

**Table S1.** The region and vineyards of strains used

<b>Region</b>	<b>Vineyards</b>	<b>Strain</b>	<b>Strain code</b>
Yunnan	Adon village	<i>Rhodotorula nothofagi</i>	B1
		<i>Aureobasidium pullulans</i>	B2
		<i>Hanseniaspora uvarum</i>	B15
		<i>Hanseniaspora uvarum</i>	B17
		<i>Meyerozyma guilliermondii</i>	B21
		<i>Hanseniaspora uvarum</i>	B22
		<i>Hanseniaspora uvarum</i>	B39
	Lezhong village	<i>Hanseniaspora uvarum</i>	B12
	Shuori village	<i>Aureobasidium pullulans</i>	B5
		<i>Starmerella bacillaris</i>	B44
		<i>Starmerella bacillaris</i>	B45
	Sile village	<i>Hanseniaspora uvarum</i>	B35
		<i>Hanseniaspora uvarum</i>	B37
	Sinong village	<i>Hanseniaspora uvarum</i>	B8
		<i>Hanseniaspora uvarum</i>	B9
		<i>Hanseniaspora uvarum</i>	B10
		<i>Hanseniaspora uvarum</i>	B32
		<i>Hanseniaspora uvarum</i>	B33
		<i>Hanseniaspora uvarum</i>	B34
		<i>Hanseniaspora uvarum</i>	B48
Ningxia	Chateau Gem	<i>Hanseniaspora uvarum</i>	D3
		<i>Hanseniaspora uvarum</i>	D15
		<i>Candida glabrata</i>	D16
		<i>Candida glabrata</i>	D18
	Kaifu Winery	<i>Hanseniaspora uvarum</i>	D36
	Yunkou Wine Estate	<i>Candida xestobii</i>	D1
		<i>Hanseniaspora uvarum</i>	D2
		<i>Wickerhamomyces anomalus</i>	D6
		<i>Hanseniaspora uvarum</i>	D25
		<i>Hanseniaspora uvarum</i>	D26
		<i>Candida glabrata</i>	D40
		<i>Hanseniaspora uvarum</i>	D44
	Chateau Zhihuiyuanshi	<i>Hanseniaspora uvarum</i>	D8
		<i>Hanseniaspora uvarum</i>	D23
		<i>Starmerella bacillaris</i>	D31
		<i>Starmerella bacillaris</i>	D32
Fangshan, Beijing	Chateau Longxibao	<i>Hanseniaspora uvarum</i>	F8
		<i>Hanseniaspora uvarum</i>	F10
		<i>Hanseniaspora opuntiae</i>	F17
	Chateau Redengbao	<i>Hanseniaspora uvarum</i>	F12
Gansu	38 degree winery	<i>Meyerozyma caribbica</i>	F26
		<i>Hanseniaspora uvarum</i>	G2
	Sanhe village, Suwu town	<i>Hanseniaspora uvarum</i>	G6
		<i>Hanseniaspora uvarum</i>	G1
		<i>Hanseniaspora uvarum</i>	G5
Huailai, Hebei	Baihua Valley	<i>Hanseniaspora uvarum</i>	E27
	Nobility Chateau	<i>Hanseniaspora uvarum</i>	E7
	Chateau Red Leaf	<i>Hanseniaspora uvarum</i>	E29

Changli, Hebei	Amethyst Manor Bodega Langes	<i>Meyerozyma guilliermondii</i>	E31
		<i>Hanseniaspora uvarum</i>	E20
		<i>Starmerella bacillaris</i>	I17
		<i>Hanseniaspora uvarum</i>	I19
		<i>Hanseniaspora uvarum</i>	I23
		<i>Hanseniaspora vineae</i>	I40
		<i>Starmerella bacillaris</i>	I46
		<i>Hanseniaspora opuntiae</i>	I55
		<i>Hanseniaspora uvarum</i>	I57
		<i>Starmerella bacillaris</i>	I59
	Great Wall Base 1 (flat)	<i>Hanseniaspora uvarum</i>	I60
		<i>Starmerella bacillaris</i>	I71
		<i>Hanseniaspora vineae</i>	I1
		<i>Hanseniaspora uvarum</i>	I2
		<i>Starmerella bacillaris</i>	I8
		<i>Hanseniaspora uvarum</i>	I9
		<i>Starmerella bacillaris</i>	I13
		<i>Hanseniaspora uvarum</i>	I33
		<i>Starmerella bacillaris</i>	I36
	Yantai	<i>Hanseniaspora uvarum</i>	H4
		<i>Issatchenkia terricola</i>	H5
		<i>Hanseniaspora uvarum</i>	H6
		<i>Hanseniaspora uvarum</i>	H7
	Chateau Longhu	<i>Hanseniaspora uvarum</i>	H1
		<i>Hanseniaspora uvarum</i>	H2
		<i>Hanseniaspora uvarum</i>	H15
		<i>Hanseniaspora opuntiae</i>	H31
		<i>Hanseniaspora uvarum</i>	H37
	Chateau Reifeng Auzias Base Tonglili	<i>Hanseniaspora uvarum</i>	H30
		<i>Hanseniaspora opuntiae</i>	H16
		<i>Starmerella bacillaris</i>	H18
	COFCO Greatwall	<i>Kazachstania hellenica</i>	H67
		<i>Hanseniaspora uvarum</i>	H10
		<i>Issatchenkia terricola</i>	H20
		<i>Starmerella bacillaris</i>	H23
		<i>Hanseniaspora uvarum</i>	H25
		<i>Hanseniaspora uvarum</i>	H35

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**Table S2.** The average peak area and relative peak area of volatile aroma compounds in each sample

Aroma compounds	Grape juice		S1		H5		DES7		UV5		UV8	
	AVE Peak (×106)	RPA %	AVE Peak (×106)	RPA %	AVE Peak (×106)	RPA %	AVE Peak (×106)	RPA %	AVE Peak (×106)	RPA %	AVE Peak (×106)	RPA %
<b>Alcohol (Except ethanol)</b>												
2-Methyl-1-propanol	N.D.	N.D.	N.D.	N.D.	2.73±0.13b	0.54	2.55±0.14b	0.62	N.D.	N.D.	0.59±0.01a	0.06
3-Methyl-1-butanol	N.D.	N.D.	43.57±1.62b	1.70	49.53±10.76b	9.87	50.29±5.64b	12.30	21.38±0.85a	1.05	24.8±2.22a	2.43
Hexyl alcohol	31.5±6.77c	14.53	2.02±0.01a	0.08	8.89±0.82b	1.77	8.86±0.61b	2.17	6.27±0.57ab	0.31	2.56±0.13ab	0.25
Leaf alcohol	3.65±1.31b	1.69	N.D.	N.D.	0.72±0.32a	0.14	0.56±0.01a	0.14	N.D.	N.D.	N.D.	N.D.
(E)-2-Hexen-1-ol	45.91±9.9b	21.18	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.11±0.53a	0.05	N.D.	N.D.
2-Ethylhexanol	0.6±0.19a	0.28	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1-Octanol	0.23±0.04a	0.11	0.31±0.01b	0.01	N.D.	N.D.	N.D.	N.D.	0.4±0.02c	0.02	N.D.	N.D.
Terpineol	2.28±0.02b	1.05	N.D.	N.D.	1.02±0.16a	0.20	0.88±0.03a	0.21	N.D.	N.D.	N.D.	N.D.
1,2-Butylene glycol	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.37±0.02a	0.09	N.D.	N.D.	N.D.	N.D.
Geraniol	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.25±0.02a	0.02
Decyl alcohol	N.D.	N.D.	1.04±0.12b	0.04	0.11±0.02a	0.02	N.D.	N.D.	2.83±0.39c	0.14	0.08±0.01a	0.01
Citronellol	N.D.	N.D.	N.D.	N.D.	0.52±0.06b	0.10	0.46±0.01b	0.11	N.D.	N.D.	0.17±0.03a	0.02
1,2-Octanediol	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.81±0.2a	0.08
Benzyl alcohol	2±0.21bc	0.92	N.D.	N.D.	1.54±0.68bc	0.31	0.68±0.13ab	0.7	0.98±0.22ab	0.05	0.14±0.02a	0.01
Phenethyl alcohol	0.45±0.13a	0.21	38±3.77c	1.48	95.3±5.44d	18.98	101.93±1.37e	24.93	21.23±0.75b	1.05	21.39±2.37b	2.09
1-Dodecanol	N.D.	N.D.	2.31±0.46b	0.09	0.43±0.18a	0.09	0.24±0.01a	0.06	5.13±1.14c	0.25	0.14±0.03a	0.01
Nerolidol	N.D.	N.D.	1.28±0.22d	0.05	0.95±0.07bc	0.19	0.82±0.11b	0.20	1.21±0.1cd	0.06	0.09±0.05a	0.01
1-Tetradecanol	N.D.	N.D.	N.D.	N.D.	0.4±0.22a	0.08	0.28±0.01a	0.07	2.16±0.21b	0.11	0.09±0.04a	0.01
3,5-Dimethylbenzyl alcohol	N.D.	N.D.	0.42±0.03b	0.02	0.87±0.09c	0.17	0.82±0.07c	0.20	0.46±0.01b	0.02	0.17±0.03a	0.02
1-Pentanol		N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.13±1.93a	0.60	N.D.	N.D.
1,2-Heptanediol		N.D.	1.1±0.04a	0.04	0.34±0.13a	0.07	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
In total	86.63	39.97	90.04	3.51	163.34	32.54	168.75	41.28	75.28	3.71	51.27	5.02
<b>Acid</b>												
Propionic acid	N.D.	N.D.	N.D.	N.D.	0.46±0.08a	0.09	0.4±0.06a	0.10	N.D.	N.D.	N.D.	N.D.

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Decanyl acetate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.91±0.47a	0.09	N.D.	N.D.
Ethyl 9-decenoate	N.D.	N.D.	515.38±19.23c	20.08	22.66±10.69a	4.51	1.93±0.67a	0.47	254.04±32.04b	12.51	0.63±0.29a	0.06
Dimethyl glutarate	0.31±0.08a	0.14	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl cis-4-decenoate	N.D.	N.D.	1.96±0.32a	0.08	N.D.	N.D.	N.D.	N.D.	2.13±0.36a	0.11	N.D.	N.D.
Propylcaprate	N.D.	N.D.	1.03±0.04a	0.04	N.D.	N.D.	N.D.	N.D.	0.6±0.15a	0.03	N.D.	N.D.
Benzyl acetate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.18±0.03a	0.02
Isobutyl caprate	N.D.	N.D.	2.32±0.76b	0.09	1.17±0.13a	0.23	0.8±0.15a	0.19	0.56±0.14a	0.03	N.D.	N.D.
Methyl salicylate	N.D.	N.D.	N.D.	N.D.	0.12±0.01b	0.02	0.12±0.01b	0.03	N.D.	N.D.	0.04±0.01a	0.00
Ethyl phenylacetate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.27±0.03a	0.03
Phenethyl acetate	N.D.	N.D.	12.01±2.31a	0.47	2.93±0.25a	0.58	2.29±0.29a	0.56	3.96±0.17a	0.20	69.75±12.02b	6.83
Ethyl laurate	N.D.	N.D.	306.46±9.4d	11.94	30.67±6.42b	6.11	16.06±1.77ab	3.93	274.42±6.18c	13.52	11.16±4.32a	1.09
Isoamyl Octanoate	N.D.	N.D.	19.97±5.44b	0.78	2.39±0.11a	0.48	1.89±0.01a	0.46	N.D.	N.D.	0.36±0.08a	0.04
Isoamyl decanoate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	5.74±0.27a	0.28	N.D.	N.D.
Butyl decanoate	N.D.	N.D.	0.35±0.1a	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl tetradecanoate	N.D.	N.D.	7.12±0.75b	0.28	2.66±0.22a	0.53	2.01±0.23a	0.49	14.21±2.84c	0.70	1.35±0.22a	0.13
Ethyl undecanoate	N.D.	N.D.	11.99±2.22b	0.47	1.19±0.53a	0.24	0.12±0.05a	0.03	17.99±0.69c	0.89	0.11±0.07a	0.01
Ethyl Pentadecanoate	N.D.	N.D.	0.58±0.08a	0.02	0.38±0.11a	0.08	0.36±0.07a	0.09	N.D.	N.D.	N.D.	N.D.
Ethyl palmitate	N.D.	N.D.	62.1±11.55c	2.42	11.1±2.93a	2.21	12.34±3.02a	3.02	35.23±8.48b	1.74	5.32±1.01a	0.52
Ethyl 9-Hexadecenoate	N.D.	N.D.	126.66±16.41b	4.93	14.52±2.27a	2.89	7.57±1.65a	1.85	136.62±25.14b	6.73	1.53±0.33a	0.15
Ethyl stearate	N.D.	N.D.	4.37±0.93b	0.17	0.14±0a	0.03	0.18±0.07a	0.04	0.44±0.19a	0.02	0.1±0.03a	0.01
Ethyl linoleate	N.D.	N.D.	2.1±0.69a	0.08	1.17±0.03a	0.23	1.06±0.03a	0.26	N.D.	N.D.	N.D.	N.D.
Ethyl oleate	N.D.	N.D.	11.99±1.31b	0.47	3.28±1.45a	0.65	3.67±1.47a	0.90	3.74±1.38a	0.18	0.93±0.32a	0.09
2-Phenylethyl octanoate	N.D.	N.D.	0.42±0.11a	0.02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Butyl cyclohexyl phthalate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.21±0.01a	0.01	N.D.	N.D.
In total	0.31	0.14	2357.37	91.85	294.87	58.74	202.57	49.56	1790.31	88.19	938.43	91.85
<b>Aldehydes and ketones</b>												
Hexanal	32.4±13.82a	14.95	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2-Hexenal	30.39±7.65a	14.02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzaldehyde	1.08±0.25cd	0.50	0.2±0.04a	0.01	1.14±0.03d	0.23	0.77±0.18b	0.19	0.81±0.08bc	0.04	0.52±0.05b	0.05

Phenylacetaldehyde	0.57±0.06b	0.26	N.D.	N.D.	N.D.	N.D.	0.3±0.01a	0.07	N.D.	N.D.	N.D.	N.D.
Dimethylbenzaldehyde	15.97±1.25c	7.42	7.58±0.36b	0.30	N.D.	N.D.	2.27±0.26a	0.56	20.31±0.82d	1.00	8.45±1.12b	0.83
beta-Damascenone	14.33±0.76b	6.61	N.D.	N.D.	4.22±1.22a	0.84	3.99±1.54a	0.98	N.D.	N.D.	N.D.	N.D.
Tetradecanal	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.76±0.02a	0.04	N.D.	N.D.
2-Dodecanone	N.D.	N.D.	0.17±0.02a	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexadecanal	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.11±0.23a	0.05	N.D.	N.D.
2-Hydroxycyclopentadecanone	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.37±0.13a	0.09	N.D.	N.D.	N.D.	N.D.
In total	94.87	43.78	7.96	0.31	5.36	1.07	7.70	1.88	23.00	1.13	8.97	0.88
<b>Terpenes</b>												
2,4-Hexadiene	1.03±0a	0.47	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1-Decene	N.D.	N.D.	0.99±0.07a	0.04	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4,5-Dimethyl-1-hexene	N.D.	N.D.	9.07±2.77a	0.35	N.D.	N.D.	N.D.	N.D.	2.76±0.18a	0.14	N.D.	N.D.
1-Pentadecene	N.D.	N.D.	N.D.	N.D.	0.1±0.02a	0.02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
In total	1.03	0.47	10.06	0.39	0.1	0.02			2.76	0.14		
<b>Others</b>												
1-ethyl-4-methyl-Benzene	N.D.	N.D.	N.D.	N.D.	0.71±0.09a	0.14	0.59±0.15a	0.14	N.D.	N.D.	N.D.	N.D.
3-Methylthiopropanol	N.D.	N.D.	N.D.	N.D.	0.37±0.02a	0.07	0.33±0.03a	0.08	N.D.	N.D.	N.D.	N.D.
Isopropylbenzene	0.57±0.07a	0.26	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1-Ethyl-2,3-dimethylbenzene	0.44±0.02a	0.20	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1,2,4-Trimethylbenzene	3.58±0.44b	1.65	3.56±0.21b	0.14	7.72±0.32c	1.54	6.66±0.99c	1.62	0.99±0.13a	0.05	2.63±0.54b	0.26
1,2,4,5-Tetramethylbenzene	N.D.	N.D.	N.D.	N.D.	0.32±0.02b	0.06	0.53±0.09c	0.13	0.11±0.06a	0.01	0.11±0.01a	0.01
1,1,6-Trimethyltetralin	0.74±0.06a	0.34	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dehydro-ar-ionene	N.D.	N.D.	0.27±0.05a	0.01	0.23±0.08a	0.05	N.D.	N.D.	N.D.	N.D.	0.26±0.18a	0.03
4-Allylphenol	N.D.	N.D.	N.D.	N.D.	4.45±0.6a	0.89	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Phenol	0.11±0.03bc	0.05	N.D.	N.D.	0.13±0c	0.03	0.14±0.02c	0.03	0.08±0ab	0.00	0.06±0.01a	0.01
Cyclododecane	N.D.	N.D.	0.54±0.1a	0.02	N.D.	N.D.	N.D.	N.D.	2.14±0.24b	0.11	N.D.	N.D.
Thymol	0.66±0.07c	0.31	N.D.	N.D.	0.49±0.28bc	0.10	0.21±0.09ab	0.05	0.38±0.11abc	0.02	0.1±0.03a	0.01

4-Hydroxy-3-methoxystyrene	N.D.	N.D.	0.24±0.02a	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.48±0.02b	0.05
4-Isopropyl-1,6-dimethylnaphthalene	N.D.	N.D.	0.2±0.01b	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.1±0.02a	0.01
2,4-Di-tert-butylphenol	26.2±1.86b	12.09	12.93±0.33a	0.50	13.1±2.55a	2.61	14.59±2.35a	3.57	31.49±1.55b	1.55	17.48±8.27a	1.71
In total	32.3	14.9	17.73	0.69	27.52	5.48	23.04	5.64	35.21	1.74	21.21	2.07
<b>In total</b>	<b>216.72</b>		<b>2566.70</b>		<b>501.98</b>		<b>408.78</b>		<b>2030.17</b>		<b>1021.70</b>	

Note: Different letters in the same row indicate that the content levels of the measured substances are significantly different,  $p < 0.05$ . N.D. denotes "not determined."