SUPPLEMENTARY DATA
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Supplementary table 1. The impact of various amino acid treatments on the production of volatile compounds by VIN13 in synthetic grape must. The data summarizes the average of duplicate fermentations and their standard deviation. Additionally, the letters denote significant differences (95%) between treatments using Fischer LSD. Odour activity values (OAV) greater than 1 are highlighted in bold text.

Aroma compound (mg/L)	Odour threshold (mg/L)	All amino acids		OAV	Ammonium		OAV	Branched chain & aromatic amino acids		OAV
2-phenyl ethanol	14[A]	109.10 ± 4.85	b	**7.79**	18.65 ± 0.15	e	**1.33**	275.04 ± 3.99	a	**19.65**
isoamyl alcohol	30[B]	257.16 ± 13.91	b	**8.57**	138.05 ± 3.64	e	**4.60**	417.02 ± 2.39	a	**13.90**
isobutanol	40[B]	46.58 ± 2.58	b	**1.16**	16.20 ± 0.52	d	0.41	126.54 ± 0.60	a	**3.16**
butanol	150[C]	0.64 ± 0.02	c	0.00	0.56 ± 0.01	d	0.00	0.49 ± 0.01	e	0.00
propanol	306[C]	28.22 ± 1.43	c	0.09	34.05 ± 1.01	b	0.11	40.01 ± 0.43	a	0.13
2-phenylethyl acetate	0.25[B]	1.09 ± 0.11	b	**4.38**	0.99 ± 0.10	b	**3.95**	2.55 ± 0.23	a	**10.19**
ethyl acetate	12.27[C]	47.44 ± 0.71	a	**3.87**	36.29 ± 0.50	b	**2.96**	38.76 ± 0.84	b	**3.16**
isoamyl acetate	0.03[B]	1.26 ± 0.04	b	**41.98**	0.80 ± 0.00	c	**26.80**	2.66 ± 0.11	a	**88.69**
acetic acid	200[B]	379.76 ± 21.77	c	**1.90**	397.45 ± 10.32	c	**1.99**	402.70 ± 1.63	c	**2.01**
butyric acid	0.173[A]	1.02 ± 0.03	b	**5.91**	0.99 ± 0.00	b	**5.73**	1.11 ± 0.01	a	**6.39**
isobutyric acid	2.3[A]	1.67 ± 0.07	b	0.73	0.79 ± 0.00	e	0.34	3.45 ± 0.02	a	**1.50**
isovaleric acid	0.033[A]	2.17 ± 0.08	b	**65.85**	1.37 ± 0.02	d	**41.43**	4.25 ± 0.09	a	**128.77**
propionic acid	8.1[C]	1.25 ± 0.03	c	0.15	1.55 ± 0.01	b	0.19	1.69 ± 0.01	a	0.21
valeric acid		0.62 ± 0.01	c		0.55 ± 0.00	d		0.74 ± 0.00	a	
ethyl lactate	150[C]	10.41 ± 0.08	cd	0.07	11.53 ± 0.24	a	0.08	10.32 ± 0.07	d	0.07
ethyl phenylacetate	0.25[B]	1.59 ± 0.02	b	**6.36**	1.34 ± 0.00	e	**5.37**	1.63 ± 0.01	b	**6.53**
hexanoic acid	0.42[A]	2.36 ± 0.10	b	**5.62**	2.33 ± 0.21	b	**5.55**	3.05 ± 0.03	a	**7.27**
octanoic acid	0.5[A]	3.52 ± 0.05	c	**7.04**	3.80 ± 0.04	bc	**7.60**	4.55 ± 0.17	a	**9.10**
decanoic acid	1[A]	1.84 ± 0.23	b	**1.84**	2.31 ± 0.00	a	**2.31**	2.34 ± 0.30	a	**2.34**
ethyl caprylate	0.005[A]	0.68 ± 0.20	b	**136.84**	0.98 ± 0.07	a	**195.96**	0.97 ± 0.16	a	**194.96**

[A] Ferreira *et al.* (2000) determined in 11% (vol/vol) ethanol, 7g/L glycerine and 5 g/L tartaric acid at pH 3.4;

[B] Guth *et al.* (1997) determined in 10% ethanol (vol/vol);

[C] Reviewed by Etievant (1991) determined in wine

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Supplementary table 1 continued. The impact of various amino acid treatments on the production of volatile compounds by VIN13 in synthetic grape must. The data summarizes the average of duplicate fermentations and their standard deviation. Additionally, the letters denote significant differences (95%) between treatments using Fischer LSD. Odour activity values (OAV) greater than 1 are highlighted in bold text.

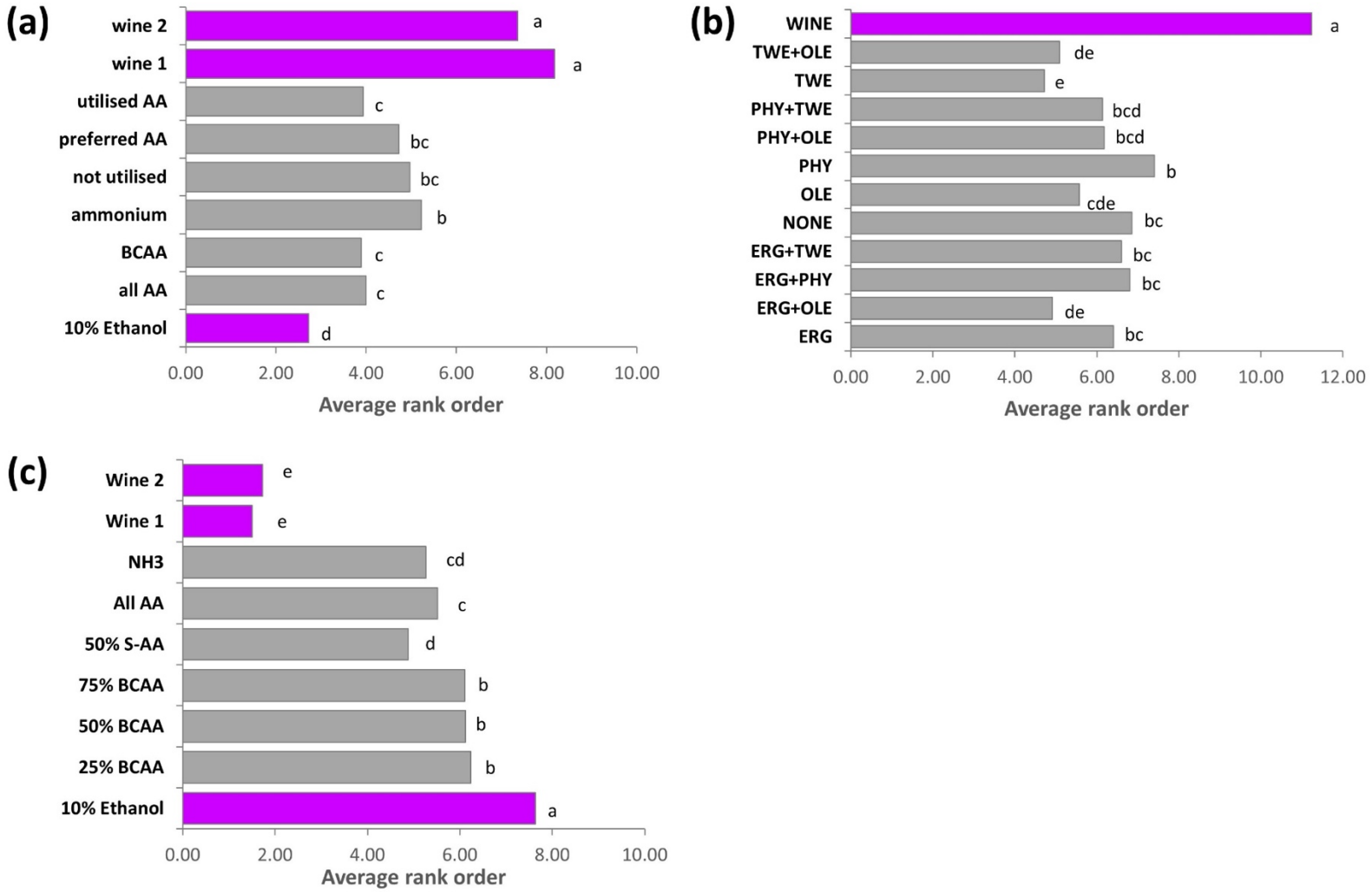
Aroma compound	Odour threshold (mg/L)	Not utilised amino acids	OAV	Preferred amino acids	OAV	Utilised but not preferred amino acids	OAV
2-phenyl ethanol	14[A]	35.18 ± 1.10 [d]	**2.51**	22.23 ± 0.50 [e]	**1.59**	79.60 ± 4.82 [c]	**5.69**
isoamyl alcohol	30[B]	157.75 ± 1.85 [d]	**5.26**	140.57 ± 4.03 [de]	**4.69**	213.73 ± 11.46 [c]	**7.12**
isobutanol	40[B]	16.37 ± 0.42 [d]	0.41	14.54 ± 0.58 [d]	0.36	28.86 ± 1.01 [c]	0.72
butanol	150[C]	0.77 ± 0.01 [b]	0.01	0.73 ± 0.02 [b]	0.00	1.00 ± 0.03 [a]	0.01
propanol	306[C]	40.36 ± 1.02 [a]	0.13	36.06 ± 0.99 [b]	0.12	39.13 ± 1.37 [a]	0.13
2-phenylethyl acetate	0.25[B]	0.65 ± 0.00 [c]	**2.61**	0.84 ± 0.15 [bc]	**3.38**	0.92 ± 0.02 [bc]	**3.69**
ethyl acetate	12.27[C]	31.88 ± 1.80 [c]	**2.60**	45.64 ± 1.30 [a]	**3.72**	45.64 ± 1.08 [a]	**3.72**
isoamyl acetate	0.03[B]	0.65 ± 0.01 [d]	**21.59**	0.82 ± 0.01 [c]	**27.24**	0.84 ± 0.03 [c]	**28.14**
acetic acid	200[B]	575.17 ± 16.88 [a]	**2.88**	593.03 ± 51.94 [a]	**2.97**	466.33 ± 21.16 [b]	**2.33**
butyric acid	0.173[A]	0.84 ± 0.01 [c]	**4.86**	0.98 ± 0.03 [b]	**5.69**	0.98 ± 0.04 [b]	**5.67**
isobutyric acid	2.3[A]	0.90 ± 0.02 [d]	0.39	0.77 ± 0.01 [e]	0.34	1.06 ± 0.04 [c]	0.46
isovaleric acid	0.033[A]	1.86 ± 0.00 [c]	**56.40**	1.41 ± 0.01 [d]	**42.79**	1.88 ± 0.08 [c]	**56.96**
propionic acid	8.1[C]	1.62 ± 0.04 [ab]	0.20	1.62 ± 0.08 [ab]	0.20	1.54 ± 0.06 [b]	0.19
valeric acid		0.51 ± 0.00 [e]		0.52 ± 0.01 [e]		0.65 ± 0.02 [b]	
ethyl lactate	150[C]	11.02 ± 0.08 [b]	0.07	10.69 ± 0.09 [c]	0.07	10.44 ± 0.01 [cd]	0.07
ethyl phenylacetate	0.25[B]	1.50 ± 0.02 [c]	**6.02**	1.43 ± 0.03 [d]	**5.73**	1.71 ± 0.03 [a]	**6.82**
hexanoic acid	0.42[A]	1.66 ± 0.02 [d]	**3.95**	2.38 ± 0.06 [b]	**5.67**	2.05 ± 0.11 [c]	**4.89**
octanoic acid	0.5[A]	2.17 ± 0.02 [e]	**4.34**	3.93 ± 0.21 [b]	**7.86**	3.04 ± 0.17 [d]	**6.08**
decanoic acid	1[A]	1.36 ± 0.01 [c]	**1.36**	2.31 ± 0.18 [a]	**2.31**	1.99 ± 0.07 [ab]	**1.99**
ethyl caprylate	0.005[A]	0.34 ± 0.02 [c]	**68.95**	0.65 ± 0.06 [b]	**130.27**	0.68 ± 0.04 [b]	**136.23**

[A] Ferreira *et al.* (2000) determined in 11% (vol/vol) ethanol, 7g/L glycerine and 5 g/L tartaric acid at pH 3.4;

[B] Guth *et al.* (1997) determined in 10% ethanol (vol/vol);

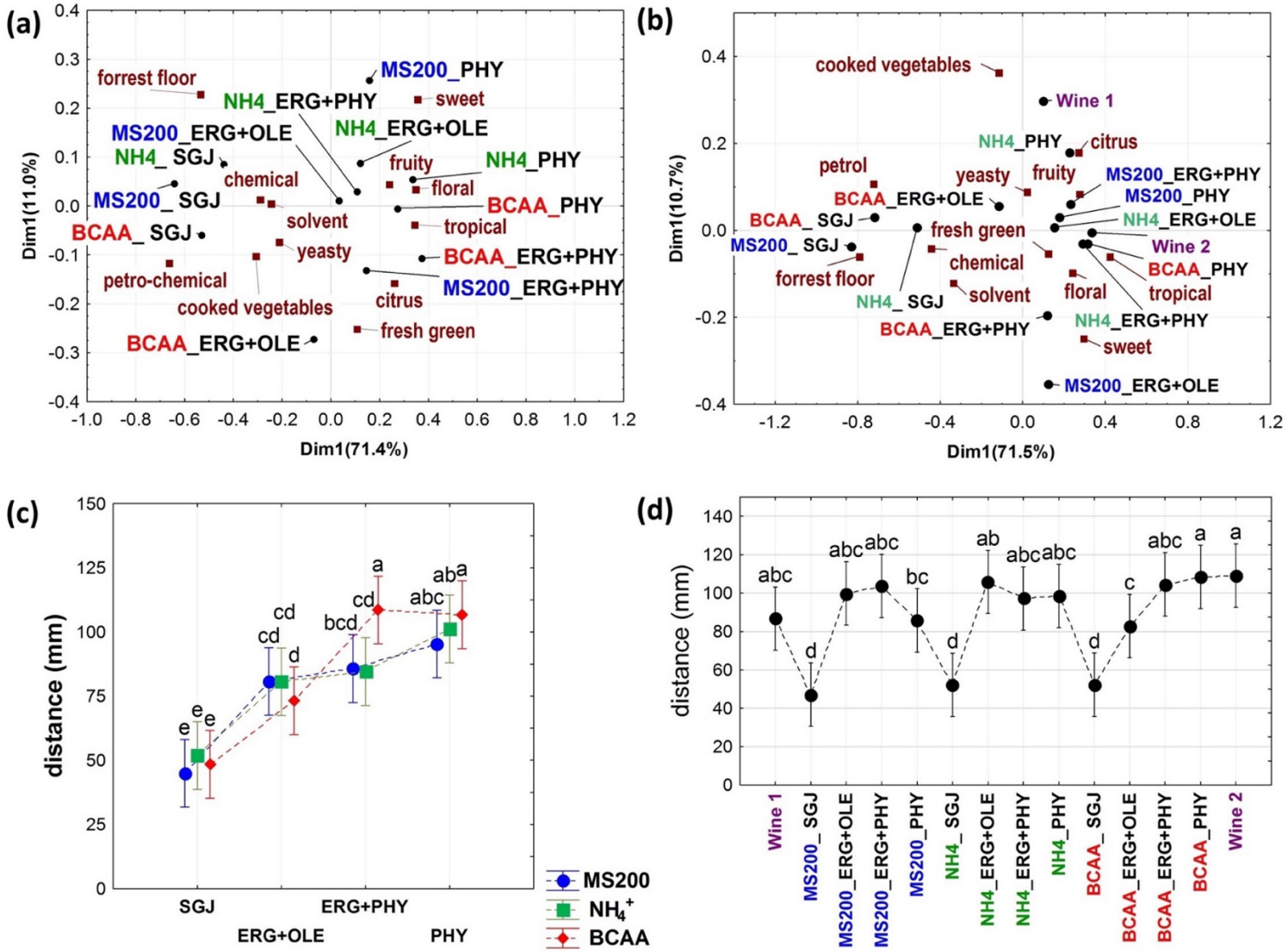
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Supplementary figure 1. The wine-like rating was obtained using a line scale which was converted into a rank order. Fermentations were treated with: Various amino acid classes -rated from least to most wine-like (a) All (all AA), preferred, branched chain and aromatic (BCAA), not utilised, and the utilised but not preferred amino acids (utilised), in addition to ammonium chloride (ammonium), two commercial wines and 10% ethanol. Various combinations of anaerobic factors -rated from least to most wine-like (b) phytosterol (PHY), ergosterol (ERG), oleic acid (OLE), tween80 (TWE) and wine. Lastly various amino acids- rated from most to least wine-like (c) 2 commercial wines, 10 % ethanol, ammonium (NH3), all amino acids where all amino acids provide an equal amount of fermentable nitrogen (All AA), the contribution of sulphur containing amino acids were reduce (50% S-AA), as were the branch chain and aromatic amino acids (25% BCAA), (50% BCAA), (75% BCAA) here glutamine and alanine were used to compensate for the reduction of these amino concentrations to reach 200 mg/L of fermentable nitrogen.

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Supplementary figure 2. Correspondence analyses were applied to the description data (Check-all-that-apply) for the synthetic products treated with various combinations of anaerobic factors (a) (phytosterol (PHY), ergosterol and oleic acid (EGR+OLE), ergosterol and phytosterol (ERG+PHY), and SGJ anaerobic factor mixture) and nitrogen compositions (BCAA, Ammonium, and MS200 amino acids), as well as these synthetic products with 2 commercial wines (b). In addition to the wine-like rating of the synthetic products on their own (c), as well as relative to 2 commercial wines (d).