*Supplemental Data for:*
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**Supplemental Table 1** Basic berry chemical composition taken at time of harvest during the 2019 vintage. Values represent the average of three replicates followed by the standard error of the mean (n = 3).

| Varietal | Total soluble solids (Brix) | pH | Titratable acidity (g/L) |
|---|---|---|---|
| Merlot | 22.7 ± 0.20 | 3.56 ± 0.20 | 5.10 ± 0.20 |
| Malbec | 22.8 ± 0.20 | 3.59 ± 0.30 | 5.40 ± 0.20 |
| Petite Sirah | 24.3 ± 0.10 | 3.54 ± 0.10 | 5.80 ± 0.30 |

**Supplemental Table 2** One-way analysis of variance of the basic chemical composition and viscosity of monovarietal, cofermented, and blended Malbec, Merlot, and Petite Sirah wines. Values represent the mean of three tank replicates followed by the standard error of the mean (n = 3).

| Treatment | Ethanol (v/v%) | pH | Titratable acidity (g/L) | Glucose + fructose (g/L) | Lactic acid (g/L) | Malic acid (g/L) | Acetic acid (g/L) |
|---|---|---|---|---|---|---|---|
| Merlot (Mer) | 13.5 ± 0.1 j[a] | 4.00 ± 0.01 b | 5.26 ± 0.02 a | 0.08 ± 0.01 defg | 0.64 ± 0.02 g | 0.01 ± 0.01 e | 0.31 ± 0.02 h |
| Malbec (Mal) | 14.7 ± 0.1 d | 4.02 ± 0.02 ab | 4.95 ± 0.03 bcde | 0.15 ± 0.02 b | 1.08 ± 0.02 b | 0.01 ± 0.00 de | 0.35 ± 0.02 fg |
| Petite Sirah (PS) | 15.3 ± 0.1 a | 4.01 ± 0.02 ab | 4.86 ± 0.03 de | 0.15 ± 0.01 b | 0.91 ± 0.03 e | 0.01 ± 0.01 de | 0.34 ± 0.01 gh |
| MalMer COF[b] | 14.0 ± 0.0 i | 4.00 ± 0.01 ab | 4.92 ± 0.07 cde | 0.13 ± 0.02 bc | 0.93 ± 0.01 de | 0.03 ± 0.01 a | 0.34 ± 0.01 fg |
| MalMer PAF | 14.0 ± 0.1 i | 4.03 ± 0.01 a | 4.93 ± 0.01 cde | 0.08 ± 0.00 efg | 0.90 ± 0.02 e | 0.02 ± 0.01 abc | 0.41 ± 0.00 d |
| MalMer PMLF | 14.1 ± 0.0 hi | 3.92 ± 0.00 def | 5.16 ± 0.07 abcd | 0.06 ± 0.01 fg | 0.92 ± 0.01 de | 0.02 ± 0.01 abc | 0.46 ± 0.01 c |
| MerPS COF | 14.3 ± 0.0 fg | 3.96 ± 0.02 c | 5.13 ± 0.17 abcde | 0.10 ± 0.01 de | 0.85 ± 0.02 f | 0.01 ± 0.01 cd | 0.37 ± 0.00 ef |
| MerPS PAF | 14.4 ± 0.0 ef | 3.91 ± 0.00 efg | 5.14 ± 0.13 abcde | 0.07 ± 0.01 efg | 0.93 ± 0.02 de | 0.01 ± 0.02 cd | 0.41 ± 0.01 d |
| MerPS PMLF | 14.2 ± 0.0 gh | 3.89 ± 0.00 fgh | 5.32 ± 0.07 a | 0.06 ± 0.00 g | 0.94 ± 0.02 de | 0.03 ± 0.00 ab | 0.52 ± 0.01 b |
| MalPS COF | 14.9 ± 0.0 bc | 3.87 ± 0.01 h | 5.19 ± 0.09 abc | 0.21 ± 0.01 a | 1.06 ± 0.02 b | 0.02 ± 0.00 abc | 0.36 ± 0.00 fg |
| MalPS PAF | 15.0 ± 0.0 b | 3.94 ± 0.01 cde | 4.84 ± 0.03 e | 0.11 ± 0.02 cd | 1.11 ± 0.01 b | 0.01 ± 0.01 cd | 0.45 ± 0.01 c |
| MalPS PMLF | 14.8 ± 0.0 c | 3.94 ± 0.00 cd | 5.15 ± 0.31 abcd | 0.09 ± 0.00 def | 1.18 ± 0.01 a | 0.02 ± 0.01 abc | 0.55 ± 0.01 a |
| MalMerPS COF | 14.4 ± 0.0 f | 3.89 ± 0.01 fgh | 4.94 ± 0.03 bcde | 0.11 ± 0.01 cd | 0.96 ± 0.00 cd | 0.02 ± 0.01 abc | 0.36 ± 0.02 fg |
| MalMerPS PAF | 14.5 ± 0.1 e | 3.88 ± 0.01 gh | 5.02 ± 0.04 abcde | 0.11 ± 0.01 cd | 0.95 ± 0.02 cde | 0.01 ± 0.00 bcd | 0.40 ± 0.00 de |
| MalMerPS PMLF | 14.4 ± 0.1 f | 3.76 ± 0.01 i | 5.24 ± 0.02 ab | 0.08 ± 0.01 defg | 1.00 ± 0.02 c | 0.02 ± 0.00 abc | 0.42 ± 0.01 d |
| *p* value[c] | **<0.0001** | **<0.0001** | **0.037** | **<0.0001** | **<0.0001** | **0.002** | **<0.0001** |

[a]Different letters within the same column indicate a significant difference for Fisher's least significant difference test ($p < 0.05$).
[b]COF, cofermentation; PAF, post-alcoholic fermentation; PMLF, post-malolactic fermentation.
[c]Significant *p* values are shown in bold fonts.

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**Supplemental Table 3** One-way analysis of variance of the phenolic composition of monovarietal, cofermented, and blended Malbec, Merlot, and Petite Sirah wines. Values represent the mean of three tank replicates followed by the standard error of the mean (n = 3). SPP, small polymeric pigments; LPP, large polymeric pigments; TPP, total polymeric pigments.

| Treatment | Anthocyanins (mg/L malvidin-3-glucoside) | SPP | LPP | TPP | Tannins (mg/L CE) | Total phenolics (mg/L CE) | Non tannin phenolics (mg/L CE) |
|---|---|---|---|---|---|---|---|
| Merlot (Mer) | 220 ± 7 i[a] | 2.28 ± 0.04 g | 2.53 ± 0.36 a | 4.80 ± 0.36 efg | 1163 ± 28 ab | 2938 ± 23 bc | 1774 ± 4 cde |
| Malbec (Mal) | 447 ± 38 de | 2.68 ± 0.21 f | 1.88 ± 0.22 def | 4.56 ± 0.43 efg | 923 ± 59 g | 2523 ± 214 gh | 1600 ± 157 fg |
| Petite Sirah (PS) | 584 ± 11 a | 4.28 ± 0.21 a | 2.61 ± 0.22 a | 6.89 ± 043 a | 1071 ± 41 def | 2734 ± 139 cdefg | 1663 ± 97 defg |
| MalMer COF[b] | 396 ± 10 fg | 2.54 ± 0.02 fg | 1.92 ± 0.18 def | 4.45 ± 0.20 fg | 1143 ± 3 abc | 3097 ± 63 ab | 1953 ± 63 ab |
| MalMer PAF | 364 ± 12 gh | 2.53 ± 0.04 fg | 2.06 ± 0.02 bcde | 4.59 ± 0.03 efg | 1082 ± 17 cdef | 2803 ± 79 cde | 1722 ± 65 def |
| MalMer PMLF | 323 ± 20 h | 2.67 ± 0.11 f | 1.64 ± 0.12 ef | 4.32 ± 0.14 g | 955 ± 18 g | 2554 ± 12 fgh | 1599 ± 29 fg |
| MerPS COF | 403 ± 9 efg | 3.35 ± 0.06 d | 2.40 ± 0.11 abc | 5.75 ± 0.05 bc | 1178 ± 14 ab | 3120 ± 31 ab | 1942 ± 18 abc |
| MerPS PAF | 389 ± 6 fg | 3.34 ± 0.03 d | 2.51 ± 0.04 a | 5.85 ± 0.07 b | 1115 ± 9 bcde | 2870 ± 20 cd | 1754 ± 23 def |
| MerPS PMLF | 399 ± 15 fg | 2.99 ± 0.12 e | 2.19 ± 0.03 abcd | 5.18 ± 0.11 cde | 1135 ± 11 abcd | 2928 ± 29 bc | 1793 ± 36 bcd |
| MalPS COF | 529 ± 18 b | 3.75 ± 0.09 b | 2.44 ± 0.02 ab | 6.19 ± 0.07 b | 1031 ± 5 f | 2656 ± 8 defg | 1626 ± 6 defg |
| MalPS PAF | 486 ± 12 bcd | 3.47 ± 0.02 bcd | 1.53 ± 0.15 f | 5.01 ± 0.13 ef | 929 ± 4 g | 2423 ± 13 h | 1495 ± 15 g |
| MalPS PMLF | 522 ± 5 bc | 3.52 ± 0.06 bcd | 2.29 ± 0.07 abcd | 5.81 ± 0.13 b | 1029 ± 10 f | 2642 ± 58 efg | 1613 ± 48 efg |
| MalMerPS COF | 481 ± 13 cd | 3.42 ± 0.06 cd | 2.21 ± 0.01 abcd | 5.63 ± 0.06 bcd | 1197 ± 17 a | 3166 ± 37 a | 1969 ± 53 a |
| MalMerPS PAF | 413 ± 25 ef | 3.72 ± 0.14 bc | 1.98 ± 0.17 cde | 5.70 ± 0.26 bc | 1023 ± 2 f | 2742 ± 22 cdef | 1719 ± 19 def |
| MalMerPS PMLF | 380 ± 4 fg | 2.83 ± 0.04 ef | 2.20 ± 0.04 abcd | 5.02 ± 0.27 def | 1068 ± 8 ef | 2583 ± 16 fgh | 1515 ± 24 g |
| *p* value[c] | **<0.0001** | **<0.0001** | **0.000** | **<0.0001** | **<0.0001** | **<0.0001** | **<0.0001** |

[a]Different letters within the same column indicate a significant difference for Fisher's least significant difference test ($p < 0.05$).
[b]COF, cofermentation; PAF, post-alcoholic fermentation; PMLF, post-malolactic fermentation.
[c]Significant *p* values are shown in bold fonts.

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**Supplemental Table 4** $r^2$ values derived from a Pearson type principal component analysis, showing correlation between time parameter factor loadings.

| Time parameters | $V_{max}$ | $T_{max}$ (sec) | $D_{max}$ (sec) | $T_{first}$ (sec) | $T_{last}$ (sec) | $T_{dominance}$ (sec) |
|---|---|---|---|---|---|---|
| $V_{max}$ | **1**[a] | **0.774** | **0.809** | **0.706** | **0.861** | **0.756** |
| $T_{max}$ (sec) | **0.774** | **1** | **0.865** | **0.966** | **0.964** | **0.549** |
| $D_{max}$ (sec) | **0.809** | **0.865** | **1** | **0.825** | **0.898** | **0.679** |
| $T_{first}$ (sec) | **0.706** | **0.966** | **0.825** | **1** | **0.919** | **0.420** |
| $T_{last}$ (sec) | **0.861** | **0.964** | **0.898** | **0.919** | **1** | **0.697** |
| $T_{dominance}$ (sec) | **0.756** | **0.549** | **0.679** | **0.420** | **0.697** | **1** |

[a]Values in bold are different from 0 at a significance of $p = 0.05$.

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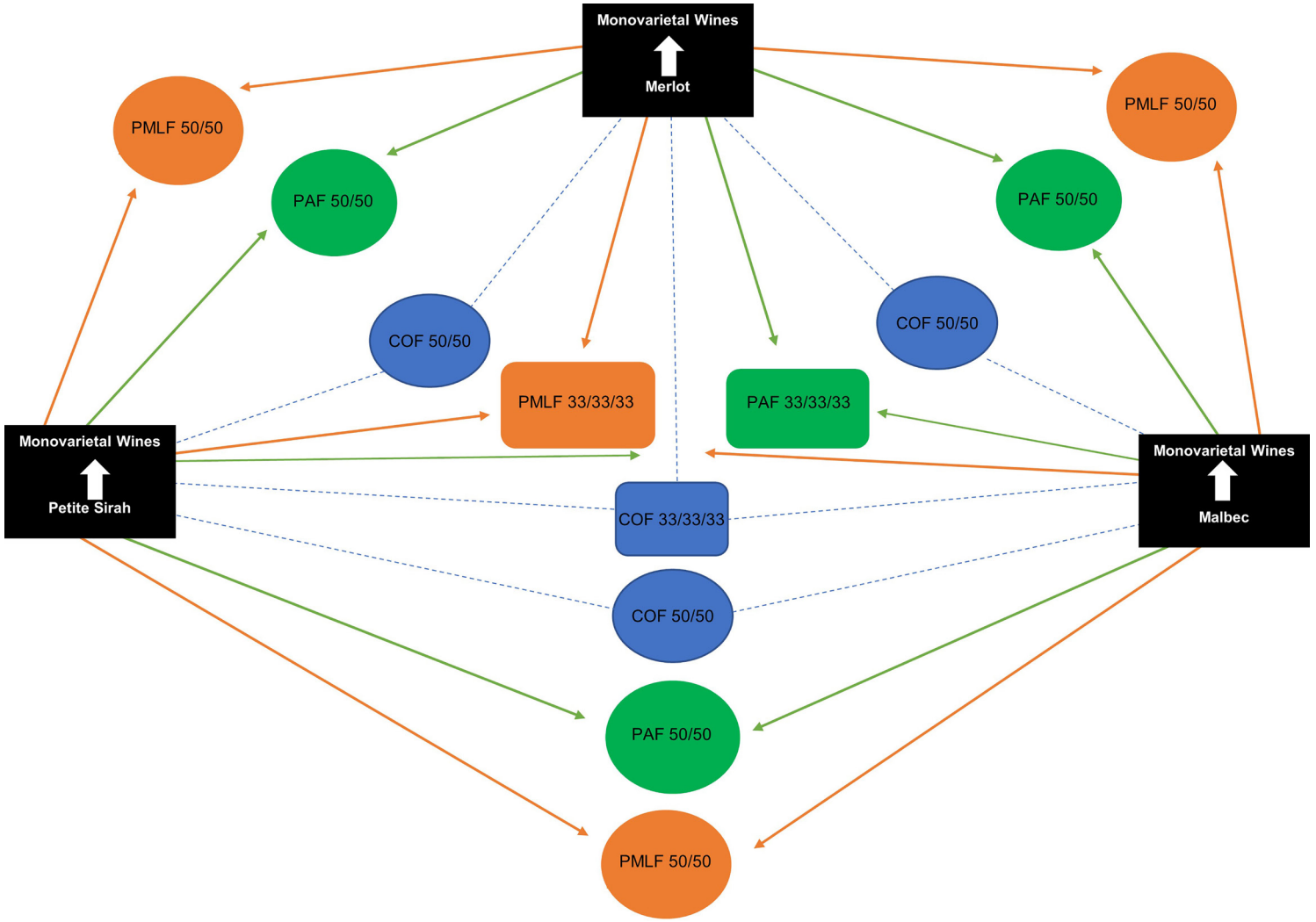


**Supplemental Figure 1** Flow diagram of winemaking treatments at the three stages of blending. ■ indicates blending of fruit after fruit processing for cofermentation (COF); ■ indicates blending from monovarietal wines after alcoholic fermentation for post-alcoholic fermentation (PAF); ■ indicates blending of monovarietal wines after malolactic fermentation for post-malolactic fermentation (PMLF); ⬭ indicates a binary blend with an even proportion of two varieties (50/50); ▭ indicates a tertiary blend with an even proportion of all three varieties (33/33/33); ·— — —· indicates blending of fruit; ⟶ indicates blending using monovarietal wine.

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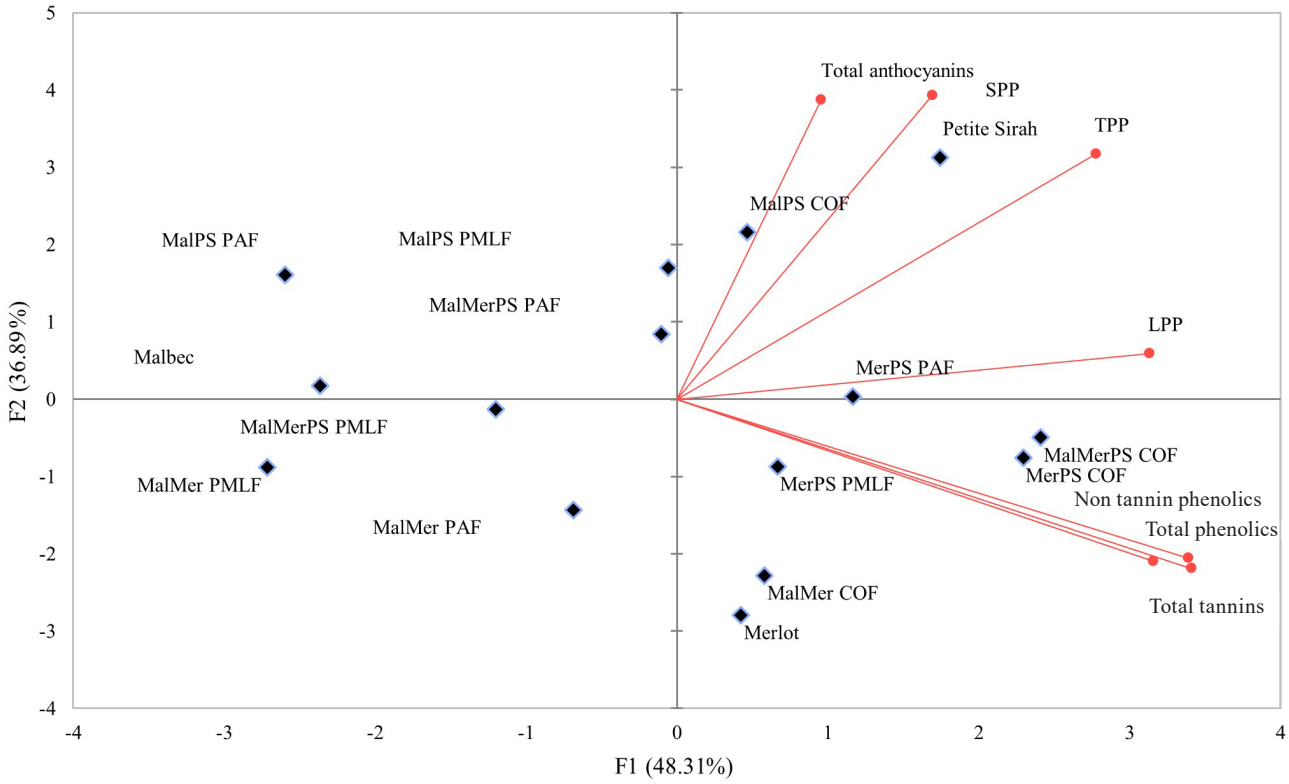


**Supplemental Figure 2** Principal component analysis of phenolic chemistry of monovarietal, cofermented, and blended Malbec, Merlot, and Petite Sirah wines (MalPS, Malbec-Petite Sirah; MalMer, Malbec-Merlot; MerPS, Merlot-Petite Sirah; MalMerPS, Malbec-Merlot-Petite Sirah). COF, cofermentation; PAF, post-alcoholic fermentation; PMLF, post-malolactic fermentation; SPP, small polymeric pigments; LPP, large polymeric pigments; TPP, total polymeric pigments.