**SUPPLEMENTARY DATA**
Škrab, D., Sivilotti, P., Comuzzo, P., Voce S., Cisilino, D., Carlin, S., Arapitsas, P., Masuero, D., & Vrhovsek, U. (2023). Influence of harvest date on multi-targeted metabolomic profile and sensory attributes of Ribolla Gialla base and sparkling wines. *OENO One*, *58*(1).
https://doi.org/10.20870/oeno-one.2024.58.1.7668

# Supplementary data

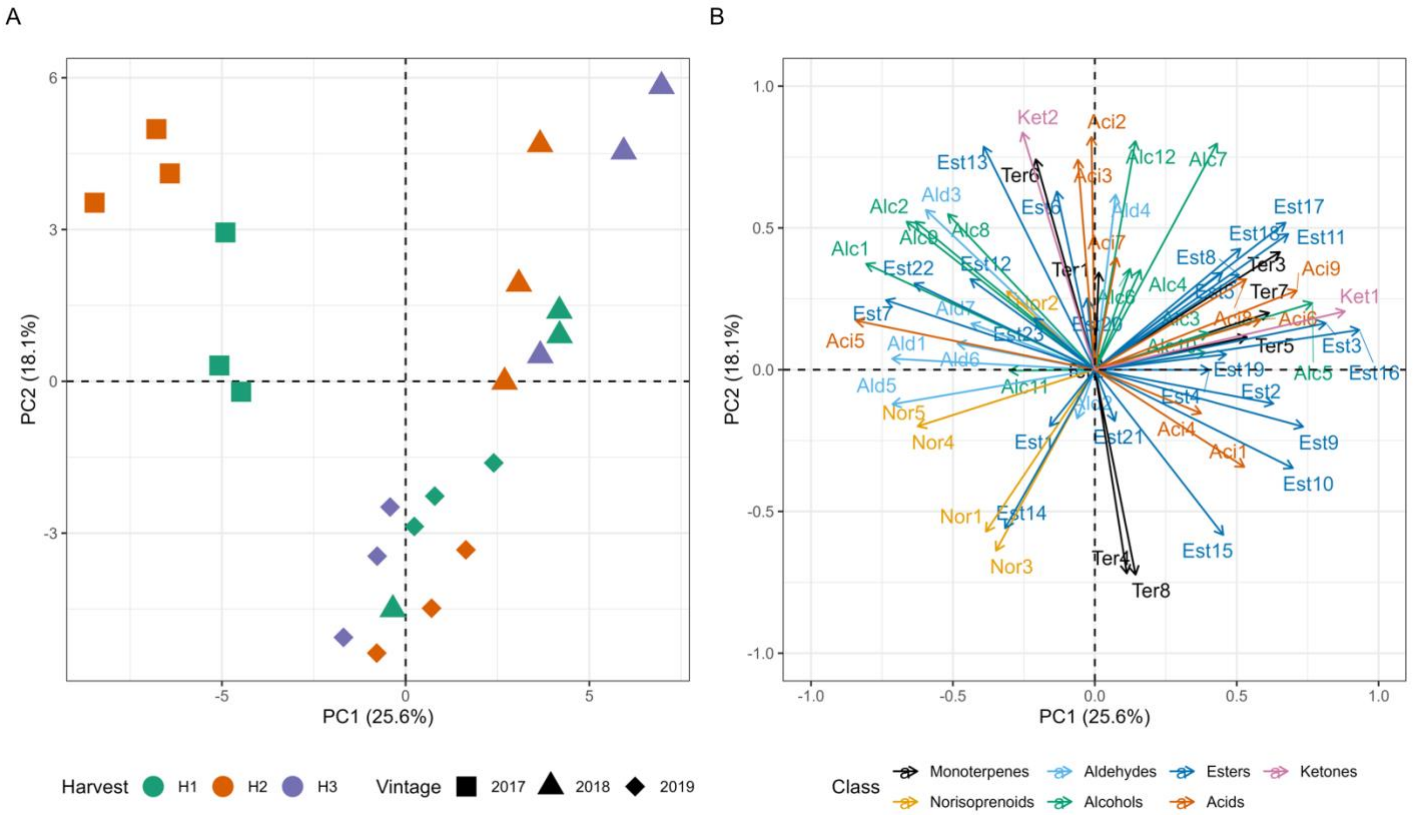



**FIGURE S1.** Principal Component Analysis (PCA) score plot (A) and loading plot (B) of two and three different harvest times (H1, H2, and H3) from three harvesting seasons (2017, 2018, and 2019), based on volatile organic compounds (VOCs), obtained from the HS-SPME-GC-MS analysis. The score and loading plot show the first two PCs, which account for 43.7% of the total variance and a clear separation between samples collected in each respective harvest season. Small points represent single replicates, while large circles show the centroid point of each year sampling cluster. Each compound in the loading plot corresponds to a denomination listed in Supplementary Table 3.

**SUPPLEMENTARY DATA**
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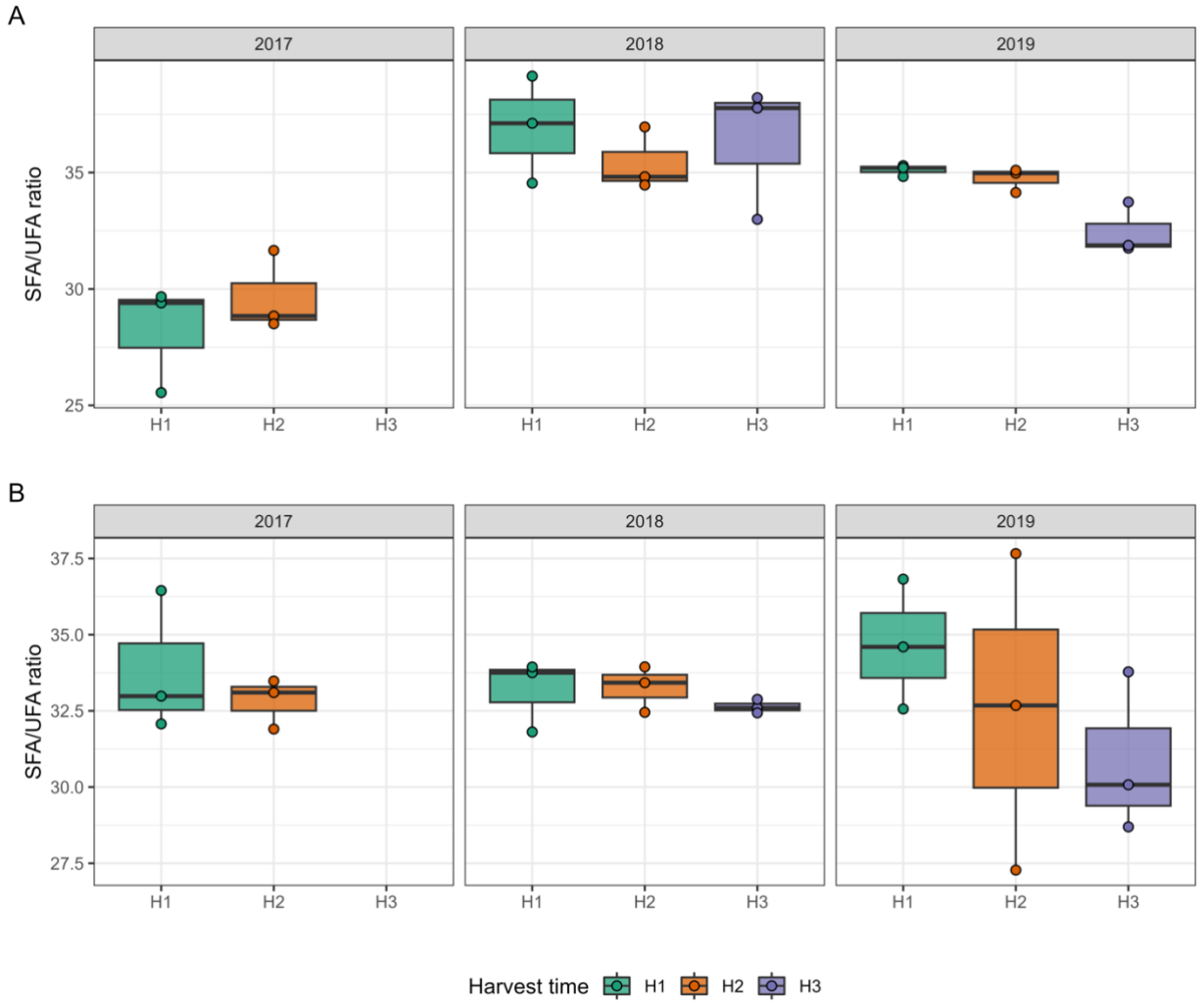



**FIGURE S2.** Boxplot representation for saturated fatty acids (SFA) versus unsaturated fatty acids (UFA) ratio determined in three harvesting seasons (2017–2019) for three different harvest timings (H1, H2, and H3). The ratio was calculated for base wines (A) and sparkling wines (B), respectively.

**SUPPLEMENTARY DATA**
Škrab, D., Sivilotti, P., Comuzzo, P., Voce S., Cisilino, D., Carlin, S., Arapitsas, P., Masuero, D., & Vrhovsek, U. (2023). Influence of harvest date on multi-targeted metabolomic profile and sensory attributes of Ribolla Gialla base and sparkling wines. *OENO One*, *58*(1).
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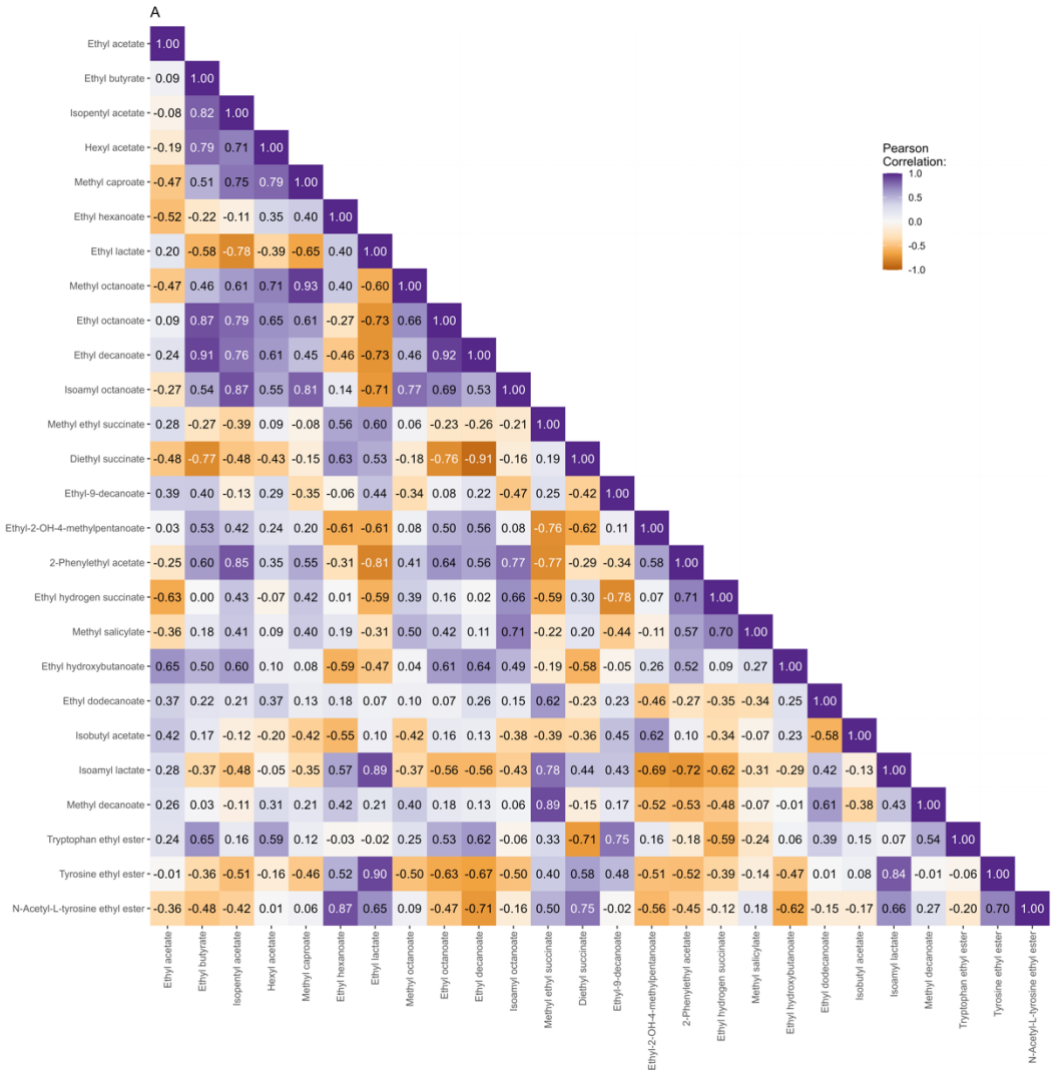



**FIGURE S3A.** Pearson correlation analysis (A) of analyzed esters, deriving from volatile organic compounds (VOCs) and aromatic amino acid (AAA) metabolites and represented as an arc diagram (B) where only positive correlations from correlogram that exhibited 'p value < 0.05' were taken into consideration. Compounds are represented as nodes, and the color of those is depicting VOCs (blue) or AAA metabolites (red). The arc width and color between entities (i.e., compounds) denote the Pearson coefficient.

**SUPPLEMENTARY DATA**
Škrab, D., Sivilotti, P., Comuzzo, P., Voce S., Cisilino, D., Carlin, S., Arapitsas, P., Masuero, D., & Vrhovsek, U. (2023). Influence of harvest date on multi-targeted metabolomic profile and sensory attributes of Ribolla Gialla base and sparkling wines. *OENO One*, *58*(1).
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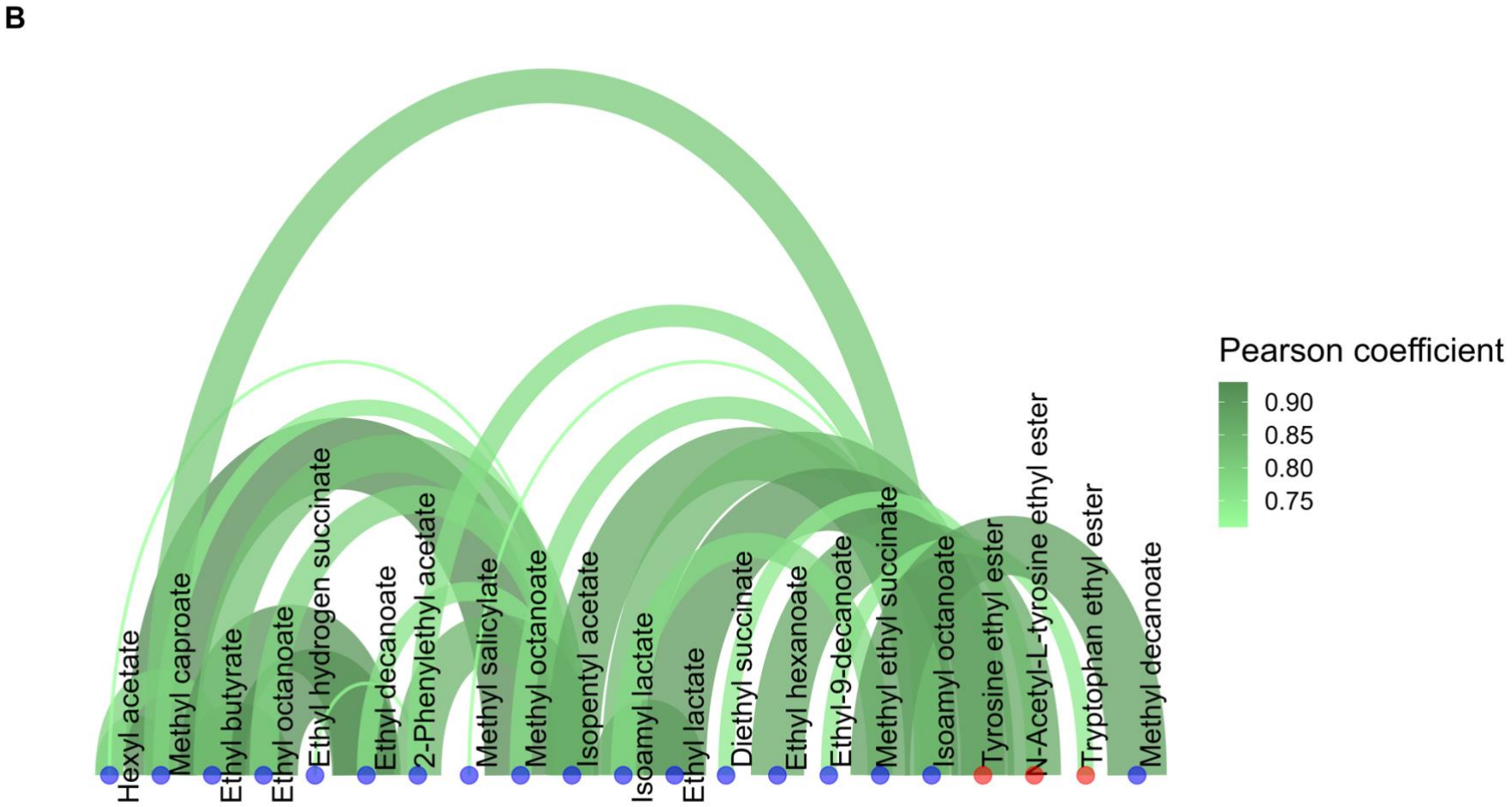



**FIGURE S3B.** Pearson correlation analysis (A) of analyzed esters, deriving from volatile organic compounds (VOCs) and aromatic amino acid (AAA) metabolites and represented as an arc diagram (B) where only positive correlations from correlogram that exhibited 'p value < 0.05' were taken into consideration. Compounds are represented as nodes, and the color of those is depicting VOCs (blue) or AAA metabolites (red). The arc width and color between entities (i.e., compounds) denote the Pearson coefficient.

**SUPPLEMENTARY DATA**
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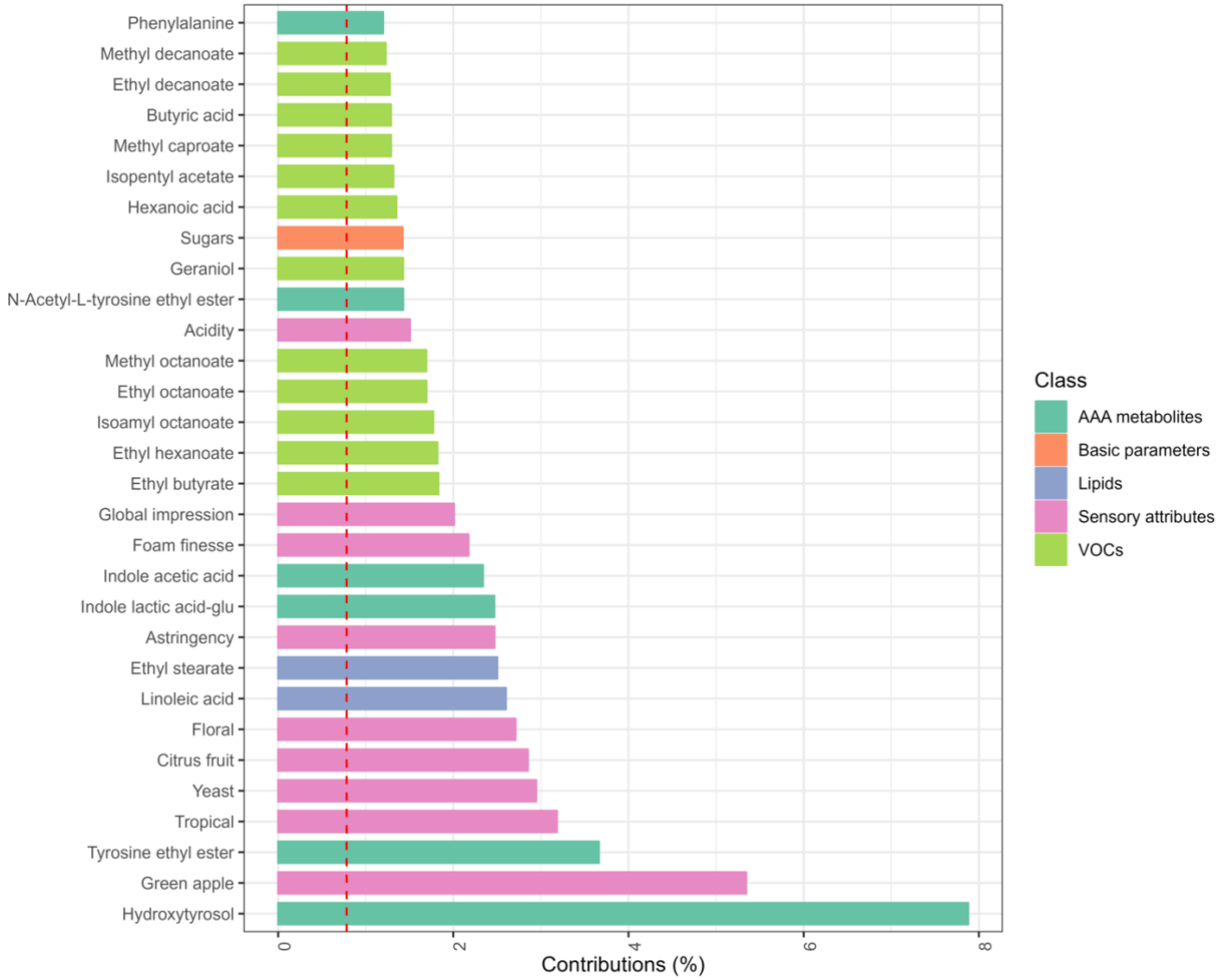



**FIGURE S4.** The contribution (%) of top 30 quantitative variables to the definition of the second dimension (Dim2) of the MFA analysis of Ribolla Gialla sparkling wines were extracted and visualized using the function fviz_contrib() obtained from factoextra package. Variables that contribute the most to Dim2 are the most important in explaining the variability in the dataset. Variables are coloured according to the chemical classification. The red dashed line on the plot indicates the expected average value if the contributions were uniform.

**SUPPLEMENTARY DATA**
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**TABLE S1.** Basic chemical characteristics of Ribolla Gialla grape juice and sparkling wines at different harvest times during 2017-2019 period.

| Parameters | 2017 | | | 2018 | | | | 2019 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | H2 | Sig. | H1 | H2 | H3 | Sig. | H1 | H2 | H3 | Sig. |
| ***Grape juice*** | | | | | | | | | | | |
| **Total soluble solids (°Brix)** | 18,55 | 18,92 | NS | 16,70 | 17,53 | 17,57 | NS | 17,90 | 18,24 | 18,31 | NS |
| **Titratable acidity (g/L)** | 7,23 | 7,07 | NS | 7,25 | 6,83 | 6,36 | NS | 6,67 | 6,87 | 6,95 | NS |
| **pH** | 3,27 | 3,29 | NS | 3,14 | 3,20 | 3,27 | NS | 3,22 | 3,18 | 3,18 | NS |
| ***Sparkling wines*** | | | | | | | | | | | |
| **Reducing sugars (g/L)** | 0,72 | 0,24 | NS | 1,67 | 2,26 | 1,81 | NS | 1,31 | 1,39 | 1,59 | NS |
| **Titratable acidity (g/L)** | 7,85 | 6,90 | NS | $7.34^{a}$ | $6.30^{b}$ | $6.08^{b}$ | ** | $8.06^{a}$ | $7.55^{b}$ | $7.25^{b}$ | * |
| **pH** | 3,16 | 3,28 | NS | 3,15 | 3,30 | 3,36 | NS | 3,05 | 3,06 | 3,15 | NS |
| **Alcohol (% v/v)** | 11,8 | 12,1 | NS | 10,5 | 11,1 | 11,7 | NS | $11.3^{b}$ | $11.5^{b}$ | $11.9^{a}$ | * |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Titratable acidity is expressed as tartaric acid.
Significance of one-way ANOVA is indicated with asterisks, '*' and '**' corresponds to '$p < 0.05$' and '$p < 0.01$', respectively.
Different letters (a and/or b) in the mean's superscript identify significantly different means according to the Tukey's HSD post-hoc test.
'NS' indicates 'no significant differences'.

**SUPPLEMENTARY DATA**
Škrab, D., Sivilotti, P., Comuzzo, P., Voce S., Cisilino, D., Carlin, S., Arapitsas, P., Masuero, D., & Vrhovsek, U. (2023). Influence of harvest date on multi-targeted metabolomic profile and sensory attributes of Ribolla Gialla base and sparkling wines. *OENO One*, *58*(1).
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**TABLE S2.** The evolution through different harvest times and the categorization of Volatile Aroma Compounds (VOCs; µg/L equivalents to internal standard 2-octanol) present in Ribolla Gialla base wines.

| Compounds | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| ***Monoterpenes*** | 17,25 | 3,29 | 21,29 | 3,60 | NS | 22,96 | 6,08 | 23,83 | 3,91 | 18,73 | 3,02 | NS | 16,89 | 1,01 | 15,29 | 1,16 | 15,77 | 0,39 | NS |
| **β-Myrcene** | 0,52 | 0,12 | 0,55 | 0,01 | NS | 0,17 | 0,10 | 0,30 | 0,01 | 0,31 | 0,08 | NS | 0,14 | 0,02 | 0,17 | 0,04 | 0,21 | 0,04 | NS |
| **Limonene** | 0,51 | 0,04 | 0,53 | 0,07 | NS | 1,12 | 0,27 | 1,76 | 0,41 | 1,46 | 0,73 | NS | 2,06 | 0,12 | 1,92 | 0,11 | 2,05 | 0,17 | NS |
| **Linalool** | 4,35 | 0,64 | 3,71 | 0,14 | NS | 5,67 | 0,35 | 7,96 | 3,73 | 3,46 | 0,27 | NS | 2,60 | 0,15 | 2,35 | 0,20 | 2,57 | 0,17 | NS |
| **Geraniol** | 5,96 | 3,75 | 6,77 | 3,23 | NS | 5,33 | 1,92 | 7,20 | 0,47 | 6,85 | 2,17 | NS | $7.43^{a}$ | 0,90 | $5.81^{ab}$ | 1,32 | $4.91^{b}$ | 0,44 | * |
| **Citronellol** | $3.66^{b}$ | 0,37 | $6.84^{a}$ | 0,43 | *** | 3,92 | 0,54 | 3,74 | 0,73 | 4,21 | 0,55 | NS | $2.51^{b}$ | 0,16 | $2.87^{b}$ | 0,40 | $3.97^{a}$ | 0,08 | ** |
| **Nerol** | $1.04^{b}$ | 0,04 | $1.88^{a}$ | 0,34 | * | 2,11 | 0,35 | 1,93 | 0,21 | 1,79 | 0,33 | NS | 1,45 | 0,08 | 1,50 | 0,08 | 1,36 | 0,15 | NS |
| **Terpinen-4-ol** | 0,22 | 0,03 | 0,29 | 0,06 | NS | 0,36 | 0,06 | 0,55 | 0,34 | 0,18 | 0,01 | NS | 0,18 | 0,02 | 0,17 | 0,04 | 0,20 | 0,05 | NS |
| **α-Terpineol** | 0,99 | 0,19 | 0,73 | 0,05 | NS | 4,28 | 3,96 | 0,39 | 0,08 | 0,47 | 0,10 | NS | 0,52 | 0,02 | 0,50 | 0,01 | 0,51 | 0,03 | NS |
| ***Norisoprenoids*** | $15.49^{b}$ | 1,23 | $20.33^{a}$ | 1,17 | ** | 8,83 | 1,69 | 17,28 | 7,14 | 13,07 | 3,82 | NS | $7.94^{b}$ | 0,76 | $10.30^{a}$ | 1,44 | $7.90^{b}$ | 0,39 | * |
| **Vitispirane** | 0,67 | 0,26 | 0,44 | 0,09 | NS | $0.45^{a}$ | 0,01 | $0.31^{b}$ | 0,03 | $0.14^{c}$ | 0,07 | *** | 0,33 | 0,09 | 0,26 | 0,16 | 0,34 | 0,07 | NS |
| **TDN** | 0,57 | 0,07 | 0,50 | 0,08 | NS | 0,79 | 0,11 | 0,74 | 0,08 | 0,75 | 0,18 | NS | 0,56 | 0,02 | 0,75 | 0,13 | 0,67 | 0,09 | NS |
| **β-Damascenone** | $13.84^{b}$ | 0,95 | $19.04^{a}$ | 0,99 | ** | 7,44 | 1,60 | 15,44 | 7,41 | 11,91 | 3,53 | NS | $6.94^{b}$ | 0,79 | $9.17^{a}$ | 1,47 | $6.77^{b}$ | 0,28 | * |
| **Actinidiol 1** | 0,21 | 0,02 | 0,18 | 0,01 | NS | $0.08^{b}$ | 0,02 | $0.71^{a}$ | 0,39 | $0.20^{b}$ | 0,15 | * | 0,05 | 0,01 | 0,06 | 0,00 | 0,06 | 0,01 | NS |
| **Actinidiol 2** | 0,21 | 0,02 | 0,18 | 0,01 | NS | 0,07 | 0,01 | 0,08 | 0,01 | 0,07 | 0,00 | NS | 0,05 | 0,01 | 0,06 | 0,00 | 0,06 | 0,01 | NS |
| ***Aldehydes*** | 157,32 | 27,55 | 128,70 | 85,96 | NS | $74.31^{b}$ | 30,74 | $154.64^{a}$ | 18,38 | $119.99^{a}$ | 12,11 | * | 97,92 | 7,29 | 102,97 | 10,29 | 113,82 | 11,22 | NS |
| **Hexanal** | 0,52 | 0,11 | 0,57 | 0,07 | NS | 0,41 | 0,13 | 0,71 | 0,24 | 0,38 | 0,19 | NS | 0,21 | 0,01 | 0,21 | 0,05 | 0,22 | 0,03 | NS |
| ***trans*-2-Hexenal** | 124,85 | 16,99 | 98,95 | 90,87 | NS | 57,91 | 29,82 | 79,14 | 12,61 | 87,80 | 6,51 | NS | 86,68 | 6,92 | 92,48 | 10,66 | 101,12 | 10,19 | NS |
| **Nonanal** | 9,69 | 4,84 | 11,89 | 3,82 | NS | $3.24^{b}$ | 0,12 | $59.24^{a}$ | 9,09 | $16.74^{b}$ | 11,99 | *** | 4,65 | 0,24 | 3,95 | 0,67 | 4,06 | 0,22 | NS |
| **Benzaldehyde** | 4,87 | 1,91 | 5,40 | 2,83 | NS | 4,03 | 0,81 | 5,70 | 1,56 | 5,61 | 0,70 | NS | 2,06 | 0,06 | 2,15 | 0,20 | 2,31 | 0,27 | NS |
| **3,4-Dimethyl benzaldehyde** | 0,56 | 0,04 | 0,59 | 0,08 | NS | $0.22^{c}$ | 0,02 | $1.68^{a}$ | 0,07 | $1.14^{b}$ | 0,11 | *** | 0,31 | 0,06 | 0,27 | 0,13 | 0,30 | 0,01 | NS |
| **Acetaldehyde** | 15,72 | 6,44 | 10,31 | 1,79 | NS | 8,37 | 1,79 | 7,65 | 2,25 | 7,81 | 0,50 | NS | 3,89 | 0,51 | 3,80 | 0,37 | 5,68 | 1,57 | NS |
| **Furfural** | 1,12 | 0,20 | 1,00 | 0,03 | NS | $0.13^{b}$ | 0,03 | $0.51^{a}$ | 0,05 | $0.49^{a}$ | 0,03 | *** | 0,12 | 0,03 | 0,11 | 0,03 | 0,11 | 0,01 | NS |
| ***Alcohols*** | $1793.53^{b}$ | 79,58 | $2142.65^{a}$ | 79,20 | ** | $1043.20^{b}$ | 277,08 | $2095.40^{a}$ | 241,35 | $2006.77^{a}$ | 120,93 | ** | $3978.79^{a}$ | 111,96 | $3587.41^{b}$ | 24,27 | $4357.48^{a}$ | 233,69 | ** |

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| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **n-Hexanol** | 94.93$^{b}$ | 5,44 | 296.89$^{a}$ | 14,65 | *** | 39,68 | 11,05 | 52,85 | 14,05 | 43,70 | 4,42 | NS | 57,26 | 2,77 | 51,69 | 12,28 | 54,00 | 2,95 | NS |
| ***trans*-3-Hexenol** | 1.29$^{b}$ | 0,21 | 4.46$^{a}$ | 0,20 | *** | 1,15 | 0,61 | 1,64 | 0,26 | 1,11 | 0,04 | NS | 1,25 | 0,10 | 0,96 | 0,31 | 0,82 | 0,05 | NS |
| **1-Octanol** | 7.32$^{b}$ | 0,69 | 9.96$^{a}$ | 0,90 | * | 10,42 | 4,81 | 14,51 | 1,52 | 11,46 | 0,79 | NS | 8,82 | 0,13 | 8,37 | 2,32 | 8,01 | 1,35 | NS |
| **Isobutanol** | 85.13$^{b}$ | 10,59 | 108.04$^{a}$ | 2,01 | * | 92.03$^{b}$ | 41,46 | 229.28$^{a}$ | 5,80 | 237.25$^{a}$ | 16,42 | *** | 92.59$^{b}$ | 2,70 | 84.85$^{b}$ | 4,56 | 129.82$^{a}$ | 8,13 | *** |
| **Methionol** | 7.35$^{b}$ | 0,26 | 8.19$^{a}$ | 0,01 | ** | 1.52$^{b}$ | 0,78 | 9.86$^{a}$ | 0,78 | 8.16$^{a}$ | 1,28 | *** | 3.06$^{b}$ | 0,16 | 3.89$^{ab}$ | 0,38 | 4.48$^{a}$ | 0,72 | * |
| **Isoamyl alcohol** | 650,45 | 65,37 | 759,85 | 39,31 | NS | 474.17$^{b}$ | 125,64 | 928.81$^{a}$ | 123,79 | 881.25$^{a}$ | 34,67 | ** | 3039.11$^{b}$ | 54,16 | 2780.84$^{c}$ | 32,20 | 3291.97$^{a}$ | 192,46 | ** |
| **3-Methyl-1-pentanol** | 8,09 | 0,46 | 8,64 | 0,36 | NS | 3.90$^{b}$ | 1,69 | 14.53$^{a}$ | 0,55 | 12.98$^{a}$ | 0,74 | *** | 7,22 | 0,34 | 6,20 | 0,05 | 7,24 | 1,39 | NS |
| **2,3-Butanediol (isomer 1)** | 20.74$^{b}$ | 2,04 | 25.77$^{a}$ | 1,17 | * | 13,81 | 6,75 | 20,32 | 6,47 | 16,09 | 1,98 | NS | 20.96$^{a}$ | 3,92 | 11.80$^{b}$ | 1,54 | 13.39$^{b}$ | 2,29 | * |
| **2,3-Butanediol (isomer 2)** | 5.48$^{b}$ | 0,56 | 6.66$^{a}$ | 0,19 | * | 6,11 | 5,35 | 6,16 | 2,45 | 4,92 | 1,21 | NS | 4,92 | 1,20 | 3,10 | 0,95 | 3,64 | 0,69 | NS |
| **2-Phenylethanol** | 912,75 | 5,71 | 914,19 | 63,70 | NS | 400.42$^{b}$ | 92,90 | 817.42$^{a}$ | 97,76 | 789.86$^{a}$ | 69,49 | ** | 743.60$^{a}$ | 70,03 | 635.71$^{b}$ | 18,82 | 844.10$^{a}$ | 48,69 | ** |
| ***Esters*** | 4154,09 | 1044,57 | 4277,32 | 257,60 | NS | 1865,14 | 755,14 | 1846,05 | 266,26 | 2021,28 | 592,56 | NS | 1137,15 | 102,18 | 909,81 | 161,07 | 978,04 | 101,76 | NS |
| **Ethyl acetate** | 108.21$^{b}$ | 9,94 | 190.51$^{a}$ | 28,87 | ** | 63,90 | 23,19 | 94,70 | 21,24 | 91,70 | 20,62 | NS | 84,80 | 10,81 | 98,83 | 35,47 | 139,08 | 38,29 | NS |
| **Ethyl butyrate** | 38,10 | 8,38 | 31,87 | 5,79 | NS | 23,27 | 11,14 | 37,54 | 6,63 | 37,17 | 20,64 | NS | 28,07 | 3,63 | 22,94 | 3,85 | 23,48 | 2,24 | NS |
| **Isopentyl acetate** | 264,74 | 46,21 | 289,85 | 34,60 | NS | 144,49 | 58,83 | 210,41 | 20,03 | 239,76 | 99,23 | NS | 203,95 | 34,32 | 124,10 | 41,78 | 133,69 | 20,17 | NS |
| **Hexyl acetate** | 87,26 | 30,95 | 114,54 | 12,18 | NS | 14,78 | 9,68 | 17,05 | 3,06 | 21,53 | 12,30 | NS | 28.92$^{a}$ | 6,02 | 13.28$^{b}$ | 8,93 | 8.54$^{b}$ | 2,76 | * |
| **Methyl caproate** | 0.33$^{b}$ | 0,07 | 0.63$^{a}$ | 0,14 | * | 0,44 | 0,30 | 0,52 | 0,05 | 0,61 | 0,30 | NS | 0.57$^{a}$ | 0,02 | 0.45$^{ab}$ | 0,12 | 0.36$^{b}$ | 0,03 | * |
| **Ethyl hexanoate** | 987,44 | 191,73 | 1026,98 | 177,24 | NS | 738,53 | 363,61 | 782,55 | 136,56 | 827,98 | 400,68 | NS | 476,54 | 12,56 | 375,91 | 92,83 | 346,22 | 10,51 | NS |
| **Ethyl lactate** | 5,86 | 0,85 | 4,81 | 0,28 | NS | 1.40$^{b}$ | 0,47 | 3.22$^{a}$ | 1,05 | 2.42$^{ab}$ | 0,37 | * | 2,83 | 0,42 | 2,46 | 0,20 | 2,55 | 0,16 | NS |
| **Methyl octanoate** | 2,07 | 0,58 | 2,98 | 0,31 | NS | 0,90 | 0,73 | 1,43 | 0,39 | 1,91 | 0,88 | NS | 0,61 | 0,02 | 0,49 | 0,10 | 0,57 | 0,16 | NS |
| **Ethyl octanoate** | 1659,39 | 443,46 | 1799,71 | 123,91 | NS | 275,58 | 109,56 | 359,40 | 43,63 | 429,81 | 32,49 | NS | 207,28 | 24,69 | 183,30 | 23,95 | 217,67 | 51,91 | NS |
| **Isoamyl lactate** | 0,57 | 0,04 | 0,55 | 0,03 | NS | 0.42$^{b}$ | 0,13 | 1.24$^{a}$ | 0,09 | 1.11$^{a}$ | 0,29 | ** | 0,47 | 0,24 | 0,49 | 0,19 | 0,48 | 0,15 | NS |
| **Methyl decanoate** | 0,23 | 0,11 | 0,39 | 0,11 | NS | 0,04 | 0,02 | 0,04 | 0,01 | 0,04 | 0,02 | NS | 0,04 | 0,01 | 0,04 | 0,01 | 0,04 | 0,00 | NS |
| **Ethyl decanoate** | 382,82 | 213,28 | 420,04 | 53,70 | NS | 67,27 | 60,68 | 71,59 | 2,88 | 136,98 | 74,98 | NS | 48,02 | 8,09 | 48,27 | 24,28 | 39,66 | 1,04 | NS |
| **Isoamyl octanoate** | 5,30 | 2,33 | 6,52 | 1,11 | NS | 2.22$^{b}$ | 1,64 | 4.71$^{ab}$ | 0,56 | 6.68$^{a}$ | 1,93 | * | 1,15 | 0,24 | 0,98 | 0,31 | 1,15 | 0,29 | NS |
| **Methyl ethyl succinate** | 101,77 | 52,60 | 111,27 | 12,95 | NS | 339.14$^{a}$ | 70,96 | 175.79$^{b}$ | 34,21 | 141.49$^{b}$ | 43,94 | ** | 0,04 | 0,03 | 0,01 | 0,01 | 0,06 | 0,03 | NS |
| **Diethyl succinate** | 175,67 | 16,88 | 149,44 | 16,18 | NS | 37.16$^{a}$ | 9,04 | 17.39$^{b}$ | 3,38 | 13.90$^{b}$ | 4,28 | ** | 2,83 | 0,18 | 2,45 | 0,34 | 2,65 | 0,79 | NS |
| **Ethyl-9-decanoate** | 188.32$^{a}$ | 60,12 | 12.44$^{b}$ | 6,54 | ** | 110.89$^{a}$ | 68,47 | 0.88$^{b}$ | 0,37 | 3.12$^{b}$ | 1,30 | * | 16,80 | 4,00 | 6,21 | 0,36 | 19,13 | 8,94 | NS |
| **Ethyl-2-OH-4-methylpentanoate** | 1,71 | 0,24 | 1,48 | 0,03 | NS | 0,92 | 0,13 | 1,59 | 0,86 | 1,26 | 0,10 | NS | 0,87 | 0,10 | 0,60 | 0,21 | 0,89 | 0,16 | NS |

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| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2-Phenylethyl acetate** | 113.64[a] | 14,97 | | 77.06[b] | 7,23 | * | | 33.46[b] | 6,58 | | 52.59[a] | 6,58 | | 49.67[a] | 2,01 | * | | 31.12[ab] | 1,66 | | 26.76[b] | 2,31 | | 39.68[a] | 8,19 | * |
| **Ethyl hydrogen succinate** | 6.13[a] | 0,59 | | 4.36[b] | 0,86 | * | | 3,53 | 1,46 | | 7,21 | 5,29 | | 7,26 | 1,92 | NS | | 0,00 | 0,00 | | 0,59 | 0,72 | | 0,09 | 0,14 | NS |
| **Methyl salicylate** | 13,54 | 6,60 | | 19,02 | 6,72 | NS | | 0,59 | 0,26 | | 0,58 | 0,46 | | 0,68 | 0,72 | NS | | 0.54[a] | 0,13 | | 0.44[ab] | 0,06 | | 0.31[b] | 0,01 | * |
| **Ethyl hydroxybutanoate** | 11,01 | 0,96 | | 12,89 | 0,68 | NS | | 6,21 | 4,09 | | 5,62 | 2,76 | | 6,19 | 1,02 | NS | | 1,70 | 0,17 | | 1,23 | 0,27 | | 1,75 | 0,59 | NS |
| ***Acids*** | 2285,97 | 637,39 | | 2556,30 | 738,36 | NS | | 467,19 | 96,34 | | 816,69 | 255,59 | | 803,00 | 113,64 | NS | | 793,88 | 199,83 | | 1785,08 | 855,54 | | 1042,50 | 85,28 | NS |
| **Acetic acid** | 15,65 | 1,20 | | 13,97 | 1,26 | NS | | 48,60 | 15,54 | | 51,76 | 21,65 | | 43,02 | 11,57 | NS | | 24,92 | 13,03 | | 54,78 | 19,02 | | 51,84 | 11,65 | NS |
| **Butyric acid** | 4,66 | 3,15 | | 4,05 | 3,47 | NS | | 5,65 | 2,04 | | 8,02 | 1,17 | | 6,30 | 0,55 | NS | | 0,70 | 1,12 | | 3,64 | 3,06 | | 4,38 | 1,17 | NS |
| **3-Methylbutyric acid** | 25.76[a] | 2,32 | | 19.79[b] | 1,38 | * | | 15.79[b] | 4,72 | | 26.69[a] | 2,42 | | 24.65[a] | 3,59 | * | | 1,88 | 3,24 | | 7,66 | 6,50 | | 12,95 | 3,95 | NS |
| **Hexanoic acid** | 144,23 | 19,34 | | 158,12 | 3,34 | NS | | 56.71[b] | 11,13 | | 79.59[a] | 4,44 | | 76.37[a] | 6,01 | * | | 108.99[a] | 1,66 | | 90.77[b] | 6,29 | | 90.42[b] | 9,29 | * |
| **Octanoic acid** | 686,30 | 60,72 | | 688,29 | 33,50 | NS | | 163.75[b] | 26,78 | | 290.79[a] | 74,64 | | 286.98[a] | 14,36 | * | | 446,44 | 41,27 | | 383,21 | 10,02 | | 404,79 | 49,71 | NS |
| **Nonanoic acid** | 2,39 | 0,27 | | 2,90 | 0,57 | NS | | 4.73[b] | 0,79 | | 23.69[a] | 8,96 | | 13.68[ab] | 8,61 | * | | 42,71 | 19,97 | | 92,19 | 66,84 | | 94,28 | 64,94 | NS |
| **Decanoic acid** | 1384,93 | 556,49 | | 1657,97 | 706,81 | NS | | 167,56 | 42,76 | | 295,36 | 200,30 | | 331,01 | 92,14 | NS | | 165,11 | 142,38 | | 1126,49 | 766,31 | | 372,37 | 36,01 | NS |
| **Benzoic acid** | 4,22 | 1,83 | | 4,99 | 2,62 | NS | | 2,31 | 0,60 | | 3,33 | 0,56 | | 3,18 | 0,29 | NS | | 0,00 | 0,01 | | 3,61 | 4,05 | | 2,07 | 1,76 | NS |
| **Dodecanoic acid** | 17,82 | 10,01 | | 6,22 | 1,74 | NS | | 2.09[b] | 0,56 | | 37.46[a] | 22,21 | | 17.80[ab] | 0,90 | * | | 3,12 | 0,82 | | 22,72 | 21,85 | | 9,39 | 5,52 | NS |
| ***Ketones*** | 19,19 | 1,77 | | 31,89 | 9,26 | NS | | 13,47 | 2,06 | | 17,08 | 1,60 | | 16,28 | 2,70 | NS | | 20,50 | 1,31 | | 14,82 | 2,37 | | 19,54 | 6,31 | NS |
| **2-Methylthiolan-3-one** | 2,26 | 0,06 | | 2,32 | 0,30 | NS | | 4.06[b] | 0,28 | | 3.07[a] | 0,63 | | 2.05[a] | 0,30 | ** | | 2.62[a] | 0,41 | | 1.22[b] | 0,57 | | 2.42[a] | 0,49 | * |
| **Isophorone** | 16,94 | 1,70 | | 29,58 | 8,96 | NS | | 9,41 | 1,90 | | 14,00 | 0,99 | | 14,23 | 2,95 | NS | | 17,88 | 1,10 | | 13,59 | 1,99 | | 17,12 | 6,54 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*', '**', and '***' corresponds to '$p < 0.05$', '$p < 0.01$', and '$p < 0.001$', respectively.
Different letters (a, b, and/or c) in the mean's superscript identify significantly different means.
'NS' indicates 'no significant differences'.

**SUPPLEMENTARY DATA**
Škrab, D., Sivilotti, P., Comuzzo, P., Voce S., Cisilino, D., Carlin, S., Arapitsas, P., Masuero, D., & Vrhovsek, U. (2023). Influence of harvest date on multi-targeted metabolomic profile and sensory attributes of Ribolla Gialla base and sparkling wines. *OENO One*, *58*(1).
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**TABLE S3.** The evolution through different harvest times and the categorization of Volatile Aroma Compounds (VOCs; µg/L equivalents to internal standard 2-octanol) present in Ribolla Gialla sparkling wines.

| Compounds | Abbreviated labels | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| ***Monoterpenes*** | | 18.17$^{b}$ | 1,71 | 24.30$^{a}$ | 2,33 | ** | 23,54 | 3,93 | 20,94 | 0,86 | 24,07 | 3,47 | NS | 32,40 | 1,46 | 28,20 | 2,38 | 29,30 | 2,73 | NS |
| **β-Myrcene** | **Ter1** | 0,66 | 0,03 | 0,69 | 0,02 | NS | 0,71 | 0,14 | 0,79 | 0,00 | 0,92 | 0,33 | NS | 0,82 | 0,07 | 0,80 | 0,08 | 0,84 | 0,05 | NS |
| **Limonene** | **Ter2** | 2,41 | 0,13 | 2,66 | 0,21 | NS | 2,76 | 0,99 | 2,12 | 0,02 | 2,72 | 0,39 | NS | 2,25 | 0,04 | 2,19 | 0,15 | 2,33 | 0,06 | NS |
| **Linalool** | **Ter3** | 3.94$^{b}$ | 0,38 | 4.62$^{a}$ | 0,18 | * | 5,46 | 0,75 | 5,49 | 0,20 | 5,93 | 1,14 | NS | 4,43 | 0,60 | 4,42 | 0,57 | 4,93 | 0,37 | NS |
| **Geraniol** | **Ter4** | 6,95 | 1,10 | 10,02 | 2,48 | NS | 7,09 | 1,82 | 6,69 | 0,86 | 7,59 | 1,18 | NS | 7,05 | 0,67 | 5,71 | 0,52 | 5,26 | 0,35 | NS |
| **Citronellol** | **Ter5** | 0.92$^{b}$ | 0,19 | 2.11$^{a}$ | 0,33 | ** | 1,27 | 0,30 | 1,66 | 0,43 | 1,74 | 0,42 | NS | 1.57$^{b}$ | 0,08 | 1.93$^{ab}$ | 0,37 | 2.22$^{a}$ | 0,10 | * |
| **Nerol** | **Ter6** | 1.61$^{b}$ | 0,15 | 2.56$^{a}$ | 0,27 | ** | 2,69 | 0,18 | 2,10 | 0,90 | 2,60 | 0,29 | NS | 3.94b | 0,07 | 4.70$^{a}$ | 0,31 | 4.11$^{b}$ | 0,05 | ** |
| **Terpinen-4-ol** | **Ter7** | 0.38$^{b}$ | 0,00 | 0.50$^{a}$ | 0,05 | * | 0,54 | 0,07 | 0,79 | 0,33 | 0,77 | 0,15 | NS | 0,64 | 0,04 | 0,58 | 0,10 | 0,68 | 0,11 | NS |
| **α-Terpineol** | **Ter8** | 1.30$^{a}$ | 0,03 | 1.14$^{b}$ | 0,07 | * | 3,03 | 1,57 | 1,29 | 0,18 | 1,80 | 0,97 | NS | 11,71 | 1,11 | 7,87 | 2,06 | 8,94 | 2,01 | NS |
| ***Norisoprenoids*** | | 14.42$^{b}$ | 0,95 | 19.42$^{a}$ | 1,48 | * | 11,55 | 0,71 | 12,84 | 1,39 | 11,61 | 1,25 | NS | 19.02$^{b}$ | 3,07 | 25.12$^{a}$ | 0,88 | 20.87$^{ab}$ | 2,31 | * |
| **Vitispirane** | **Nor1** | 0.65$^{b}$ | 0,11 | 1.00$^{a}$ | 0,18 | * | 0,85 | 0,30 | 0,67 | 0,10 | 0,54 | 0,07 | NS | 0,81 | 0,27 | 0,57 | 0,18 | 0,63 | 0,27 | NS |
| **TDN** | **Nor2** | 0,97 | 0,11 | 1,02 | 0,27 | NS | 0,34 | 0,02 | 0,38 | 0,05 | 0,39 | 0,03 | NS | 1,54 | 0,20 | 1,88 | 0,10 | 1,57 | 0,13 | NS |
| **β-Damascenone** | **Nor3** | 11.83$^{b}$ | 0,97 | 16.46$^{a}$ | 0,99 | ** | 9,44 | 0,94 | 11,17 | 1,35 | 10,04 | 1,34 | NS | 15.80$^{b}$ | 2,52 | 21.77$^{a}$ | 0,75 | 17.91$^{b}$ | 1,89 | * |
| **Actinidiol 1** | **Nor4** | 0,42 | 0,04 | 0,40 | 0,03 | NS | 0,39 | 0,02 | 0,27 | 0,03 | 0,27 | 0,01 | NS | 0,37 | 0,06 | 0,39 | 0,02 | 0,32 | 0,04 | NS |
| **Actinidiol 2** | **Nor5** | 0,56 | 0,05 | 0,54 | 0,05 | NS | 0,52 | 0,03 | 0,35 | 0,05 | 0,36 | 0,01 | NS | 0,49 | 0,07 | 0,51 | 0,03 | 0,43 | 0,06 | NS |
| ***Aldehydes*** | | 418,46 | 37,23 | 466,23 | 8,77 | NS | 321.02$^{b}$ | 13,94 | 400.73$^{a}$ | 37,98 | 382.06$^{a}$ | 25,01 | * | 448,61 | 54,48 | 408,94 | 22,54 | 410,01 | 21,98 | NS |
| **Hexanal** | **Ald1** | 0.08$^{b}$ | 0,01 | 0.16$^{a}$ | 0,03 | * | 0,03 | 0,02 | 0,06 | 0,04 | 0,04 | 0,02 | NS | 0,09 | 0,02 | 0,06 | 0,02 | 0,11 | 0,03 | NS |
| ***trans*-2-Hexenal** | **Ald2** | 384,46 | 34,42 | 430,32 | 16,68 | NS | 295.84$^{b}$ | 12,14 | 362.56$^{a}$ | 29,31 | 350.04$^{a}$ | 24,00 | * | 421,93 | 58,69 | 387,29 | 22,58 | 377,65 | 20,30 | NS |
| **Nonanal** | **Ald3** | 2,89 | 0,28 | 2,83 | 1,03 | NS | 2,46 | 0,72 | 2,75 | 0,36 | 2,64 | 0,18 | NS | 3,09 | 1,52 | 2,70 | 1,04 | 4,36 | 0,35 | NS |
| **Benzaldehyde** | **Ald4** | 7,37 | 0,65 | 9,84 | 1,67 | NS | 5,15 | 0,26 | 5,64 | 0,21 | 6,99 | 1,26 | NS | 5,94 | 0,37 | 5,85 | 0,47 | 6,26 | 0,49 | NS |

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,4-Dimethyl benzaldehyde** | **Ald5** | 1.58[b] | 0,09 | 1.85[a] | 0,08 | * | 0,97 | 0,10 | 1,36 | 0,32 | 1,53 | 0,29 | NS | 1.56[b] | 0,19 | 1.49[b] | 0,15 | 1.91[a] | 0,06 | * |
| **Acetaldehyde** | **Ald6** | 20,36 | 1,83 | 18,93 | 5,82 | NS | 15,40 | 3,67 | 27,20 | 11,05 | 19,71 | 1,16 | NS | 13,96 | 6,37 | 10,05 | 1,50 | 17,65 | 2,87 | NS |
| **Furfural** | **Ald7** | 1.70[b] | 0,10 | 2.30[a] | 0,25 | * | 1,17 | 0,06 | 1,16 | 0,28 | 1,10 | 0,13 | NS | 2.05[a] | 0,09 | 1.50[b] | 0,12 | 2.07[a] | 0,06 | *** |
| ***Alcohols*** | | 3767.37[b] | 173,68 | 4414.74[a] | 203,22 | * | 3519.63[b] | 142,56 | 4223.98[a] | 277,13 | 4274.44[a] | 316,94 | * | 4087,53 | 338,77 | 3759,93 | 111,14 | 4135,32 | 262,33 | NS |
| **n-Hexanol** | **Alc1** | 91.89[b] | 3,19 | 248.04[a] | 11,03 | *** | 29,71 | 2,10 | 34,47 | 0,95 | 35,62 | 3,56 | NS | 66,93 | 2,04 | 61,89 | 12,66 | 61,68 | 1,55 | NS |
| ***trans*-3-Hexenol** | **Alc2** | 1.58[b] | 0,29 | 4.91[a] | 0,17 | *** | 1.01[b] | 0,18 | 1.58[a] | 0,30 | 1.18[ab] | 0,11 | * | 1.60[a] | 0,10 | 1.26[ab] | 0,31 | 1.05[b] | 0,01 | * |
| **1-Octanol** | **Alc3** | 8,33 | 1,08 | 10,08 | 0,56 | NS | 10,18 | 1,88 | 10,80 | 0,45 | 10,06 | 0,72 | NS | 11,42 | 0,19 | 10,28 | 1,92 | 9,34 | 1,55 | NS |
| **Isobutanol** | **Alc4** | 114.86[b] | 2,56 | 143.81[a] | 0,19 | *** | 114,07 | 13,44 | 151,72 | 27,63 | 151,19 | 51,70 | NS | 128,87 | 11,18 | 115,77 | 15,05 | 154,36 | 20,58 | NS |
| **Methionol** | **Alc5** | 2,02 | 0,47 | 1,57 | 0,18 | NS | 3,07 | 0,59 | 3,93 | 0,82 | 4,74 | 2,09 | NS | 3,49 | 1,30 | 3,02 | 0,30 | 2,33 | 0,32 | NS |
| **Isoamyl alcohol** | **Alc6** | 2768.28[b] | 142,18 | 3172.54[a] | 190,79 | * | 2628.76[b] | 113,04 | 3168.99[a] | 187,02 | 3187.32[a] | 225,38 | * | 3150,75 | 292,90 | 2895,04 | 75,91 | 3122,45 | 245,37 | NS |
| **3-Methyl-1-pentanol** | **Alc7** | 9.63[b] | 0,36 | 10.74[a] | 0,58 | * | 10,40 | 2,65 | 11,80 | 0,43 | 12,83 | 1,29 | NS | 9,52 | 0,42 | 8,14 | 0,22 | 9,40 | 1,92 | NS |
| **2,3-Butanediol (isomer 1)** | **Alc8** | 2,48 | 2,29 | 7,06 | 3,07 | NS | 0,54 | 0,08 | 3,60 | 4,76 | 0,64 | 0,26 | NS | 0,71 | 0,25 | 0,57 | 0,18 | 1,22 | 0,43 | NS |
| **2,3-Butanediol (isomer 2)** | **Alc9** | 1.41[b] | 0,66 | 3.78[a] | 1,13 | * | 0,47 | 0,23 | 1,60 | 1,70 | 0,61 | 0,26 | NS | 0.67[b] | 0,14 | 0.54[b] | 0,07 | 1.21[a] | 0,28 | ** |
| ***cis*-3-Hexenol**‡ | **Alc10** | 0,33 | 0,12 | 0,20 | 0,11 | NS | 0,30 | 0,01 | 0,25 | 0,06 | 1,07 | 0,74 | NS | 0,23 | 0,02 | 1,11 | 0,84 | 0,22 | 0,05 | NS |
| ***trans*-2-Hexenol**‡ | **Alc11** | 2,11 | 0,93 | 0,96 | 0,28 | NS | 0,52 | 0,29 | 0,73 | 0,66 | 0,72 | 0,70 | NS | 1,06 | 0,31 | 0,89 | 0,17 | 1,58 | 1,70 | NS |
| **2-Phenylethanol** | **Alc12** | 766.90[b] | 24,33 | 812.22[a] | 11,07 | * | 721.41[b] | 33,14 | 835.49[a] | 77,17 | 870.26[a] | 39,19 | * | 713.58[ab] | 39,64 | 663.42[b] | 26,66 | 772.28[a] | 37,79 | * |
| ***Esters*** | | 2649,06 | 375,76 | 2662,68 | 213,51 | NS | 2565,75 | 629,92 | 2706,80 | 230,92 | 3076,48 | 360,36 | NS | 3515,87 | 331,34 | 3024,32 | 281,11 | 2821,46 | 164,44 | NS |
| **Ethyl acetate** | **Est1** | 299,68 | 34,46 | 368,98 | 115,28 | NS | 231,76 | 22,14 | 341,27 | 81,71 | 321,56 | 31,70 | NS | 344.86[b] | 23,12 | 372.79[b] | 45,66 | 496.77[a] | 83,33 | * |
| **Ethyl butyrate** | **Est2** | 40,07 | 4,74 | 32,91 | 13,48 | NS | 42,84 | 10,92 | 45,78 | 3,24 | 49,43 | 6,72 | NS | 58,22 | 5,44 | 49,60 | 3,18 | 46,02 | 6,75 | NS |
| **Isopentyl acetate** | **Est3** | 131,22 | 26,80 | 123,88 | 58,68 | NS | 184,07 | 38,93 | 253,33 | 41,38 | 269,13 | 49,15 | NS | 269.96[a] | 37,00 | 189.37[b] | 37,42 | 177.56[b] | 8,15 | * |
| **Hexyl acetate** | **Est4** | 14,24 | 3,99 | 14,41 | 10,01 | NS | 17,72 | 7,85 | 21,03 | 5,40 | 21,60 | 2,71 | NS | 41.78[a] | 8,63 | 20.02[b] | 10,33 | 11.66[b] | 1,80 | ** |
| **Methyl caproate** | **Est5** | 0,49 | 0,09 | 0,61 | 0,42 | NS | 0,68 | 0,25 | 0,67 | 0,20 | 0,71 | 0,11 | NS | 0.77[a] | 0,08 | 0.59[b] | 0,11 | 0.48[b] | 0,04 | ** |
| **Ethyl hexanoate** | **Est6** | 1113,91 | 204,19 | 1185,94 | 101,96 | NS | 985,75 | 310,45 | 943,32 | 75,73 | 1043,95 | 82,68 | NS | 1131.51[a] | 129,34 | 908.67[b] | 135,82 | 767.99[b] | 44,59 | * |
| **Ethyl lactate** | **Est7** | 22,76 | 3,24 | 20,83 | 1,23 | NS | 13,47 | 1,20 | 13,10 | 1,76 | 14,09 | 2,91 | NS | 15,61 | 0,70 | 15,04 | 1,34 | 17,71 | 2,62 | NS |
| **Methyl octanoate** | **Est8** | 2.40[b] | 0,42 | 3.17[a] | 0,07 | * | 3,43 | 1,00 | 3,03 | 0,18 | 3,59 | 0,68 | NS | 3.74[a] | 0,28 | 3.26[a] | 0,46 | 2.34[b] | 0,16 | * |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ethyl octanoate** | **Est9** | 403,32 | 42,17 | 461,18 | 80,72 | NS | 630,92 | 155,21 | 576,76 | 110,43 | 770,74 | 100,22 | NS | 799,34 | 71,04 | 726,73 | 76,64 | 638,57 | 32,70 | NS |
| **Isoamyl lactate** | **Est10** | 2,69 | 0,16 | 2,73 | 0,05 | NS | 1,89 | 0,00 | 2,18 | 0,35 | 2,18 | 0,30 | NS | 2,46 | 0,14 | 2,16 | 0,07 | 2,33 | 0,24 | NS |
| **Methyl decanoate** | **Est11** | 0.23[b] | 0,03 | 0.41[a] | 0,08 | * | 0,21 | 0,07 | 0,22 | 0,08 | 0,28 | 0,07 | NS | 0,36 | 0,06 | 0,38 | 0,10 | 0,25 | 0,01 | NS |
| **Ethyl decanoate** | **Est12** | 25,47 | 5,61 | 26,05 | 5,52 | NS | 156,19 | 45,21 | 204,34 | 84,57 | 224,10 | 62,31 | NS | 308,70 | 89,10 | 303,30 | 73,58 | 216,54 | 37,42 | NS |
| **Isoamyl octanoate** | **Est13** | 1,67 | 0,74 | 2,19 | 0,36 | NS | 2,46 | 0,90 | 3,00 | 0,70 | 3,87 | 1,34 | NS | 3,01 | 0,80 | 2,47 | 0,56 | 1,85 | 0,14 | NS |
| **Methyl ethyl succinate** | **Est14** | 125,96 | 21,21 | 182,39 | 62,26 | NS | 76,20 | 22,22 | 96,45 | 36,12 | 107,22 | 28,97 | NS | 138,27 | 29,68 | 139,25 | 28,67 | 105,47 | 18,23 | NS |
| **Diethyl succinate** | **Est15** | 153,52 | 16,66 | 150,50 | 11,89 | NS | 104,36 | 14,49 | 95,81 | 5,82 | 111,16 | 20,73 | NS | 47,66 | 4,28 | 38,73 | 5,31 | 48,18 | 3,68 | NS |
| **Ethyl-9-decanoate** | **Est16** | 251.04[a] | 63,98 | 39.94[b] | 25,28 | ** | 16.78[a] | 3,99 | 9.81[b] | 1,89 | 7.76[b] | 1,74 | * | 283,55 | 5,65 | 185,68 | 51,06 | 228,03 | 68,44 | NS |
| **Ethyl-2-OH-4-methylpentanoate** | **Est17** | 2,51 | 0,30 | 2,17 | 0,07 | NS | 3,59 | 0,44 | 3,07 | 0,51 | 2,75 | 0,27 | NS | 3.26[a] | 0,31 | 2.80[b] | 0,08 | 3.47[a] | 0,16 | * |
| **2-Phenylethyl acetate** | **Est18** | 38.22[a] | 5,02 | 29.20[b] | 0,54 | * | 53,42 | 8,27 | 56,32 | 1,95 | 63,25 | 1,08 | NS | 50,41 | 5,59 | 41,81 | 4,17 | 46,46 | 4,62 | NS |
| **Ethyl hydrogen succinate** | **Est19** | 14.84[a] | 6,61 | 9.59[b] | 1,54 | * | 32,98 | 17,05 | 31,45 | 6,37 | 41,61 | 12,83 | NS | 5,76 | 0,74 | 14,73 | 12,56 | 3,33 | 1,08 | NS |
| **Methyl salicylate** | **Est20** | 2,94 | 0,94 | 2,85 | 0,40 | NS | 5.08[b] | 2,99 | 1.62[b] | 1,45 | 12.72[a] | 3,30 | * | 3,05 | 1,12 | 3,09 | 2,21 | 1,60 | 1,15 | NS |
| **Ethyl hydroxybutanoate** | **Est21** | 1,15 | 0,29 | 1,91 | 0,06 | NS | 1,42 | 0,34 | 3,35 | 1,80 | 4,07 | 1,80 | NS | 2,73 | 0,04 | 2,99 | 0,84 | 4,16 | 0,85 | NS |
| **Ethyl dodecanoate** | **Est22** | 0,73 | 0,18 | 0,83 | 0,09 | NS | 0,51 | 0,02 | 0,88 | 0,44 | 0,71 | 0,17 | NS | 0,86 | 0,08 | 0,88 | 0,20 | 0,69 | 0,12 | NS |
| **Isobutyl acetate‡** | **Est23** | 1,24 | 0,73 | 0,96 | 0,27 | NS | 1,38 | 0,35 | 0,89 | 1,00 | 1,17 | 0,41 | NS | 1,26 | 0,67 | 1,06 | 0,16 | 1,83 | 0,25 | NS |
| ***Acids*** | | 1861,12 | 38,89 | 1787,31 | 105,42 | NS | 2416,50 | 917,29 | 2041,74 | 243,74 | 2598,38 | 474,07 | NS | 2029,38 | 374,74 | 2413,15 | 599,89 | 1664,80 | 160,53 | NS |
| **Acetic acid** | **Aci1** | 23,16 | 5,40 | 22,20 | 0,70 | NS | 31,03 | 1,69 | 48,33 | 13,52 | 51,44 | 13,31 | NS | 40.26[c] | 6,24 | 51.84[b] | 2,43 | 62.02[a] | 4,70 | ** |
| **Butyric acid** | **Aci2** | 7,20 | 0,44 | 6,64 | 0,55 | NS | 7,23 | 1,72 | 7,58 | 1,34 | 8,02 | 1,01 | NS | 7,95 | 0,63 | 7,18 | 0,32 | 7,13 | 0,78 | NS |
| **3-Methylbutyric acid** | **Aci3** | 23,83 | 0,89 | 20,88 | 1,49 | * | 17.76[b] | 0,43 | 23.02[a] | 1,97 | 23.16[a] | 2,85 | * | 16,63 | 0,33 | 14,55 | 1,36 | 16,69 | 1,56 | NS |
| **Hexanoic acid** | **Aci4** | 121,18 | 16,72 | 140,36 | 20,99 | NS | 117,01 | 25,32 | 121,88 | 7,47 | 127,52 | 2,77 | NS | 125.73[a] | 3,20 | 108.57[b] | 6,97 | 103.35[b] | 5,95 | ** |
| **Octanoic acid** | **Aci5** | 446,70 | 46,08 | 415,04 | 94,24 | NS | 445,24 | 91,67 | 465,47 | 58,22 | 474,72 | 10,93 | NS | 519,21 | 7,75 | 504,62 | 71,17 | 506,35 | 28,67 | NS |
| **Nonanoic acid** | **Aci6** | 85,36 | 6,90 | 89,29 | 3,58 | NS | 14,90 | 2,49 | 18,71 | 1,91 | 21,88 | 6,02 | NS | 33.11[b] | 17,29 | 23.94[b] | 8,01 | 72.83[a] | 13,48 | ** |
| **Decanoic acid** | **Aci7** | 1115,24 | 104,07 | 1065,29 | 143,78 | NS | 1715,49 | 766,84 | 1303,78 | 285,75 | 1807,32 | 472,57 | NS | 1247,16 | 364,76 | 1652,32 | 575,35 | 871,03 | 117,31 | NS |
| **Benzoic acid** | **Aci8** | 3,60 | 0,18 | 2,93 | 0,20 | NS | 2,98 | 0,41 | 2,95 | 0,37 | 3,46 | 0,34 | NS | 2,80 | 0,23 | 3,01 | 0,30 | 2,89 | 0,58 | NS |

**SUPPLEMENTARY DATA**
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| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dodecanoic acid** | **Aci9** | | 34,85 | 5,81 | | 24,67 | 6,35 | NS | | 64,86 | 30,51 | | 50,00 | 25,72 | | 80,86 | 8,54 | NS | | 36,53 | 2,89 | | 47,12 | 22,55 | | 22,49 | 1,16 | NS |
| ***Ketones*** | | | 171,75 | 1,47 | | 173,66 | 2,12 | NS | | 133,34 | 12,02 | | 170,86 | 24,45 | | 165,77 | 16,12 | NS | | 134,11 | 14,99 | | 118,10 | 10,44 | | 144,37 | 12,04 | NS |
| **2-Methylthiolan-3-one** | **Ket1** | | 0,94 | 0,23 | | 0,83 | 0,05 | NS | | 5,33 | 1,47 | | 5,37 | 0,20 | | 5,32 | 1,16 | NS | | $3.55^{a}$ | 0,70 | | $1.59^{b}$ | 0,59 | | $3.16^{a}$ | 0,95 | * |
| **Isophorone** | **Ket2** | | 170,80 | 1,37 | | 172,83 | 2,16 | NS | | 128,01 | 10,81 | | 165,49 | 24,65 | | 160,45 | 14,97 | NS | | 130,56 | 14,52 | | 116,51 | 10,26 | | 141,21 | 11,53 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*', '**', and '***' corresponds to '$p < 0.05$', '$p < 0.01$', and '$p < 0.001$', respectively.
Different letters (a, b, and/or c) in the mean's superscript identify significantly different means.
‡ The concentrations are reported as ng/L equivalents to internal standard 2-octanol.
'NS' indicates 'no significant differences'.

**SUPPLEMENTARY DATA**
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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S4.** The evolution through different harvest times and the categorization of lipid compounds (mg/L) present in Ribolla Gialla base wines.

| Compounds | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| ***Glycerolipids*** | 0,28 | 0,06 | 0,24 | 0,05 | NS | 0,25 | 0,02 | 0,25 | 0,03 | 0,21 | 0,01 | NS | 0.28$^{a}$ | 0,01 | 0.28$^{a}$ | 0,02 | 0.26$^{b}$ | 0,00 | *** |
| **1-Linoleoyl-rac-glycerol** | 0,25 | 0,06 | 0,21 | 0,04 | NS | 0,22 | 0,02 | 0,22 | 0,02 | 0,19 | 0,02 | NS | 0.24$^{b}$ | 0,02 | 0.25$^{a}$ | 0,02 | 0.24$^{a}$ | 0,00 | ** |
| **1-Oleoyl-rac-glycerol‡** | 25,61 | 6,12 | 25,27 | 7,23 | NS | 20,48 | 1,57 | 20,91 | 2,24 | 20,10 | 2,33 | NS | 24,54 | 2,27 | 25,16 | 3,32 | 24,24 | 4,50 | NS |
| **1-Monopalmitoleoyl-rac-glycerol‡** | 9,06 | 7,82 | 5,60 | 1,47 | NS | 4.46$^{b}$ | 1,86 | 3.54$^{b}$ | 1,13 | 5.13$^{a}$ | 3,18 | * | 6,97 | 1,56 | 2,71 | 1,37 | 2,57 | 2,51 | NS |
| ***Sterols*** | 0,33 | 0,06 | 0,30 | 0,07 | NS | 0,28 | 0,01 | 0,28 | 0,03 | 0,26 | 0,03 | NS | 0.32$^{b}$ | 0,01 | 0.33$^{a}$ | 0,02 | 0.32$^{b}$ | 0,03 | * |
| **Ergosterol** | 0,30 | 0,06 | 0,27 | 0,06 | NS | 0,25 | 0,01 | 0,26 | 0,03 | 0,23 | 0,03 | NS | 0.29$^{b}$ | 0,01 | 0.30$^{a}$ | 0,02 | 0.29$^{b}$ | 0,02 | * |
| **Desmosterol‡** | 28,58 | 3,07 | 25,86 | 6,52 | NS | 23.59$^{b}$ | 1,34 | 24.66$^{a}$ | 2,46 | 22.45$^{b}$ | 2,71 | * | 27,38 | 1,19 | 28,82 | 2,80 | 29,02 | 4,37 | NS |
| ***Unsaturated fatty acids*** | 6,35 | 0,82 | 5,93 | 0,11 | NS | 3.77$^{b}$ | 0,28 | 3.72$^{b}$ | 0,16 | 3.93$^{a}$ | 0,13 | ** | 4.14$^{b}$ | 0,18 | 4.36$^{a}$ | 0,19 | 4.41$^{a}$ | 0,19 | * |
| **Linoleic acid** | 0,34 | 0,04 | 0,36 | 0,06 | NS | 0,24 | 0,02 | 0,23 | 0,01 | 0,22 | 0,02 | NS | 0,25 | 0,03 | 0,26 | 0,02 | 0,26 | 0,02 | NS |
| **Linolenic acid** | 0,03 | 0,01 | 0,03 | 0,01 | NS | 0,03 | 0,00 | 0,03 | 0,00 | 0,03 | 0,00 | NS | 0,03 | 0,00 | 0,03 | 0,00 | 0,03 | 0,00 | NS |
| **Palmitoleic acid** | 0.28$^{a}$ | 0,02 | 0.21$^{b}$ | 0,04 | * | 0,11 | 0,04 | 0,10 | 0,01 | 0,15 | 0,02 | NS | 0,11 | 0,01 | 0,12 | 0,02 | 0,13 | 0,02 | NS |
| **Oleic acid + *cis*-vaccenic acid** | 5,71 | 0,76 | 5,33 | 0,16 | NS | 3,40 | 0,26 | 3,36 | 0,14 | 3,53 | 0,13 | NS | 3.75$^{b}$ | 0,17 | 3.94$^{a}$ | 0,18 | 3.99$^{a}$ | 0,16 | ** |
| ***Saturated fatty acids*** | 177,68 | 11,56 | 175,77 | 7,53 | NS | 139,10 | 5,77 | 133,70 | 11,61 | 140,97 | 12,32 | NS | 143,88 | 2,27 | 151,43 | 8,36 | 141,38 | 7,77 | NS |
| **Behenic acid** | 0.72$^{a}$ | 0,03 | 0.68$^{b}$ | 0,03 | * | 0,58 | 0,03 | 0,59 | 0,03 | 0,61 | 0,07 | NS | 0,62 | 0,03 | 0,63 | 0,01 | 0,60 | 0,01 | NS |
| **Stearic acid** | 54,59 | 2,36 | 53,77 | 3,88 | NS | 41,68 | 1,99 | 40,27 | 4,62 | 40,15 | 4,94 | NS | 40,92 | 1,77 | 41,91 | 1,80 | 40,28 | 5,08 | NS |
| **Lignoceric acid** | 0,37 | 0,09 | 0,35 | 0,05 | NS | 0,35 | 0,03 | 0,34 | 0,02 | 0,35 | 0,07 | NS | 0,33 | 0,03 | 0,31 | 0,02 | 0,31 | 0,03 | NS |
| **Arachidic acid** | 2,77 | 0,17 | 2,80 | 0,22 | NS | 1,97 | 0,15 | 1,89 | 0,17 | 1,85 | 0,26 | NS | 2,07 | 0,08 | 2,10 | 0,07 | 2,02 | 0,15 | NS |
| **Myristic acid** | 1,64 | 0,17 | 1,49 | 0,17 | NS | 1,67 | 0,15 | 1,52 | 0,11 | 1,70 | 0,16 | NS | 1.76$^{b}$ | 0,14 | 2.07$^{a}$ | 0,25 | 1.92$^{a}$ | 0,08 | ** |
| **Palmitic acid** | 116,55 | 8,92 | 115,73 | 3,76 | NS | 92,02 | 3,64 | 88,26 | 7,44 | 95,51 | 6,88 | NS | 97,25 | 1,40 | 103,43 | 8,97 | 95,33 | 3,60 | NS |
| **Miristoleic acid** | 0,51 | 0,09 | 0,46 | 0,10 | NS | 0,43 | 0,02 | 0,45 | 0,05 | 0,40 | 0,05 | NS | 0.51$^{a}$ | 0,01 | 0.51$^{b}$ | 0,03 | 0.51$^{a}$ | 0,04 | * |
| **Margaric acid** | 0,53 | 0,05 | 0,51 | 0,05 | NS | 0,39 | 0,04 | 0,37 | 0,04 | 0,40 | 0,04 | NS | 0,42 | 0,04 | 0,46 | 0,02 | 0,42 | 0,02 | NS |
| ***Prenols*** | 0,06 | 0,05 | 0,14 | 0,05 | NS | 0,21 | 0,13 | 0,17 | 0,05 | 0,08 | 0,02 | NS | 0,08 | 0,07 | 0,13 | 0,13 | 0,13 | 0,11 | NS |
| **Lupeol** | 0,06 | 0,05 | 0,14 | 0,05 | NS | 0,21 | 0,13 | 0,17 | 0,05 | 0,08 | 0,02 | NS | 0,08 | 0,07 | 0,13 | 0,13 | 0,13 | 0,11 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*', '**', and '***' corresponds to '$p < 0.05$', '$p < 0.01$', and '$p < 0.001$', respectively.
Different letters (a and b) in the mean's superscript identify significantly different means.
‡ The concentrations are reported as µg/L.
'NS' indicates 'no significant differences'.

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S5.** The evolution through different harvest times and the categorization of lipid compounds (mg/L) present in Ribolla Gialla sparkling wines.

| Compounds | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| ***Glycerolipids*** | 0,23 | 0,00 | 0,23 | 0,02 | NS | 0,21 | 0,02 | 0,23 | 0,02 | 0,21 | 0,00 | NS | 0,33 | 0,04 | 0,33 | 0,04 | 0,35 | 0,01 | NS |
| **1-Linoleoyl-rac-glycerol** | 0,20 | 0,00 | 0,20 | 0,02 | NS | 0,18 | 0,02 | 0,20 | 0,03 | 0,19 | 0,00 | NS | 0,29 | 0,04 | 0,28 | 0,04 | 0,31 | 0,01 | NS |
| **1-Oleoyl-rac-glycerol** | 0,02 | 0,00 | 0,03 | 0,00 | NS | 0,02 | 0,00 | 0,02 | 0,00 | 0,02 | 0,00 | NS | 0,03 | 0,00 | 0,04 | 0,00 | 0,03 | 0,00 | NS |
| **1-Monopalmitoleoyl-rac-glycerol‡** | 4,65 | 2,08 | 2,78 | 1,50 | NS | 6,08 | 2,85 | 9,08 | 3,46 | 5,05 | 3,39 | NS | 12,90 | 5,25 | 14,06 | 8,09 | 5,51 | 2,00 | NS |
| ***Sterols*** | 0,26 | 0,01 | 0,33 | 0,05 | NS | 0,24 | 0,01 | 0,25 | 0,03 | 0,25 | 0,01 | NS | 0,44 | 0,06 | 0,40 | 0,04 | 0,45 | 0,02 | NS |
| **Ergosterol** | 0,24 | 0,01 | 0,31 | 0,05 | NS | 0,22 | 0,01 | 0,23 | 0,03 | 0,23 | 0,01 | NS | 0,40 | 0,06 | 0,37 | 0,04 | 0,41 | 0,02 | NS |
| **Desmosterol** | 0,02 | 0,00 | 0,02 | 0,00 | NS | 0,02 | 0,00 | 0,02 | 0,00 | 0,02 | 0,00 | NS | 0,04 | 0,01 | 0,03 | 0,00 | 0,04 | 0,00 | NS |
| ***Unsaturated fatty acids*** | 5,56 | 0,05 | 5,70 | 0,39 | NS | $5.17^{b}$ | 0,24 | $5.57^{a}$ | 0,04 | $5.59^{a}$ | 0,10 | * | 6,41 | 0,32 | 6,89 | 0,63 | 7,18 | 1,10 | NS |
| **Linoleic acid** | 0,27 | 0,02 | 0,29 | 0,03 | NS | 0,30 | 0,00 | 0,29 | 0,05 | 0,25 | 0,01 | NS | 0,39 | 0,04 | 0,38 | 0,05 | 0,50 | 0,04 | NS |
| **Linolenic acid** | 0,03 | 0,00 | 0,03 | 0,00 | NS | 0,03 | 0,00 | 0,03 | 0,01 | 0,02 | 0,00 | NS | $0.04^{b}$ | 0,01 | $0.04^{b}$ | 0,00 | $0.05^{a}$ | 0,00 | * |
| **Palmitoleic acid** | 0,44 | 0,03 | 0,55 | 0,11 | NS | 0,29 | 0,08 | 0,27 | 0,02 | 0,36 | 0,05 | NS | 0,21 | 0,06 | 0,29 | 0,03 | 0,24 | 0,02 | NS |
| **Oleic acid + *cis*-vaccenic acid** | 4,82 | 0,07 | 4,82 | 0,28 | NS | $4.55^{b}$ | 0,18 | $4.97^{a}$ | 0,04 | $4.96^{a}$ | 0,08 | * | 5,77 | 0,22 | 6,18 | 0,57 | 6,40 | 1,05 | NS |
| ***Saturated fatty acids*** | 187,98 | 10,99 | 186,94 | 12,41 | NS | $171.46^{b}$ | 6,25 | $185.35^{a}$ | 3,49 | $182.52^{a}$ | 4,64 | * | 222,18 | 17,58 | 222,06 | 19,34 | 220,52 | 29,41 | NS |
| **Behenic acid** | 0,72 | 0,02 | 0,70 | 0,05 | NS | 0,69 | 0,04 | 0,66 | 0,01 | 0,72 | 0,04 | NS | 0,93 | 0,04 | 0,92 | 0,07 | 0,91 | 0,04 | NS |
| **Stearic acid** | 56,68 | 1,73 | 56,71 | 1,86 | NS | 52,66 | 2,16 | 56,89 | 0,31 | 53,96 | 0,78 | NS | 68,72 | 4,74 | 67,96 | 5,71 | 67,38 | 7,03 | NS |
| **Lignoceric acid** | 0,47 | 0,02 | 0,49 | 0,06 | NS | 0,40 | 0,02 | 0,39 | 0,02 | 0,43 | 0,05 | NS | 0,45 | 0,02 | 0,46 | 0,02 | 0,44 | 0,05 | NS |
| **Arachidic acid** | 2,58 | 0,26 | 2,40 | 0,12 | NS | 2,33 | 0,07 | 2,51 | 0,06 | 2,39 | 0,07 | NS | 3,26 | 0,18 | 3,35 | 0,43 | 3,32 | 0,46 | NS |
| **Myristic acid** | 1,61 | 0,02 | 1,67 | 0,14 | NS | 1,66 | 0,16 | 1,75 | 0,08 | 1,76 | 0,01 | NS | 2,09 | 0,10 | 2,10 | 0,28 | 1,83 | 0,35 | NS |
| **Palmitic acid** | 125,05 | 9,40 | 124,11 | 10,38 | NS | $112.90^{b}$ | 4,55 | $122.24^{a}$ | 3,04 | $122.36^{a}$ | 3,70 | * | 145,44 | 12,41 | 146,03 | 14,86 | 145,35 | 21,65 | NS |
| **Miristoleic acid** | 0,38 | 0,01 | 0,38 | 0,01 | NS | 0,37 | 0,00 | 0,39 | 0,04 | 0,39 | 0,01 | NS | 0,68 | 0,12 | 0,63 | 0,07 | 0,70 | 0,03 | NS |
| **Margaric acid** | 0,49 | 0,02 | 0,48 | 0,02 | NS | 0,46 | 0,03 | 0,51 | 0,03 | 0,52 | 0,07 | NS | 0,60 | 0,08 | 0,62 | 0,13 | 0,58 | 0,08 | NS |
| ***Fatty esters*** | 17,02 | 15,55 | 12,64 | 3,00 | NS | 8,70 | 0,85 | 13,94 | 6,24 | 21,22 | 10,73 | NS | 4,55 | 1,78 | 3,43 | 1,52 | 2,39 | 1,10 | NS |
| **Ethyl stearate‡** | 17,02 | 15,55 | 12,64 | 3,00 | NS | 8,70 | 0,85 | 13,94 | 6,24 | 21,22 | 10,73 | NS | 4,55 | 1,78 | 3,43 | 1,52 | 2,39 | 1,10 | NS |
| ***Prenols*** | 0,08 | 0,05 | 0,08 | 0,02 | NS | 0,05 | 0,03 | 0,04 | 0,03 | 0,09 | 0,04 | NS | 0,17 | 0,03 | 0,11 | 0,06 | 0,10 | 0,04 | NS |
| **Lupeol** | 0,08 | 0,05 | 0,08 | 0,02 | NS | 0,05 | 0,03 | 0,04 | 0,03 | 0,09 | 0,04 | NS | 0,17 | 0,03 | 0,11 | 0,06 | 0,10 | 0,04 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*' corresponds to '$p < 0.05$'.
Different letters (a and b) in the mean's superscript identify significantly different means.
‡ The concentrations are reported as µg/L.
'NS' indicates 'no significant differences'.

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S6.** The evolution through different harvest times of aromatic amino acid (AAA) metabolites (mg/L) present in Ribolla Gialla base wines.

| Compounds | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| **Tyrosine** | 5.77$^{a}$ | 1,55 | 2.63$^{b}$ | 0,31 | * | 2.11$^{b}$ | 0,44 | 3.41$^{b}$ | 0,39 | 6.92$^{a}$ | 2,87 | * | 2,52 | 0,50 | 2,31 | 0,56 | 2,21 | 0,56 | NS |
| **Phenylalanine** | 3.40$^{a}$ | 0,97 | 1.37$^{b}$ | 0,17 | * | 0,26 | 0,11 | 0,74 | 0,21 | 1,93 | 0,97 | NS | 0,38 | 0,17 | 0,36 | 0,42 | 0,30 | 0,06 | NS |
| **Tryptophan** | 0,28 | 0,15 | 0,13 | 0,02 | NS | 0,15 | 0,03 | 0,19 | 0,04 | 0,36 | 0,21 | NS | 0,31 | 0,35 | 0,15 | 0,12 | 0,04 | 0,05 | NS |
| **Kynurenic acid** | 17.39$^{a}$ | 1,84 | 3.15$^{b}$ | 2,23 | ** | 2,02 | 0,77 | 0,25 | 0,14 | 1,18 | 0,90 | NS | 12.90$^{a}$ | 0,75 | 5.79$^{b}$ | 2,32 | 3.86$^{b}$ | 2,77 | ** |
| **Nicotinamide** | 0,16 | 0,01 | 0,30 | 0,20 | NS | 0.17$^{b}$ | 0,03 | 0.82$^{a}$ | 0,10 | 0.22$^{b}$ | 0,08 | *** | 0,69 | 0,48 | 0,64 | 0,04 | 0,19 | 0,10 | NS |
| **Tryptophan ethyl ester** | 0,24 | 0,14 | 0,21 | 0,05 | NS | 0,33 | 0,03 | 0,80 | 0,03 | 0,64 | 0,45 | NS | 0,17 | 0,02 | 0,15 | 0,02 | 0,24 | 0,12 | NS |
| **Tyrosine ethyl ester** | 4.77$^{b}$ | 3,93 | 14.77$^{a}$ | 1,32 | * | 1.78$^{c}$ | 1,15 | 7.31$^{b}$ | 2,47 | 23.35$^{a}$ | 12,36 | * | 2,60 | 1,14 | 1,53 | 0,57 | 1,40 | 0,83 | NS |
| **N-Acetyl-L-tyrosine ethyl ester** | 0.73$^{a}$ | 0,15 | 0.31$^{b}$ | 0,17 | * | 0,24 | 0,07 | 0,27 | 0,08 | 0,44 | 0,15 | NS | 0,23 | 0,11 | 0,37 | 0,14 | 0,47 | 0,11 | NS |
| **Tyrosol** | 14,82 | 1,52 | 16,23 | 1,67 | NS | 9,10 | 6,98 | 17,68 | 0,19 | 16,99 | 0,47 | NS | 15.69$^{a}$ | 0,47 | 11.84$^{b}$ | 0,72 | 14.05$^{a}$ | 1,60 | * |
| **Hydroxytyrosol** | 0,21 | 0,06 | 0,29 | 0,09 | NS | 0,29 | 0,04 | 0,25 | 0,08 | 0,26 | 0,08 | NS | 0,34 | 0,01 | 0,20 | 0,04 | 0,35 | 0,13 | NS |
| **Phenyl acetic acid** | 0.23$^{b}$ | 0,15 | 0.57$^{a}$ | 0,10 | * | 0,11 | 0,09 | 0,23 | 0,07 | 0,31 | 0,17 | NS | 0,23 | 0,20 | 0,38 | 0,09 | 0,51 | 0,23 | NS |
| **Tryptophol** | 0,26 | 0,05 | 0,29 | 0,12 | NS | 0.28$^{b}$ | 0,05 | 1.09$^{a}$ | 0,15 | 1.12$^{a}$ | 0,15 | *** | 0,49 | 0,16 | 0,44 | 0,10 | 0,46 | 0,15 | NS |
| **Indole 3-acetic acid** | 0,61 | 0,43 | 0,47 | 0,06 | NS | 0,17 | 0,03 | 0,20 | 0,07 | 0,42 | 0,38 | NS | 0,49 | 0,26 | 0,33 | 0,09 | 0,24 | 0,14 | NS |
| **Indole 3-lactic acid** | 0,37 | 0,15 | 0,34 | 0,18 | NS | 0,18 | 0,20 | 0,59 | 0,45 | 0,39 | 0,13 | NS | 0,48 | 0,21 | 0,87 | 0,10 | 0,58 | 0,29 | NS |
| **Indole 3-lactic acid glucoside‡** | 0.40$^{b}$ | 0,09 | 1.18$^{a}$ | 0,32 | * | 1.08$^{b}$ | 0,23 | 2.22$^{a}$ | 0,08 | 2.74$^{a}$ | 0,88 | * | 0.96$^{b}$ | 0,01 | 1.40$^{a}$ | 0,03 | 1.36$^{a}$ | 0,06 | *** |
| **N-Acetyl serotonin** | 0,36 | 0,02 | 0,39 | 0,06 | NS | 0,43 | 0,07 | 0,40 | 0,06 | 0,37 | 0,02 | NS | 0,41 | 0,06 | 0,33 | 0,16 | 0,45 | 0,08 | NS |
| **Phenyl lactic acid** | 0,57 | 0,05 | 0,56 | 0,02 | NS | 0.47$^{b}$ | 0,11 | 0.90$^{ab}$ | 0,06 | 1.25$^{a}$ | 0,40 | * | 0,72 | 0,04 | 0,65 | 0,02 | 0,71 | 0,23 | NS |
| **Tryptophol-2-sulfonic acid** | 0,62 | 0,14 | 0,70 | 0,16 | NS | 0,18 | 0,08 | 0,42 | 0,33 | 0,58 | 0,43 | NS | 0,19 | 0,00 | 0,18 | 0,02 | 0,32 | 0,13 | NS |
| **Abscisic acid** | 0,39 | 0,12 | 0,55 | 0,08 | NS | 0,39 | 0,06 | 0,46 | 0,04 | 0,47 | 0,08 | NS | 0,37 | 0,02 | 0,30 | 0,07 | 0,25 | 0,07 | NS |
| **Abscisic acid glucoside** | 0,49 | 0,43 | 0,43 | 0,35 | NS | 0,39 | 0,25 | 0,30 | 0,09 | 0,20 | 0,05 | NS | 0,60 | 0,21 | 0,14 | 0,01 | 0,48 | 0,33 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*', '**', and '***' corresponds to '$p < 0.05$', '$p < 0.01$', and '$p < 0.001$', respectively.
Different letters (a, b and c) in the mean's superscript identify significantly different means.
‡ Quantified as indole lactic acid.
'NS' indicates 'no significant differences'.

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S7.** The evolution through different harvest times of aromatic amino acid (AAA) metabolites (mg/L) present in Ribolla Gialla sparkling wines.

| Compounds | 2017 | | | | | | 2018 | | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | | H1 | | H2 | | H3 | | Sig. | | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | | Mean | SD | Mean | SD | Mean | SD | | | Mean | SD | Mean | SD | Mean | SD | |
| **Tyrosine** | 11,34 | 1,70 | 9,37 | 0,19 | NS | | 5,11 | 1,81 | 6,66 | 1,20 | 12,37 | 4,90 | NS | | 3,18 | 2,17 | 4,72 | 0,36 | 5,78 | 1,73 | NS |
| **Phenylalanine** | 7,05 | 1,72 | 4,93 | 0,18 | NS | | 2,52 | 0,16 | 3,79 | 0,89 | 2,96 | 1,67 | NS | | 0,91 | 0,58 | 0,73 | 0,13 | 0,80 | 0,20 | NS |
| **Tryptophan** | 0,20 | 0,05 | 0,16 | 0,03 | NS | | 0,32 | 0,16 | 0,36 | 0,18 | 0,42 | 0,34 | NS | | 0,39 | 0,08 | 0,23 | 0,15 | 0,25 | 0,15 | NS |
| **Kynurenic acid** | 16,75 | 14,36 | 2,00 | 0,39 | NS | | 2.13$^{a}$ | 0,32 | 0.89$^{b}$ | 0,12 | 0.91$^{b}$ | 0,61 | * | | 12.15$^{a}$ | 2,02 | 7.30$^{b}$ | 2,81 | 15.40$^{a}$ | 1,89 | * |
| **Nicotinamide** | 0,21 | 0,10 | 0,48 | 0,22 | NS | | 0,22 | 0,04 | 0,19 | 0,00 | 0,18 | 0,04 | NS | | 0,65 | 0,45 | 0,39 | 0,25 | 0,82 | 0,10 | NS |
| **Tryptophan ethyl ester** | 0,24 | 0,01 | 0,19 | 0,04 | NS | | 0,19 | 0,12 | 0,13 | 0,01 | 0,18 | 0,06 | NS | | 0,49 | 0,35 | 0,46 | 0,36 | 0,27 | 0,16 | NS |
| **Tyrosine ethyl ester** | 32.66$^{a}$ | 0,85 | 18.70$^{b}$ | 2,93 | ** | | 6,39 | 2,69 | 7,27 | 0,26 | 11,61 | 3,95 | NS | | 15,47 | 15,64 | 5,80 | 3,30 | 13,74 | 5,17 | NS |
| **N-Acetyl-L-tyrosine ethyl ester** | 0,68 | 0,48 | 0,78 | 0,18 | NS | | 0,48 | 0,22 | 0,23 | 0,13 | 0,50 | 0,40 | NS | | 0,54 | 0,31 | 0,19 | 0,08 | 0,27 | 0,11 | NS |
| **Tyrosol** | 16,12 | 1,17 | 17,53 | 0,97 | NS | | 17,66 | 0,91 | 13,74 | 10,31 | 17,78 | 1,40 | NS | | 14,25 | 1,82 | 9,83 | 7,14 | 15,34 | 1,90 | NS |
| **Hydroxytyrosol** | 0.50$^{b}$ | 0,06 | 0.80$^{a}$ | 0,09 | ** | | 0,25 | 0,10 | 0,27 | 0,03 | 0,22 | 0,03 | NS | | 0.39$^{b}$ | 0,02 | 0.56$^{a}$ | 0,11 | 0.71$^{a}$ | 0,08 | ** |
| **Phenyl acetic acid** | 0.14$^{b}$ | 0,03 | 0.72$^{a}$ | 0,34 | * | | 0,45 | 0,28 | 0,17 | 0,07 | 0,28 | 0,10 | NS | | 0.28$^{b}$ | 0,15 | 0.56$^{a}$ | 0,01 | 0.15$^{b}$ | 0,02 | ** |
| **Tryptophol** | 0,33 | 0,07 | 0,38 | 0,02 | NS | | 0,77 | 0,10 | 1,07 | 0,17 | 1,14 | 0,28 | NS | | 0.42$^{b}$ | 0,04 | 0.38$^{b}$ | 0,03 | 0.49$^{a}$ | 0,02 | * |
| **Indole 3-acetic acid** | 0,15 | 0,03 | 0,42 | 0,16 | NS | | 0.22$^{b}$ | 0,03 | 0.17$^{b}$ | 0,07 | 0.66$^{a}$ | 0,26 | * | | 0,65 | 0,39 | 0,56 | 0,30 | 0,22 | 0,06 | NS |
| **Indole 3-lactic acid** | 0,38 | 0,07 | 0,24 | 0,11 | NS | | 0,66 | 0,44 | 0,18 | 0,07 | 0,29 | 0,15 | NS | | 0,46 | 0,38 | 0,61 | 0,32 | 0,19 | 0,02 | NS |
| **Indole 3-lactic acid glucoside‡** | 0.66$^{b}$ | 0,04 | 1.51$^{a}$ | 0,07 | *** | | 1.11$^{b}$ | 0,15 | 1.81$^{ab}$ | 0,11 | 2.41$^{a}$ | 0,69 | * | | 1.42$^{b}$ | 0,16 | 1.94$^{b}$ | 0,34 | 2.69$^{a}$ | 0,28 | ** |
| **N-Acetyl serotonin** | 0,40 | 0,04 | 0,39 | 0,03 | NS | | 0,36 | 0,03 | 0,43 | 0,07 | 0,44 | 0,12 | NS | | 0,39 | 0,07 | 0,40 | 0,06 | 0,38 | 0,05 | NS |
| **Phenyl lactic acid** | 0,72 | 0,21 | 0,71 | 0,02 | NS | | 1,26 | 0,29 | 1,06 | 0,15 | 1,37 | 0,46 | NS | | 0,76 | 0,09 | 0,72 | 0,17 | 1,19 | 0,39 | NS |
| **Tryptophol-2-sulfonic acid** | 1,19 | 0,07 | 1,26 | 0,12 | NS | | 0,54 | 0,18 | 0,31 | 0,08 | 0,54 | 0,17 | NS | | 0,51 | 0,41 | 0,22 | 0,06 | 0,19 | 0,10 | NS |
| **Anthranilic acid** | 0,41 | 0,06 | 0,44 | 0,34 | NS | | 0.16$^{b}$ | 0,02 | 0.87$^{a}$ | 0,09 | 0.15$^{b}$ | 0,08 | *** | | 0,19 | 0,06 | 0,50 | 0,35 | 0,18 | 0,04 | NS |
| **Abscisic acid** | 0,57 | 0,13 | 0,70 | 0,07 | NS | | 0,58 | 0,10 | 0,61 | 0,04 | 0,56 | 0,16 | NS | | 0,46 | 0,06 | 0,36 | 0,03 | 0,35 | 0,08 | NS |
| **Abscisic acid glucoside** | 0,19 | 0,17 | 0,32 | 0,19 | NS | | 0,51 | 0,36 | 0,65 | 0,13 | 0,39 | 0,27 | NS | | 0,47 | 0,24 | 0,59 | 0,43 | 0,59 | 0,40 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisks, '*', '**', and '***' corresponds to '$p < 0.05$', '$p < 0.01$', and '$p < 0.001$', respectively.
Different letters (a, b and c) in the mean's superscript identify significantly different means.
‡ Quantified as indole lactic acid.
'NS' indicates 'no significant differences'.

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S8.** Sensory attributes of Ribolla Gialla sparkling wines at different harvest times during 2017-2019 period.

| Sensory attributes | 2017 | | | | | 2018 | | | | | | | 2019 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H1 | | H2 | | Sig. | H1 | | H2 | | H3 | | Sig. | H1 | | H2 | | H3 | | Sig. |
| | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | | Mean | SD | Mean | SD | Mean | SD | |
| Floral | 4,11 | 0,71 | 4,97 | 0,17 | NS | 4,32 | 0,23 | 4,21 | 1,22 | 3,90 | 0,18 | NS | 5,70 | 1,77 | 5,38 | 0,46 | 3,58 | 0,86 | NS |
| Dry vegetable | 2,86 | 0,27 | 4,18 | 1,06 | NS | 2,67 | 0,39 | 2,86 | 0,84 | 3,16 | 0,32 | NS | 4,71 | 0,45 | 5,21 | 1,41 | 4,31 | 0,78 | NS |
| Citrus fruit | 4,33 | 1,05 | 4,30 | 0,80 | NS | 3,67 | 0,65 | 3,66 | 1,50 | 3,52 | 0,24 | NS | 5,99 | 1,21 | 4,65 | 1,33 | 3,53 | 1,17 | NS |
| Yeast | 3,06 | 0,24 | 4,32 | 0,87 | NS | 3,53 | 0,32 | 3,76 | 0,89 | 4,34 | 0,98 | NS | 5,64 | 0,88 | 5,89 | 0,83 | 5,01 | 1,62 | NS |
| Green apple | 4,92 | 1,49 | 3,05 | 0,19 | NS | 4,00 | 0,44 | 3,57 | 0,78 | 4,13 | 0,14 | NS | 6,01 | 1,74 | 5,86 | 0,80 | 4,75 | 1,44 | NS |
| Tropical | 3,50 | 0,47 | 3,72 | 0,68 | NS | $2.96^{c}$ | 0,02 | $3.54^{a}$ | 0,21 | $3.16^{b}$ | 0,26 | * | 5,84 | 1,39 | 5,37 | 0,16 | 4,55 | 0,22 | NS |
| Oxidation notes | 4,91 | 0,34 | 4,13 | 0,55 | NS | 1,96 | 0,71 | 3,00 | 0,15 | 3,13 | 0,18 | NS | 3,10 | 0,38 | 4,02 | 1,88 | 5,06 | 1,29 | NS |
| Acidity | 3,57 | 0,98 | 3,78 | 1,63 | NS | 5,65 | 1,09 | 5,86 | 1,08 | 4,50 | 0,17 | NS | 5,77 | 0,55 | 5,66 | 1,09 | 5,83 | 1,30 | NS |
| Astringency | 2,92 | 1,47 | 3,57 | 1,81 | NS | 3,78 | 0,59 | 3,49 | 1,07 | 3,09 | 1,07 | NS | 4,42 | 1,50 | 4,81 | 1,91 | 4,97 | 1,01 | NS |
| Bitterness | 3,55 | 0,15 | 3,97 | 1,19 | NS | 3,95 | 0,98 | 3,03 | 0,65 | 3,74 | 0,42 | NS | 4,59 | 0,76 | 3,89 | 1,14 | 4,07 | 1,62 | NS |
| Flavour | 4,11 | 0,90 | 3,80 | 0,87 | NS | 4,86 | 0,39 | 5,32 | 1,10 | 4,43 | 0,32 | NS | 5,41 | 1,48 | 6,25 | 1,31 | 5,16 | 1,67 | NS |
| Body | 3,71 | 0,69 | 3,98 | 0,45 | NS | 3,61 | 0,67 | 4,56 | 0,41 | 4,67 | 1,29 | NS | 4,67 | 0,35 | 4,88 | 0,80 | 5,49 | 0,95 | NS |
| Foam finesse | 3,64 | 0,90 | 3,95 | 1,70 | NS | 4,89 | 0,74 | 3,90 | 1,28 | 4,30 | 1,33 | NS | 5,94 | 0,79 | 4,84 | 0,19 | 5,59 | 0,90 | NS |
| Liquorice | 2,84 | 0,48 | 3,00 | 0,36 | NS | 3,48 | 0,16 | 2,97 | 1,05 | 3,25 | 0,64 | NS | 3,78 | 0,44 | 4,25 | 0,83 | 4,25 | 0,55 | NS |
| Herbaceous | 2,34 | 0,37 | 2,75 | 0,72 | NS | 3,12 | 0,56 | 2,26 | 0,84 | 3,47 | 1,12 | NS | $4.51^{b}$ | 0,48 | $5.08^{a}$ | 0,52 | $3.82^{c}$ | 0,35 | * |
| Dried fruit | 2,51 | 0,79 | 3,10 | 0,68 | NS | 2,43 | 0,40 | 2,54 | 0,99 | 3,19 | 0,66 | NS | 4,89 | 1,84 | 4,79 | 0,59 | 4,87 | 1,07 | NS |
| Mineral | 3,19 | 0,74 | 2,95 | 0,42 | NS | 4,48 | 0,52 | 3,03 | 1,50 | 2,67 | 0,20 | NS | 4,33 | 0,55 | 4,04 | 0,32 | 4,55 | 0,50 | NS |
| Global impression | 3,08 | 0,27 | 3,98 | 0,67 | NS | 4,19 | 0,54 | 4,25 | 0,93 | 3,93 | 0,63 | NS | 6,15 | 1,10 | 5,84 | 1,17 | 5,15 | 0,94 | NS |

H1, H2, and H3 refer to 'early', 'medium', and 'late' harvest, respectively.
Significance of one-way ANOVA is indicated with asterisk '*' that corresponds to '$p < 0.05$'.
Different letters (a, b, and c) in the mean's superscript identify significantly different means according to the Tukey's HSD post-hoc test.
'NS' indicates 'no significant differences'.

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https://doi.org/10.20870/oeno-one.2024.58.1.7668

**TABLE S9.** Linear retention indices (LRI) and identification method used for Volatile Aroma Compounds (VOCs) analysis in base wines and sparklings wines.

| Compounds | Matrix | RT (min) | $RI_{exp}$ | $RI_{lit}$ | IM | Literature |
|---|---|---|---|---|---|---|
| ***Monoterpenes*** | | | | | | |
| **β-Myrcene** | BW SW | 8,59 | 1159 | 1173 | MS RI STD | [1] |
| **Limonene** | BW SW | 9,32 | 1187 | 1204 | MS RI STD | [2] |
| **Linalool** | BW SW | 17,60 | 1546 | 1555 | MS RI STD | [3] |
| **Geraniol** | BW SW | 23,28 | 1876 | 1850 | MS RI STD | [4] |
| **Citronellol** | BW SW | 21,81 | 1766 | 1777 | MS RI STD | [1] |
| **Nerol** | BW SW | 21,73 | 1761 | 1777 | MS RI STD | [5] |
| **Terpinen-4-ol** | BW SW | 18,69 | 1600 | 1618 | MS RI STD | [6] |
| **α-Terpineol** | BW SW | 20,54 | 1696 | 1679 | MS RI STD | [7] |
| ***Norisoprenoids*** | | | | | | |
| **Vitispirane** | BW SW | 17,15 | 1524 | 1505 | MS | |
| **TDN** | BW SW | 21,44 | 1745 | 1732 | MS RI | [3] |
| **β-Damascenone** | BW SW | 22,81 | 1833 | 1857 | MS RI STD | [8] |
| **Actinidiol (isomer 1)** | BW SW | 24,65 | 2005 | - | MS | |
| **Actinidiol (isomer 2)** | BW SW | 24,88 | 2018 | - | MS | |
| ***Aldehydes*** | | | | | | |
| **Hexanal** | BW SW | 6,55 | 1081 | 1072 | MS RI STD | [9] |
| ***trans*-2-Hexenal** | BW SW | 10,73 | 1242 | 1235 | MS RI STD | [10] |
| **Nonanal** | BW SW | 14,32 | 1392 | 1397 | MS RI | [11] |
| **Benzaldehyde** | BW SW | 17,08 | 1520 | 1507 | MS RI STD | [12] |
| **3,4-Dimethyl benzaldehyde** | BW SW | 22,23 | 1789 | 1790 | MS RI | [13] |
| **Acetaldehyde** | BW SW | 1,72 | 549 | -- | MS | |
| **Furfural** | BW SW | 15,86 | 1463 | 1460 | MS RI | [14] |
| ***Alcohols*** | | | | | | |
| **n-Hexanol** | BW SW | 13,40 | 1353 | 1358 | MS RI STD | [12] |
| ***trans*-3-Hexenol** | BW SW | 13,63 | 1363 | 1374 | MS RI STD | [16] |
| **1-Octanol** | BW SW | 17,81 | 1556 | 1562 | MS RI | [12] |
| **Isobutanol** | BW SW | 7,14 | 1104 | 1114 | MS RI STD | [15] |
| **Methionol** | BW SW | 20,88 | 1715 | 1711 | MS RI | [16] |
| **Isoamyl alcohol** | BW SW | 10,11 | 1218 | 1209 | MS RI STD | [17] |
| **3-Methyl-1-pentanol** | BW SW | 12,76 | 1325 | 1316 | MS RI STD | [16] |
| **2,3-Butanediol (isomer 1)** | BW SW | 17,41 | 1537 | 1529 | MS RI | [18] |
| **2,3-Butanediol (isomer 2)** | BW SW | 18,16 | 1574 | 1583 | MS RI | [17] |
| ***cis*-3-Hexenol** | SW | 14,57 | 1403 | 1382 | MS RI STD | [18] |

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| | | | | | | |
|---|---|---|---|---|---|---|
| **trans-2-Hexenol** | SW | 15,06 | 1426 | 1420 | MS RI STD | [15] |
| **2-Phenylethanol** | BW SW | 24,08 | 1906 | 1923 | MS | |
| ***Esters*** | | | | | | [19] |
| **Ethyl acetate** | BW SW | 2,69 | 892 | 889 | MS RI | [20] |
| **Ethyl butyrate** | BW SW | 5,52 | 1040 | 1025 | MS RI STD | [2] |
| **Isopentyl acetate** | BW SW | 7,60 | 1122 | 1120 | MS RI STD | [3] |
| **Hexyl acetate** | BW SW | 11,46 | 1272 | 1295 | MS RI STD | [4] |
| **Methyl caproate** | BW SW | 9,28 | 1185 | 1180 | MS RI STD | [1] |
| **Ethyl hexanoate** | BW SW | 10,53 | 1234 | 1241 | MS RI STD | [5] |
| **Ethyl lactate** | BW SW | 13,18 | 1343 | 1355 | MS RI | [6] |
| **Methyl octanoate** | BW SW | 14,26 | 1390 | 1387 | MS RI | [7] |
| **Ethyl octanoate** | BW SW | 15,24 | 1434 | 1453 | MS RI STD | |
| **Isoamyl lactate** | BW SW | 18,04 | 1568 | 1570 | MS RI | |
| **Methyl decanoate** | BW SW | 18,60 | 1596 | 1604 | MS RI | [3] |
| **Ethyl decanoate** | BW SW | 19,48 | 1641 | 1643 | MS RI STD | [8] |
| **Isoamyl octanoate** | BW SW | 19,85 | 1660 | 1654 | MS RI STD | |
| **Methyl ethyl succinate** | BW SW | 19,36 | 1635 | 1641 | MS RI | |
| **Diethyl succinate** | BW SW | 20,16 | 1677 | 1679 | MS RI | |
| **Ethyl 9-decanoate** | BW SW | 20,46 | 1692 | 1708 | MS RI | [9] |
| **Ethyl-2-OH-4-methylpentanoate** | BW SW | 17,51 | 1542 | 1547 | MS RI | [10] |
| **2-Phenylethyl acetate** | BW SW | 22,72 | 1825 | 1832 | MS RI STD | [11] |
| **Ethyl hydrogen succinate** | BW SW | 31,69 | - | - | MS | [12] |
| **Methyl salicylate** | BW SW | 21,99 | 1775 | 1765 | MS RI STD | [13] |
| **Ethyl hydroxybutanoate** | BW SW | 22,51 | 1806 | - | MS | |
| **Ethyl dodecanoate** | SW | 22,80 | 1832 | 1850 | MS RI | [14] |
| **Isobutyl acetate** | SW | 5,42 | 1036 | 1020 | MS RI STD | |
| ***Acids*** | | | | | | [12] |
| **Acetic acid** | BW SW | 15,66 | 1453 | 1437 | MS RI STD | [14] |
| **Butyric acid** | BW SW | 19,26 | 1630 | 1598 | MS RI STD | [12] |
| **3-Methylbutyric acid** | BW SW | 20,05 | 1671 | 1657 | MS RI | [1] |
| **Hexanoic acid** | BW SW | 23,28 | 1876 | 1857 | MS RI STD | |
| **Octanoic acid** | BW SW | 26,86 | - | - | MS STD | |
| **Nonanoic acid** | BW SW | 28,54 | - | - | MS STD | |
| **Decanoic acid** | BW SW | 30,13 | - | - | MS STD | |
| **Benzoic acid** | BW SW | 32,47 | - | - | MS | |
| **Dodecanoic acid** | BW SW | 33,17 | - | - | MS | |
| ***Ketones*** | | | | | | |
| **2-Methylthiolan-3-one** | BW SW | 17,16 | 1524 | 1510 | MS RI | [21] |
| **Isophorone** | BW SW | 18,00 | 1566 | 1600 | MS RI | [22] |

Matrix where the specific compound was analyzed; BW base wines and SW sparkling wines.
RT, retention time in min.
RIexp, experimentally determined retention index.
RIlit, retention index reported in the literature.
IM, identification method (MS, comparison of mass spectra with those reported in mass spectrum libraries; RI, comparison of order of elution with those reported in literature; STD, comparison of mass spectra and retention).

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