Differences in the volatile profile of apple cider fermented with *Schizosaccharomyces pombe* and *Schizosaccharomyces japonicus*

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Supplementary Table S1. Chemical composition of apple cider fermented with *Schizosaccharomyces pombe* SzpT and Szp, *Schizosaccharomyces japonicus* SzjT and Szj, and *Saccharomyces cerevisiae* Sc at half fermentation. Data are the averages of three independent fermentations. Different letters for the same data series indicate a significant difference in Tukey's HSD test ($p<0.05$).
N.D.= not detected

Compound	Strain				
(g/L)	SzpT	Szp	SzjT	Szj	Sc
Fructose	41.68 ± 2.47^{a}	43.64 ± 0.50^{a}	34.63 ± 2.91^{a}	37.82 ± 7.19^{a}	40.24 ± 3.68^{a}
Glucose	5.95 ± 2.71^{b}	9.47 ± 0.89^{ab}	8.40 ± 1.00^{ab}	12.47 ± 2.76^{a}	5.44 ± 0.96^{b}
Sucrose	N.D.	N.D.	N.D.	1.59 ± 0.36^{a}	1.42 ± 0.09^{a}
Citrate	N.D.	N.D.	N.D.	N.D.	N.D.
Malate	3.25 ± 0.04^{a}	1.64 ± 0.01^{b}	0.93 ± 0.01^{d}	0.17 ± 0.00^{c}	3.25 ± 0.04^{a}
Glycerol	2.77 ± 0.51^{c}	3.35 ± 0.42^{c}	6.44 ± 0.66^{a}	5.04 ± 0.11^{b}	2.79 ± 0.31^{c}
Sorbitol	N.D.	N.D.	N.D.	N.D.	N.D.
Ethanol (v/v, %)	3.65 ± 0.60^{b}	4.39 ± 0.51^{ab}	4.49 ± 0.32^{ab}	3.80 ± 0.15^{b}	5.37 ± 0.56^{a}
pH	3.56 ± 0.04^{c}	3.58 ± 0.05^{c}	3.58 ± 0.03^{c}	4.74 ± 0.10^{a}	3.74 ± 0.02^{b}
Ratio Fructose/ Glucose	7.34 ± 1.39^{a}	4.63 ± 0.39^{b}	4.13 ± 0.18^{b}	3.04 ± 0.09^{b}	7.49 ± 0.85^{a}

Supplementary Table S2. Volatile organic compounds (μg/L) in apple cider fermented with *Schizosaccharomyces pombe* SzpT and Szp, *Schizosaccharomyces japonicus* SzjT and Szj, and *Saccharomyces cerevisiae* Sc.

Compound	IUPAC Name	OD	Strain					p- value
			SzpT	Szp	SzjT	Szj	Sc	
Esters								
ethyl acetate (mg/L)	ethyl acetate	Ethereal, fruity, sweet	32.58 ± 4.37^{c}	17.61 ± 3.91^{c}	180.96 ± 14.21^{c}	315.44 ± 73.07^{a}	63.29 ± 3.41^{b}	3.05e-06
ethyl butanoate	ethyl butanoate	Fruity sweet apple	125.4 ± 25.61^{c}	104.4 ± 6.17^{c}	182.83 ± 4.51^{a}	127.73 ± 8.33^{c}	225.7 ± 9.72^{b}	3.05e-06
ethyl hexanoate	ethyl hexanoate	Sweet, fruity, pineapple	127.77 ± 24.97^{c}	171.7 ± 4.24^{c}	148.77 ± 9.52^{c}	276.77 ± 20.39^{b}	448.77 ± 22.06^{a}	4.87e-09
ethyl octanoate	ethyl octanoate	Fruity, winey, waxy	74.23 ± 19.81^{c}	137.62 ± 8.63^{b}	19.7 ± 0.26^{d}	37.5 ± 1.57^{d}	526.7 ± 20.57^{a}	2.52e-12
ethyl decanoate	ethyl decanoate	Sweet, waxy, fruity	49.13 ± 25.05^{c}	112.42 ± 6.23^{b}	101.33 ± 20.1^{b}	33.3 ± 2.56^{c}	352 ± 23.06^{a}	6.05e-09
ethyl di-2 hydroxyhexanoate	ethyl 2-hydroxyhexanoate	Sweet, fruity	0.57 ± 0.06^{a}	0.7 ± 0.1^{a}	0.07 ± 0.06^{b}	0.03 ± 0.06^{b}	0.1 ± 0^{b}	2.19e-07
isoamyl acetate	3-methylbutyl acetate	Floral, rose, sweet	183.53 ± 28.67^{d}	145.03 ± 3.28^{d}	2166.77 ± 254.84^{c}	5994.03 ± 135.5^{a}	774.17 ± 28.26^{b}	4.22e-13
2 phenethyl acetate	2-phenylethyl acetate	Sweet, fruity	139.03 ± 1.76^{c}	130.98 ± 4.71^{c}	1174.47 ± 138.86^{a}	658.33 ± 69.38^{b}	196.13 ± 5.41^{c}	1.47e-08
		∑ *ESTERS (mg/L)*	33.27	18.41	184.75	322.57	65.81	
Alcohols								
isoamyl alcohol	3-methylbutan-1-ol	Roasted, spicy, sweet	42671.97 ± 4821.3^{cd}	24884.02 ± 2162.82^{d}	177672.2 ± 10105.07^{b}	247762.43 ± 15190^{a}	71098.37 ± 15597.49^{c}	8.82e-10
1 pentanol	pentan-1-ol	Sweet solvent, fusel	92.4 ± 4.99^{ab}	91.49 ± 6.86^{ab}	45.57 ± 5.02^{c}	111.87 ± 2.94^{a}	70.63 ± 19.58^{bc}	0.000103
1 hexanol	hexan-1-ol	Sweet, resin, ether	2031 ± 14.05^{a}	1884.05 ± 191.28^{ab}	926.53 ± 143.59^{c}	1953.57 ± 103.57^{ab}	1612.53 ± 117.49^{b}	5.66e-06
benzyl alcohol	phenylmethanol	Floral, rose, phenolic	51.7 ± 19.92^{b}	46.14 ± 19.61^{b}	41.9 ± 3.21^{b}	96.5 ± 3.05^{a}	17.27 ± 6.18^{b}	0.000332
phenylethyl alcohol	2-phenylethanol	Sweet, floral, fresh	2876.27 ± 502.83^{c}	2727.31 ± 143.16^{c}	6195.87 ± 515.27^{a}	4842.67 ± 274.79^{b}	3432.67 ± 220.25^{c}	1.49e-06
		∑ *ALCOHOLS*	47723.34	2457.01	184882.07	254767.04	76231.47	

Terpenes								
β-myrcene	7-methyl-3-methylideneocta-1,6-diene	Peppery, terpenic, spicy	1.04 ± 0.43^{b}	0.79 ± 0.16^{b}	0.97 ± 0.25^{b}	1.47 ± 0.27^{b}	2.33 ± 0.29^{a}	0.000566
limonene	1-methyl-4-prop-1-en-2-ylcyclohexene	Citrus, orange, fresh	0.35 ± 0.06^{ab}	0.33 ± 0.09^{b}	0.32 ± 0.06^{b}	0.51 ± 0.06^{ab}	0.63 ± 0.19^{a}	0.0183
linalool	3,7-dimethylocta-1,6-dien-3-ol	Citrus, floral, sweet	4.37 ± 0.53^{ab}	4.33 ± 0.61^{b}	2.28 ± 0.4^{c}	1.92 ± 0.21^{c}	5.67 ± 0.58^{a}	1.3e-05
α-terpineol	2-(4-methylcyclohex-3-en-1-yl) propan-2-ol	Woody, terpenic, lemon	0.25 ± 0.03^{b}	0.24 ± 0.06^{b}	0.22 ± 0.02^{b}	0.16 ± 0.03^{b}	0.39 ± 0.06^{a}	0.000759
geraniol	(2E)-3,7-dimethylocta-2,6-dien-1-ol	Sweet, floral, fruity	1.26 ± 0.37^{b}	2.28 ± 0.47^{ab}	1.33 ± 0.18^{b}	1.83 ± 0.55^{ab}	3.04 ± 0.57^{a}	0.00364
nerolidol 2	(3S,6Z)-3,7,11-trimethyldodeca-1,6,10-trien-3-ol	Mild, floral	0.82 ± 0.42^{b}	0.85 ± 0.06^{b}	0.79 ± 0.1^{b}	0 ± 0^{b}	2.58 ± 0.74^{a}	0.000137
		∑ *TERPENES*	8.09	8.82	5.91	5.89	14.64	
Fatty acids								
hexanoic acid	hexanoic acid	Sour, fatty, sweaty	1803.7 ± 160.44^{d}	2721.14 ± 147.14^{c}	3102.1 ± 142.53^{c}	8040.03 ± 208.39^{a}	4510.27 ± 99.93^{b}	2.62e-12
octanoic acid	octanoic acid	Fatty, waxy, rancid	10806.03 ± 678.07^{c}	14036.47 ± 776.31^{b}	2040.5 ± 285.69^{d}	2145 ± 201.12^{d}	25047.97 ± 855.22^{a}	3.08e-12
3-methylbutanoic acid	3-methylbutanoic acid	Tropical, acid, sweaty	16.27 ± 0.95^{b}	34.37 ± 2.05^{b}	2362.73 ± 436.96^{a}	300.07 ± 34.11^{b}	304.6 ± 106.66^{b}	2.37e-07
		∑ *FATTY ACIDS*	12662.00	16791.98	7505.33	10485.1	29862.84	
Sulphur compound								
methionol	3-methylsulfanylpropan-1-ol	Vegetable, sulphurous	731.9 ± 85.81^{b}	562.74 ± 25.93^{b}	3726.5 ± 715.89^{a}	954.5 ± 190.19^{b}	861.87 ± 282.41^{b}	3.39e-06
Benzenoid								
methyl salicylate	methyl 2-hydroxybenzoate	Vanilla, spices, herbal	0.21 ± 0.05^{c}	0.21 ± 0.04^{c}	0.28 ± 0.04^{bc}	0.80 ± 0.15^{b}	1.52 ± 0.41^{a}	3.53e-05
4-vinyl guaiacol	2-methoxy-4-(prop-1-en-1-yl) phenol	Spicy, clove-like	3.33 ± 0.43^{a}	4.11 ± 1.92^{a}	11.79 ± 5.62^{a}	13.20 ± 2.79^{a}	150.21 ± 7.25^{b}	0.000179

4-vinyl phenol	4-Ethenylphenol	Phenolic,pungent, and slightly sweet	2.97 ± 0.69[a]	3.82 ± 0.98[a]	5.85 ± 4.58[a]	5.05 ± 0.68[a]	375.88 ± 12.17[b]	7.01e-15
4-ethyl guaiacol	4-ethyl-2-methoxyphenol	Smoky, spicy, and phenolic	0.01 ± 0.02[a]	0.03 ± 0.01[a]	0 ± 0[a]	0.22 ± 0.03[b]	0.06 ± 0.01[a]	1.64e-07
4- ethyl phenol	para-ethylphenol	Strong, phenolic, smoky	0.12 ± 0.09[1]	0 ± 0[a]	0.08 ± 0.08[a]	0 ± 0[a]	0 ± 0[a]	0.0581
Norisoprenoids								
β-damascenone	(E)-1-(2,6,6-trimethylcyclohexa-1,3-dien-1-yl) but-2-en-1-one	Natural, sweet, fruity	0.72 ± 0.12[b]	1.04 ± 0.04[b]	0.82 ± 0.13[b]	0.66 ± 0.10[b]	2.49 ± 0.69[a]	0.000179

Mean ± standard deviation values of three independent replicates are indicated. Different letters in each row indicate significant difference according to HSD Tukey test ($p<0.05$).
OD = Odour Descriptor