**Supplementary Materials**

The following are available online at www.mdpi.com/xxx/s1

Table S1: Volatile aroma compounds of different concentrations of α-pinene from 60-day black queen wine

Table S2: Volatile aroma compounds of different concentrations of α-pinene from 1-day black queen wine.

Table S1. Volatile aroma compounds of different concentrations of α-pinene from 60-day black queen wine.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Compounds1 | Area (%)2 | | | | |
| Control | SO2 | 0.125%  α-pinene | 0.25%  α-pinene | 0.50%  α-pinene |
| Carboxilic acids |  | | | | |
| Propanoic acid | -3 | - | - | - | 0.83 |
| Hydrogen azide | 1.38 | - | - | - | - |
| Acetoin | - | - | 0.67 | - | - |
| Koten |  | | | | |
| Ketone | - | - | - | - | 2.88 |
| Esters |  | | | | |
| Ether, tert-butyl ethyl | - | - | 0.18 | 1 | 0.85 |
| L-Proline, 5-oxo-, methyl ester | - | - | - | - | 1.24 |
| Alcohols |  | | | | |
| Isopentyl alcohol | 66.97 | 100 | 12.74 | 22.56 | 6.48 |
| (1R)-endo-(+)-Fenchyl alcohol | - | - | 2.98 | 5.98 | 6.02 |
| Myrtenol | - | - | - | 1.78 | 6.39 |
| Terpenoids |  | | | | |
| 4-Penten-2-one | - | - | - | 2.38 | - |
| 3-Buten-2-one, 3-methyl | 26.51 | - | 51.64 | - | - |
| Terminal | - | - | 30.47 | 58.71 | 64.81 |
| Other compounds |  | | | | |
| Butane, 1-isocyano- | - | - | 1.28 | 5.1 | 8.78 |
| 4-Pyridazinamine | - | - | - | - | 1.67 |
| Propane, 2-nitro- | 5.13 | - | - | - | - |

1Aroma compounds detected in black queen wine

2Area(%) express volatile compounds content by GCMS

3Not detected in sample

Table S2. Volatile aroma compounds of different concentrations of α-pinene from 1-day black queen wine.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Compounds1 | Area (%)2 | | | | |
| Control | SO2 | 0.125  α-pinene | 0.25%  α-pinene | 0.50%  α-pinene |
| Carboxilic acids |  | | | | |
| Ethanethioic acid | -3 | - | 0.52 | - | - |
| Pentanoic acid | - | - | 0.54 | - | - |
| Oxalic acid | - | 3.65 | 0.59 | - | - |
| Butanoic acid | 13.06 | 7.02 | - | 5.93 | - |
| Sulfurous acid | - | - | - | 0.68 | - |
| Undecanoic acid | 16.26 | - | - | 0.93 | - |
| Propenoic acid | - | - | 0.61 | - | - |
| Acetic acid | - | - | 0.76 | 10.92 | - |
| Sulfurous acid | - | 8.83 | - | 6.02 | - |
| Oxalic acid | 7.09 | 3.14 | - | 0.64 | - |
| Butanoic acid | - | 3.74 | - | 0.64 | - |
| Decanoic acid | - | - | - | - | - |
| Koten |  | | | | |
| 2-Butanone, 3-ethoxy-3-methyl | - | - | 1.25 | 0.63 | 9.73 |
| Butyrolactone | - | - | 0.73 | - | - |
| 2-Hydroxy-γ-butyrolactone | 6.18 | - | - | - | - |
| 4-Heptanone, 2-methyl- | - | - | - | 0.84 | - |
| Esters |  | | | | |
| Ethyl acetate | 7.70 | 21.63 | - | - | 5.61 |
| Tert-Butyl acrylate | 6.42 | - | - | - | - |
| Alcohols |  | | | | |
| Isobutyl alcohol | - | 5.30 | 1.20 | 0.62 | - |
| Isopentyl alcohol | 21.82 | 26.77 | 31.24 | 22.16 | 27.22 |
| endo-Borneol | - | - | 2.02 | 1.42 | - |
| Phenylethyl alcohol | - | - | 0.89 | - | - |
| Myrtenol | - | - | 0.87 | 1.29 | - |
| Fenchol, exo- | - | - | 6.07 | 5.03 | 4.14 |
| Pinocarveol <trans-> | - | - | 2.14 | 3.90 | 1.96 |
| 1-Propanol, 2-methyl-2-nitro- | - | - | 0.42 | - | - |
| Terpenoids |  | | | | |
| α-pinene | - | - | - | - | 17.36 |
| Limonene | - | - | 1.01 | - | 2.19 |
| Terpinen-4-ol | - | - | 1.02 | 0.68 | - |
| α-Terpineol | - | - | 43.12 | 23.45 | 13.67 |
| 2-Cyclopenten-1-one, 2,3,5-trimethyl-4-methylene- | - | - | 0.36 | - | - |
| Oxirane, (butoxymethyl)- | - | 3.39 | - | 0.97 | - |
| Ethylene oxide cyclic hexamer | - | - | - | - | - |
| Aziridine, 1-methyl- | 5.48 | - | - | - | - |
| 2-Propen-1-ol | - | 4.98 | - | - | - |
| Other compounds |  | | | | |
| 1,3-Dioxolane, 2,4,5-trimethyl- | - | 5.49 | - | - | 2.96 |
| Toluene | - | - | - | - | 3.55 |
| 3-Methyl-4-cyclohexene-1,2-dicarboxylic anhydride | - | - | 0.74 | - | 2.78 |
| Benzene, 1-methyl-4-(1-methylethenyl)- | - | - | 3.19 | - | 8.76 |
| Bicyclo[2.2.1]heptane, 2-(2-propenyl)- | - | - | 0.60 | - | - |
| Hexahydro-1,3,5-trinitroso-1,3,5-triazine | 9.72 | - | - | - | - |
| Docosane,Oxirane, (butoxymethyl)- | 6.20 | - | - | 9.62 | - |
| Furan, 2-(1,1-dimethylethoxy)tetrahydro,2-tert-Butoxytetrahydrofuran | - | - | - | - | - |
| Succindialdehyde | - | 6.00 | - | - | - |
| Hexadecane, 1-iodo,Propane, 1-(chloromethoxy)-2-methyl | - | - | - | 1.94 | - |
| Cyclobutane, methyl,Propane, 2-methoxy-2-methyl- | - | - | - | 0.71 | - |
| 1,4-Dioxane-2,5-dione, 3,6-dimethyl- | - | - | - | 0.87 | - |

1Aroma compounds detected in black queen wine

2Area(%) express volatile compounds content by GCMS

3Not detected in sample