

Supplementary Table 1. Fermentative volatiles in control and UPH musts fermented by *Saccharomyces cerevisiae* (Sc7VA), *Lachancea thermotolerans* (L31), *Torulaspora delbrueckii* (Td), *Hanseniaspora vineae* (Hv), *Metschnikowia pulcherrima* (M29). Compounds analyzed by HS-SPME-GC-MS, values are means \pm sd (fermentations in triplicate) in $\mu\text{g L}^{-1}$. Different letters within the same row mean significant differences for ANOVA and Tukey HSD test at $p < 0.05$.

| | Sc7VA | | L31 | | Td | | Hv | | M29 | |
|-------------------------|--------------------|---------------------|-------------------|--------------------|---------------------|------------------|---------------------|--------------------|---------------------|---------------------|
| | Control | | UPH | | Control | | UPH | | Control | |
| | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD |
| Ethyl hexanoate | 185.2 \pm 26.8 f | 136.4 \pm 17.4 de | 74.7 \pm 5.0 bc | 39.7 \pm 1.9 ab | 107.7 \pm 11.7 cd | 28.6 \pm 3.1 a | 98.9 \pm 8.4 c | 22.3 \pm 2.2 a | 161.2 \pm 16.3 ef | 77.4 \pm 8.3 c |
| Hexyl acetate | 4.7 \pm 0.5 c | 14.7 \pm 1.4 d | 0.7 \pm 1.1 a | 0.7 \pm 0.0 a | 4.4 \pm 0.4 c | 0.6 \pm 1.1 a | 2.6 \pm 0.2 b | 1.2 \pm 0.1 ab | 4.8 \pm 0.5 c | 2.4 \pm 0.2 b |
| Ethyl-3-hexenoate | 0.5 \pm 0.0 bc | 0.0 \pm 0.0 a | 2.9 \pm 0.4 d | 0.0 \pm 0.0 a | 0.8 \pm 0.2 c | 0.2 \pm 0.0 a | 0.1 \pm 0.0 a | 0.0 \pm 0.0 a | 0.2 \pm 0.1 ab | 0.2 \pm 0.0 ab |
| 3-Hexen-1-ol acetate | 0.8 \pm 0.1 de | 1.5 \pm 0.2 f | 0.0 \pm 0.0 a | 0.2 \pm 0.2 ab | 0.6 \pm 0.1 cd | 0.0 \pm 0.0 a | 0.3 \pm 0.0 ab | 0.2 \pm 0.2 ab | 1.0 \pm 0.1 e | 0.4 \pm 0.1 bc |
| 4-methyl-1-pentanol | 0.8 \pm 0.2 d | 0.2 \pm 0.0 a | 0.5 \pm 0.1 bc | 0.2 \pm 0.0 ab | 0.5 \pm 0.1 c | 0.2 \pm 0.0 a | 0.4 \pm 0.1 ab | 1.4 \pm 0.1 e | 0.6 \pm 0.1 cd | 0.1 \pm 0.0 a |
| 3-Hexen-1-ol, (E)- | 2.1 \pm 0.8 a | 1.8 \pm 0.4 a | 1.6 \pm 0.3 a | 2.1 \pm 0.4 a | 1.7 \pm 0.3 a | 1.5 \pm 0.3 a | 1.5 \pm 0.3 a | 2.0 \pm 0.5 a | 2.1 \pm 0.6 ab | 2.2 \pm 0.5 a |
| 3-ethoxy-1-propanol | 0.4 \pm 0.1 a | 1.4 \pm 0.4 bcd | 1.8 \pm 0.4 cd | 2.2 \pm 0.4 de | 1.1 \pm 0.2 abc | 2.4 \pm 0.5 e | 0.3 \pm 0.0 a | 1.1 \pm 0.3 abc | 0.6 \pm 0.1 ab | 1.1 \pm 0.3 ab |
| 3-Hexen-1-ol, (Z)- | 1.1 \pm 0.2 a | 1.7 \pm 0.4 a | 1.0 \pm 0.1 a | 1.5 \pm 0.6 a | 1.0 \pm 0.2 a | 1.3 \pm 0.2 a | 1.0 \pm 0.1 a | 1.5 \pm 0.4 a | 1.1 \pm 0.2 ab | 1.7 \pm 0.5 a |
| Ethyl octanoate | 308.2 \pm 26.8 i | 211.7 \pm 30.0 gh | 96.1 \pm 7.5 cd | 67.5 \pm 11.3 bc | 160.1 \pm 11.5 ef | 40.7 \pm 3.1 b | 192.5 \pm 10.2 fg | 20.3 \pm 2.8 a | 243.4 \pm 11.4 h | 125.8 \pm 15.6 de |
| Acetic acid | 27.3 \pm 6.5 ab | 57.6 \pm 12.7 c | 24.2 \pm 3.1 ab | 25.6 \pm 3.8 ab | 37.7 \pm 7.0 abc | 15.7 \pm 4.0 a | 63.0 \pm 11.6 c | 48.1 \pm 10.8 bc | 45.2 \pm 9.1 bc | 57.0 \pm 12.3 c |
| 3-methylbutyl hexanoate | 1.7 \pm 0.0 e | 0.3 \pm 0.2 abc | 0.5 \pm 0.1 bc | 0.0 \pm 0.0 a | 0.6 \pm 0.3 c | 0.0 \pm 0.0 a | 0.4 \pm 0.1 bc | 0.0 \pm 0.0 a | 1.2 \pm 0.3 d | 0.1 \pm 0.1 ab |
| Ethyl-3-octenoate | 1.7 \pm 0.5 c | 0.1 \pm 0.0 a | 4.5 \pm 0.5 e | 0.1 \pm 0.0 a | 3.2 \pm 0.2 d | 0.4 \pm 0.0 a | 0.5 \pm 0.0 ab | 0.2 \pm 0.0 a | 1.0 \pm 0.2 bc | 0.2 \pm 0.0 a |
| 2-Ethyl-1-hexanol | 0.5 \pm 0.3 a | 0.5 \pm 0.3 a | 0.3 \pm 0.1 a | 2.4 \pm 1.2 a | 0.4 \pm 0.1 a | 1.6 \pm 0.7 a | 0.3 \pm 0.1 a | 7.8 \pm 1.6 b | 0.9 \pm 0.6 a | 1.9 \pm 1.1 a |
| Benzaldehyde | 0.3 \pm 0.2 a | 0.1 \pm 0.0 a | 0.1 \pm 0.0 a | 0.1 \pm 0.0 a | 0.1 \pm 0.1 a | 0.2 \pm 0.1 a | 0.3 \pm 0.0 a | 2.3 \pm 0.5 b | 0.1 \pm 0.0 a | 0.0 \pm 0.0 a |
| Linalool | 0.8 \pm 0.2 a | 0.5 \pm 0.1 a | 0.6 \pm 0.1 a | 0.8 \pm 0.2 a | 0.4 \pm 0.1 a | 0.8 \pm 0.4 a | 0.4 \pm 0.1 a | 0.9 \pm 0.4 a | 0.5 \pm 0.1 a | 0.5 \pm 0.1 a |
| 1-Octanol | 1.7 \pm 0.5 de | 2.0 \pm 0.2 e | 0.5 \pm 0.0 ab | 0.4 \pm 0.1 a | 1.2 \pm 0.2 bcd | 0.3 \pm 0.0 a | 0.8 \pm 0.2 ab | 0.6 \pm 0.1 ab | 1.3 \pm 0.3 cde | 1.0 \pm 0.3 ab |
| 2-methylpropanoic acid | 1.7 \pm 0.7 a | 1.0 \pm 0.2 a | 4.9 \pm 0.7 d | 4.0 \pm 0.8 cd | 5.0 \pm 1.2 d | 1.5 \pm 0.3 a | 2.8 \pm 0.6 ab | 1.9 \pm 0.5 ab | 3.9 \pm 0.8 bcd | 2.1 \pm 0.7 ab |
| γ -butyrolactone | 1.2 \pm 0.3 a | 1.9 \pm 0.4 ab | 3.4 \pm 0.7 c | 1.8 \pm 0.3 ab | 2.3 \pm 0.3 abc | 3.2 \pm 0.8 c | 1.6 \pm 0.4 a | 1.2 \pm 0.3 a | 2.4 \pm 0.4 abc | 1.8 \pm 0.4 a |
| Butanoic acid | 1.3 \pm 0.4 ab | 0.9 \pm 0.2 ab | 1.2 \pm 0.2 ab | 0.9 \pm 0.1 ab | 1.1 \pm 0.2 ab | 0.7 \pm 0.2 a | 1.4 \pm 0.1 ab | 0.8 \pm 0.2 a | 1.5 \pm 0.4 b | 1.3 \pm 0.3 ab |

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|----------------------------------|----------------|-----------------|----------------|----------------|-----------------|---------------|----------------|-----------------|-----------------|----------------|
| Ethyl decanoate | 24.3 ± 2.8 bc | 18.2 ± 5.8 b | 4.0 ± 0.5 a | 3.5 ± 1.2 a | 8.4 ± 1.6 a | 2.5 ± 0.4 a | 27.6 ± 2.9 c | 9.2 ± 2.7 a | 19.3 ± 3.2 b | 7.6 ± 1.6 a |
| 3-methylbutanoic acid | 8.4 ± 2.0 c | 3.7 ± 0.7 a | 7.0 ± 1.0 bc | 5.1 ± 0.8 ab | 6.9 ± 1.3 bc | 2.7 ± 0.4 a | 4.4 ± 0.4 ab | 3.5 ± 0.6 a | 6.8 ± 1.2 bc | 4.1 ± 0.8 ab |
| Diethyl succinate | 21.5 ± 6.4 e | 5.9 ± 0.9 abc d | 9.3 ± 2.5 d | 3.6 ± 0.8 ab | 11.3 ± 2.2 cd | 2.5 ± 0.8 a b | 5.0 ± 1.3 ab c | 0.5 ± 0.1 a | 12.7 ± 3.0 d | 3.2 ± 1.0 ab |
| Ethyl 9-decanoate | 14.5 ± 3.1 e | 4.6 ± 0.9 abc | 9.4 ± 0.7 d | 1.4 ± 0.1 a | 22.1 ± 0.5 f | 2.7 ± 0.1 a b | 12.8 ± 0.7 e | 6.5 ± 0.6 cd | 13.0 ± 0.0 e | 5.5 ± 0.1 bc |
| 3-methylthio-1-propanol | 2.7 ± 0.8 cd | 0.6 ± 0.2 a | 2.1 ± 0.5 d | 0.5 ± 0.1 a | 3.2 ± 0.6 d | 0.7 ± 0.2 a | 1.1 ± 0.3 ab | 0.5 ± 0.1 a | 1.6 ± 0.4 abc | 0.5 ± 0.1 a |
| β-citronellol | 0.6 ± 0.2 ab | 1.0 ± 0.6 b | 0.3 ± 0.1 a | 0.4 ± 0.1 ab | 0.4 ± 0.1 ab | 0.3 ± 0.1 a | 0.4 ± 0.1 a | 0.3 ± 0.0 a | 0.4 ± 0.1 ab | 0.7 ± 0.2 ab |
| ethyl phenylacetate | 0.3 ± 0.0 d | 0.2 ± 0.0 abc | 0.3 ± 0.1 cd | 0.2 ± 0.0 ab c | 0.3 ± 0.1 bcd | 0.1 ± 0.0 a | 0.1 ± 0.1 ab | 0.2 ± 0.0 abc | 0.2 ± 0.0 abc d | 0.3 ± 0.0 bc d |
| Ethyl 4-hydroxybutanoate | 0.6 ± 0.2 ab | 1.0 ± 0.1 bcd | 1.3 ± 0.3 cd | 0.7 ± 0.2 ab | 0.9 ± 0.2 abc d | 1.4 ± 0.3 d | 0.5 ± 0.2 ab | 0.3 ± 0.1 a | 1.0 ± 0.2 bcd | 0.8 ± 0.2 ab c |
| β-damascenone | 1.3 ± 0.4 a | 1.4 ± 0.2 a | 1.3 ± 0.4 a | 1.6 ± 0.4 a | 1.7 ± 0.3 a | 1.2 ± 0.4 a | 1.2 ± 0.3 a | 4.5 ± 0.9 b | 1.4 ± 0.3 a | 1.5 ± 0.5 a |
| Hexanoic acid | 11.2 ± 3.0 c | 10.1 ± 1.1 cb | 7.4 ± 1.7 ab c | 5.4 ± 0.9 ab | 8.1 ± 1.4 abc | 3.4 ± 0.7 a | 7.4 ± 1.2 ab c | 4.3 ± 0.6 a | 11.1 ± 2.4 c | 9.6 ± 2.2 cb |
| Phenyl methanol (benzyl alcohol) | 1.2 ± 0.4 c | 0.3 ± 0.1 a | 0.5 ± 0.2 ab | 0.3 ± 0.1 a | 0.8 ± 0.2 bc | 0.3 ± 0.1 a | 0.7 ± 0.2 ab c | 0.3 ± 0.1 a | 0.8 ± 0.2 abc | 0.4 ± 0.1 ab |
| Octanoic acid | 4.8 ± 1.3 bc | 5.7 ± 0.2 c | 2.7 ± 0.9 ab | 2.6 ± 0.6 ab | 3.8 ± 0.5 abc | 1.4 ± 0.4 a | 3.5 ± 0.6 ab c | 4.6 ± 0.7 bc | 5.2 ± 1.3 c | 4.9 ± 1.2 bc |
| 4-vinylguaiacol | 0.6 ± 0.2 bc d | 0.8 ± 0.1 cd | 0.2 ± 0.1 a | 0.4 ± 0.1 ab | 0.5 ± 0.1 abc d | 0.4 ± 0.1 a b | 0.3 ± 0.1 ab | 0.5 ± 0.1 abc d | 0.4 ± 0.1 abc | 0.9 ± 0.2 d |
| Ethyl hexadecanoate | 2.0 ± 0.5 b | 2.3 ± 0.0 bc | 1.2 ± 0.3 ab | 2.3 ± 0.3 bc | 3.8 ± 0.5 d | 2.0 ± 0.5 b | 0.7 ± 0.4 a | 3.3 ± 0.3 cd | 2.1 ± 0.1 b | 2.3 ± 0.8 bc |
| Decanoic acid | 0.2 ± 0.0 bc | 0.3 ± 0.0 e | 0.1 ± 0.0 ab | 0.1 ± 0.0 ab c | 0.3 ± 0.0 e | 0.1 ± 0.0 a | 0.2 ± 0.0 de | 0.7 ± 0.1 f | 0.2 ± 0.0 c | 0.2 ± 0.0 cd |
| Ethyl 9-hexadecenoate | 0.3 ± 0.0 a | 0.5 ± 0.0 a | 0.3 ± 0.0 a | 1.2 ± 0.1 b | 0.3 ± 0.1 a | 1.4 ± 0.3 b | 0.1 ± 0.0 a | 0.2 ± 0.0 a | 0.3 ± 0.1 a | 1.2 ± 0.3 b |
| Ethyl octadecanoate | 0.2 ± 0.1 a | 0.3 ± 0.0 a | 0.2 ± 0.1 a | 0.3 ± 0.0 a | 1.1 ± 0.1 c | 0.2 ± 0.1 a | 0.1 ± 0.0 a | 0.5 ± 0.1 b | 0.3 ± 0.0 a | 0.2 ± 0.1 a |
| Ethyl 9-octadecenoate | 0.3 ± 0.0 ab | 0.4 ± 0.0 b | 0.3 ± 0.1 b | 0.9 ± 0.0 c | 0.3 ± 0.0 ab | 0.9 ± 0.2 c | 0.1 ± 0.0 a | 0.1 ± 0.0 a | 0.3 ± 0.0 b | 0.7 ± 0.2 c |
| Σesters | 566 | 397 | 204 | 122 | 325 | 83 | 342 | 65 | 461 | 227 |
| Σterpenes | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Totals | 637 | 491 | 267 | 181 | 404 | 124 | 435 | 154 | 550 | 322 |

