{c}	8.5 ± 0.8^{b}	7.4 ± 2.0^{b}	8.6 ± 0.6^{b}	14.5 ± 3.4^{a}
Time to dryness (days)	15	11	10	9	15	12	11	10	>15	15	12	10	15	12	10	10

The polyfunctional thiol 4-MSP and 2-FMT were below their limit of detection (LOD) in all the wines tested. LMWSCs (low molecular weight sulfur compounds). Means with the same letter are not significantly different from each other (Tukey's HSD test, $P < 0.05$) for each of the yeast strains.

SUPPLEMENTARY DATA
Cordente, A., Kulcsar, A., Langone, D., Pisaniello, L., Siebert, T., & Bekker, M. (2024). Modulation of the 'flinty' aroma compound phenylmethanethiol during fermentation: impacts of yeast starter culture and nitrogen supplementation. *OENO One*, 58(3). https://doi.org/10.20870/oeno-one.2024.58.3.8067

Table S10. Pearson correlation coefficients (R) between the concentrations of phenylmethanethiol (PMT), benzenoids (benzaldehyde and benzyl alcohol) and low molecular weight sulfur compounds (LMWSCs) (H_2S, MeSH and MeSAc) after laboratory-scale fermentation of a synthetic grape must supplemented with different concentrations of inorganic nitrogen to achieve a final yeast assimilable nitrogen concentration of 100, 150, 250 or 350 mg N L^{-1}. Two-tailed Pearson correlation analysis was conducted with $\alpha = 0.05$. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

	PMT	Benzaldehyde	Benzyl alcohol	H_2S_f	H_2S	MeSH	MeSAc
PMT	1						
Benzaldehyde	-0.234	1					
Benzyl alcohol	-0.281	-0.109	1				
H_2S_f	-0.210	0.206	-0.266	1			
H_2S	-0.053	-0.125	0.271	0.403	1		
MeSH	**0.499***	-0.433	0.334	**-0.548***	-0.234	1	
MeSAc	-0.162	-0.120	-0.295	**0.826*****	**0.583***	-0.468	1

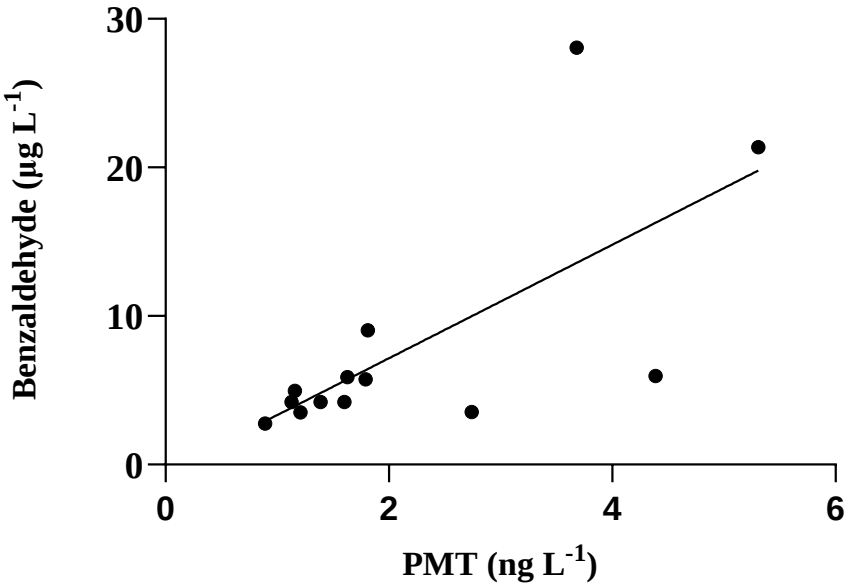


Figure S1. Relationship between phenylmethanethiol (PMT, ngL^{-1}) and benzaldehyde (μgL^{-1}) concentrations as measured in synthetic grape must ferments by 13 wine yeast strains. The correlation coefficient (R) was found to be 0.693 ($P < 0.01$).

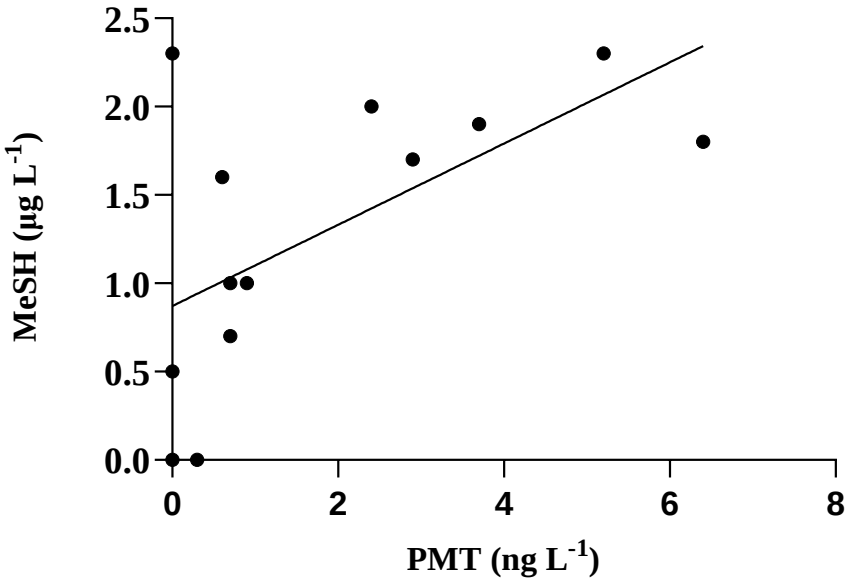


Figure S2. Relationship between phenylmethanethiol (PMT, ngL^{-1}) and methanethiol (MeSH, μgL^{-1}) concentrations as measured in Chardonnay ferments (must MV) by 13 wine yeast strains. The correlation coefficient (R) was found to be 0.620 ($P < 0.05$).

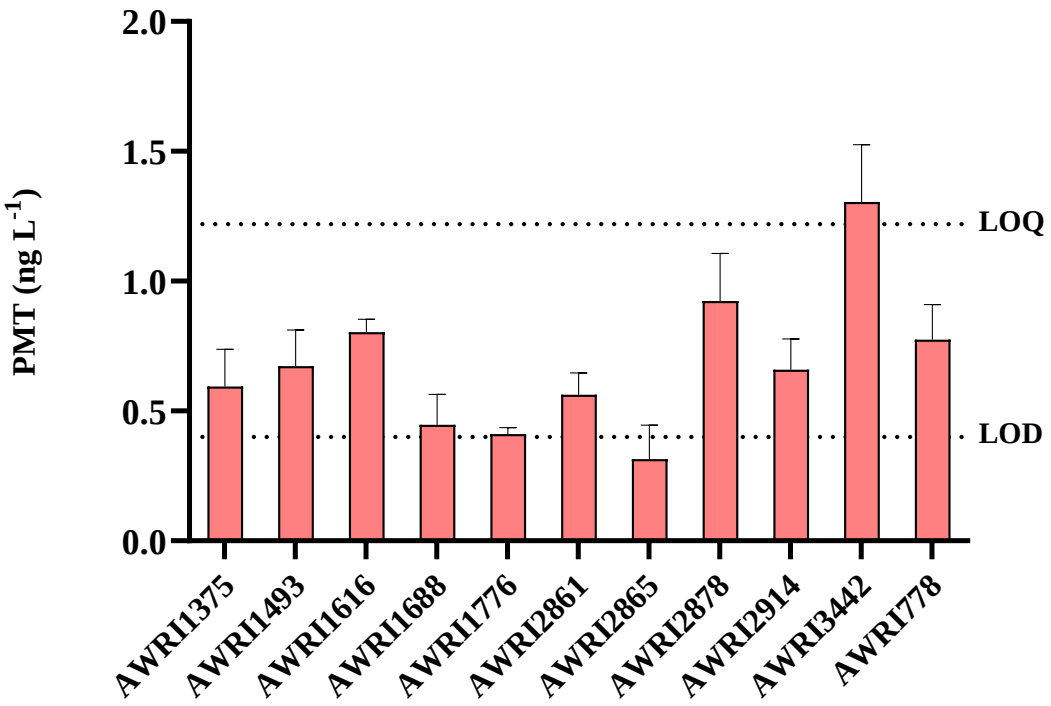


Figure S3. Production of phenylmethanethiol (PMT) (ngL^{-1}) by 13 wine yeast strains after laboratory-scale fermentation of a Pinot Noir must. Only the high-H_2S producing strain AWRI3442 produced levels of PMT above its limit of quantification (LOQ).

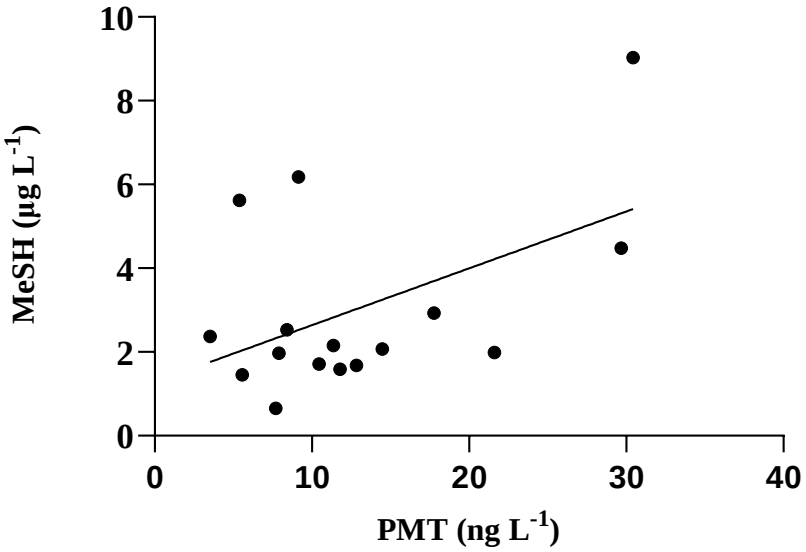


Figure S4. Relationship between phenylmethanethiol (PMT, ngL^{-1}) and methanethiol (MeSH, μgL^{-1}) concentrations as measured in ferments in a synthetic grape must with different concentrations of nitrogen. The correlation coefficient (R) was found to be 0.499 ($P < 0.05$).