SUPPLEMENTARY DATA
Gambuti, A., Luciano, A., Moio, L., & Picariello, L. (2025). Screening of Italian red wines for quercetin precipitation risk index: This is an original research article submitted in cooperation with Macrowine 2025. *OENO One*, *59*(2).
https://doi.org/10.20870/oeno-one.2025.59.2.8490

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Table S1. Oenological parameters of red wines.

Samples Code	pH	Titratable Acidity (g/L of tartaric acid)	Residual Sugars g/L	Ethanol (%v/v)	Volatile Acidity (g/L of acetic acid)	Malic Acid (g/L)	Total Sulphite (mg/L)	Free Sulphite (mg/L)
A1	3.0 ± 0.01	7.7 ± 0.21	0.13 ± 0.01	13.7 ± 0.01	0.24 ± 0.01	1.6 ± 0.03	35 ± 0.00	17.79 ± 0.69
A2	3.5 ± 0.01	6.6 ± 0.06	0.18 ± 0.01	14.6 ± 0.01	0.72 ± 0.02	0.0 ± 0.00	21.5 ± 0.71	12.96 ± 0.55
A3	3.1 ± 0.06	10.6 ± 0.11	0.30 ± 0.04	14.5 ± 0.01	0.57 ± 0.04	2.8 ± 0.10	48.5 ± 0.71	13.82 ± 2.09
A4	3.2 ± 0.01	10.2 ± 0.16	0.36 ± 0.01	15.0 ± 0.02	0.60 ± 0.04	3.0 ± 0.04	36.5 ± 0.71	13.48 ± 2.49
A5	3.0 ± 0.01	10.5 ± 0.00	0.38 ± 0.00	15.0 ± 0.01	0.69 ± 0.02	3.0 ± 0.11	43 ± 0.00	13.75 ± 0.83
A6	3.1 ± 0.01	9.4 ± 0.02	0.38 ± 0.01	15.7 ± 0.08	0.55 ± 0.01	2.1 ± 0.01	21 ± 1.41	19.45 ± 2.28
A7	3.4 ± 0.01	6.1 ± 0.01	0.13 ± 0.01	14.0 ± 0.07	0.50 ± 0.01	0.0 ± 0.00	32.5 ± 0.71	26.79 ± 3.59
A8	3.1 ± 0.01	8.9 ± 0.02	0.15 ± 0.02	14.7 ± 0.07	0.37 ± 0.01	1.8 ± 0.02	32.5 ± 0.71	23.57 ± 3.97
B1	3.7 ± 0.01	5.5 ± 0.02	0.24 ± 0.03	12.7 ± 0.04	0.47 ± 0.02	0.0 ± 0.00	28.5 ± 0.71	18.90 ± 2.45
B2	3.5 ± 0.01	6.3 ± 0.01	1.02 ± 0.03	15.0 ± 0.05	0.87 ± 0.04	0.0 ± 0.00	29 ± 0.00	26.32 ± 3.23
B3	3.3 ± 0.01	7.7 ± 0.02	0.40 ± 0.01	13.5 ± 0.06	0.43 ± 0.04	0.0 ± 0.00	30.5 ± 0.71	16.17 ± 1.85
C1	3.7 ± 0.02	7.6 ± 0.03	0.11 ± 0.01	12.4 ± 0.05	0.23 ± 0.01	3.0 ± 0.04	50 ± 0.00	14.95 ± 2.19
C2	3.4 ± 0.01	6.4 ± 0.02	0.12 ± 0.01	13.6 ± 0.03	0.35 ± 0.02	3.0 ± 0.04	33.5 ± 2.12	5.51 ± 1.38
C3	3.7 ± 0.03	6.7 ± 0.14	0.44 ± 0.04	16.5 ± 0.03	0.56 ± 0.01	3.0 ± 0.10	16.5 ± 0.71	10.86 ± 2.32
CV	3.3 ± 0.05	5.0 ± 0.04	0.16 ± 0.01	13.6 ± 0.04	0.74 ± 0.03	0.0 ± 0.00	25.5 ± 0.71	21.85 ± 3.08
DP	3.4 ± 0.04	4.6 ± 0.02	0.06 ± 0.00	12.4 ± 0.01	0.38 ± 0.02	0.0 ± 0.00	36.5 ± 0.71	20.42 ± 2.31
M1	3.4 ± 0.07	4.8 ± 0.06	0.23 ± 0.02	13.9 ± 0.03	0.37 ± 0.01	0.0 ± 0.00	33.5 ± 0.71	23.87 ± 4.19
M2	3.2 ± 0.01	5.8 ± 0.04	0.25 ± 0.02	15.5 ± 0.04	0.56 ± 0.02	0.9 ± 0.06	33 ± 1.41	13.25 ± 2.23
M3	3.7 ± 0.03	4.5 ± 0.05	0.33 ± 0.01	15.0 ± 0.10	0.32 ± 0.02	0.0 ± 0.00	26 ± 0.00	10.27 ± 3.01
MP	3.5 ± 0.05	4.5 ± 0.04	0.15 ± 0.01	13.4 ± 0.04	0.55 ± 0.01	0.0 ± 0.00	42 ± 1.41	18.06 ± 2.43
NEP	3.3 ± 0.03	5.0 ± 0.18	0.20 ± 0.00	12.9 ± 0.03	0.47 ± 0.02	0.0 ± 0.00	23 ± 0.00	12.70 ± 3.76

NEG	3.6 ± 0.01	4.3 ± 0.02	0.09 ± 0.01	14.1 ± 0.05	0.52 ± 0.01	0.0 ± 0.00	29.5 ± 0.71	14.73 ± 2.64
NA	3.4 ± 0.01	5.6 ± 0.05	0.40 ± 0.00	14.9 ± 0.04	0.67 ± 0.03	0.0 ± 0.00	17 ± 0.00	11.85 ± 3.09
NT	3.7 ± 0.01	4.3 ± 0.05	0.00 ± 0.00	14.0 ± 0.01	0.41 ± 0.01	0.5 ± 0.05	32.5 ± 0.71	18.62 ± 2.82
PN	3.9 ± 0.01	4.5 ± 0.07	0.00 ± 0.00	11.9 ± 0.02	1.25 ± 0.07	0.0 ± 0.00	22.5 ± 0.71	15.90 ± 2.38
PD	3.6 ± 0.01	4.9 ± 0.00	0.03 ± 0.00	10.0 ± 0.00	0.62 ± 0.01	0.0 ± 0.00	36 ± 0.00	21.36 ± 0.61
PP	3.3 ± 0.01	6.4 ± 0.14	0.29 ± 0.00	15.7 ± 0.13	0.41 ± 0.01	0.0 ± 0.00	35 ± 0.00	17.29 ± 2.48
S1	3.6 ± 0.03	4.6 ± 0.09	0.64 ± 0.02	14.7 ± 0.01	0.44 ± 0.01	0.7 ± 0.02	53 ± 0.00	19.84 ± 2.72
S2	3.5 ± 0.01	5.1 ± 0.18	0.37 ± 0.01	15.6 ± 0.03	0.45 ± 0.01	0.0 ± 0.00	30 ± 0.00	18.07 ± 3.59
S3	3.3 ± 0.01	5.3 ± 0.11	0.20 ± 0.01	15.5 ± 0.01	0.56 ± 0.02	0.0 ± 0.00	28.5 ± 0.71	18.56 ± 4.19
SS	4.0 ± 0.01	4.2 ± 0.06	0.15 ± 0.01	15.1 ± 0.19	0.44 ± 0.02	0.0 ± 0.00	26.5 ± 2.12	17.27 ± 3.05
TT	3.6 ± 0.01	5.2 ± 0.06	0.06 ± 0.00	13.3 ± 0.01	0.62 ± 0.02	0.0 ± 0.00	25.5 ± 0.71	15.78 ± 3.91

Table S2. Linearity of assays for Q and QG-s assessed by regression analysis.

Equation of calibration line	Equation of calibration line	r^2	linearity range (mg/L)
quercetin dihydrate	y = 80.468x	0.999	5–100 mg/L
quercetin-3-rhamnoside	y = 19.585x	0.9999	5–100 mg/L
quercetin-3-rutinoside	y = 30.69x	0.9992	5–100 mg/L
quercetin-3-glucuronide	y = 12.922x	0.9991	5–100 mg/L
quercetin-3-galactoside	y = 24.828x	0.9999	5–100 mg/L
quercetin-3-glucoside	y = 26.873x	0.9992	5–100 mg/L

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Table S3. Phenolic composition and colour intensity of red wines. Different capital letters indicate significant differences ($p < 0.005$) among samples.

Samples	Total Phenols (mg/L)	Monomeric Anthocyanins (mg/L)	Color Intensity (Abs)	Long Polymeric Pigment (mg/L)	Short Polymeric Pigment (mg/L)	Tannins Reactive to BSA (mg/L)	Flavans Reactive to Vanillin (mg/L)	VRF/ Monomeric Anthocyanins	Tannins/ Monomeric Anthocyanins
A1	637 ± 16 HIJ	546.5 ± 38.0 M	16.92 ± 0.14 L	2.76 ± 0.51 EFGH	2.88 ± 0.25 F	950 ± 58 GH	1373 ± 128 GHIJ	2.51 ± 0.11 ABCDEF	1.75 ± 0.23 IJK
A2	1018 ± 26 C	464.5 ± 28.7 IJKLM	15.79 ± 0.33 JK	3.30 ± 0.68 DE	2.43 ± 0.07 G	1439 ± 22 LMN	2080 ± 71 NOPQ	4.49 ± 0.35 DEFGHI	3.10 ± 0.15 GH
A3	496 ± 7 LMN	520.1 ± 24.3 LM	10.73 ± 0.06 FG	1.45 ± 0.53 JKLM	1.87 ± 0.12 HI	632 ± 39 E	925 ± 39 BCDEF	1.78 ± 0.15 ABC	1.22 ± 0.03 JK
A4	513 ± 38 LMN	506.4 ± 17.1 KLM	12.39 ± 0.22 H	1.42 ± 0.30 JKLM	2.37 ± 0.24 GHI	643 ± 7 E	1075 ± 86 DEFGH	2.12 ± 0.10 ABCD	1.27 ± 0.05 JK
A5	551 ± 6 KL	458.5 ± 17.0 IJKLM	11.35 ± 0.07 G	1.45 ± 0.10 JKLM	2.17 ± 0.22 HIJK	570 ± 8 DE	1000 ± 189 CDEFG	2.19 ± 0.43 ABCD	1.24 ± 0.05 JK
A6	1157 ± 18 B	530.3 ± 40.6 M	30.88 ± 0.06 P	6.67 ± 1.05 B	4.99 ± 0.33 C	1782 ± 32 P	2488 ± 138 RST	3.17 ± 0.06 ABCDEFG	2.27 ± 0.08 HIJ
A7	524 ± 15 LM	323.7 ± 3.1 EFGHIJ	12.58 ± 0.21 H	1.65 ± 0.05 IJKL	2.72 ± 0.07 FG	575 ± 12 DE	1313 ± 26 FGHI	4.06 ± 0.08 CDEFGH	1.78 ± 0.05 IJK
A8	737 ± 140 FG	370.4 ± 12.5 FGHIJKLM	15.98 ± 0.15 K	3.07 ± 0.21 DEF	2.18 ± 0.12 HIJK	1224 ± 128 JK	1776 ± 91 KLMNO	4.79 ± 0.10 FGHI	3.31 ± 0.039 GH
B1	479 ± 4 MN	408.1 ± 2.0 GHIJKLM	12.77 ± 0.18 H	3.33 ± 0.04 DE	2.73 ± 0.15 FG	438 ± 32 CD	579 ± 152 AB	1.42 ± 0.37 AB	1.07 ± 0.07 K
B2	703 ± 19 GH	347.8 ± 4.4 FGHIJKL	33.25 ± 0.17 Q	7.78 ± 0.50 A	7.52 ± 0.20 A	950 ± 33 GH	1281 ± 118 EFGHI	3.68 ± 0.36 BCDEFGH	2.73 ± 0.13 GHI
B3	398 ± 36 O	273.6 ± 4.8 CDEFGH	7.80 ± 0.064 BC	5.14 ± 0.44 C	1.38 ± 0.10 MN	228 ± 11 AB	736 ± 79 ABCD	2.69 ± 0.27 ABCDEF	0.84 ± 0.05 K
C1	300 ± 5 Q	489.4 ± 25.5 JKLM	16.15 ± 0.98 KL	0.29 ± 0.34 O	4.00 ± 0.26 D	581 ± 100 DE	603 ± 26 ABC	1.23 ± 0.02 A	1.19 ± 0.23 K
C2	395 ± 12 O	604.4 ± 12.2 GHIJKLM	20.86 ± 0.41 O	1.31 ± 0.59 KLMN	3.76 ± 0.29 DE	592 ± 81 DE	882 ± 104 BCDE	1.46 ± 0.15 AB	0.99 ± 0.14 K
C3	812 ± 27 E	794.6 ± 26.9 N	36.10 ± 0.33 R	3.79 ± 0.27 D	5.73 ± 0.23 B	1126 ± 153 IJ	1835 ± 193 LMNOP	2.31 ± 0.16 ABCDE	1.42 ± 0.20 JK
CV	975 ± 45 C	327.2 ± 8.2 EFGHIJK	21.17 ± 0.24 O	3.24 ± 0.48 DE	2.69 ± 0.67 FG	1829 ± 68 P	2607 ± 204 ST	7.96 ± 0.43 KL	5.59 ± 0.14 F
DP	470 ± 5 MN	265.9 ± 7.1 CDEFG	8.84 ± 0.41 D	0.58 ± 0.20 NO	1.46 ± 0.15 LMN	817 ± 143 FG	1126 ± 87 DEFGH	4.24 ± 0.42 DEFGH	3.08 ± 0.61 GH
M1	871 ± 19 D	452.6 ± 2.5 HIJKLM	16.89 ± 0.25 L	2.00 ± 0.36 HIJK	1.99 ± 0.12 IJK	1518 ± 179 NO	2133 ± 46 OPQR	4.71 ± 0.11 EFGHI	3.35 ± 0.38 G
M2	1188 ± 11 B	667.7 ± 0.8 A	20.62 ± 1.80 O	4.94 ± 0.25 C	2.12 ± 0.09 HIJK	1574 ± 101 NO	2641 ± 196 T	39.55 ± 2.46 Q	23.60 ± 1.82 A
M3	718 ± 12 FG	402.9 ± 6.4 CDEFG	14.35 ± 1.10 JK	2.11 ± 0.30 GHIJ	1.78 ± 0.23 KLM	1307 ± 37 KL	1713 ± 527 JKLMN	4.26 ± 1.25 DEFGH	3.26 ± 0.12 GH
MP	465 ± 4 N	251.8 ± 4.3 BCDEFG	14.93 ± 0.54 IJ	0.97 ± 0.31 LMNO	2.16 ± 0.25 HIJK	317 ± 30 BC	914 ± 82 BCDEF	3.63 ± 0.30 ABCDEFGH	1.26 ± 0.10 JK
NEP	708 ± 20 GH	719 ± 2.2 AB	4.51 ± 0.03 A	0.78 ± 0.36 GHIJ	0.35 ± 0.29 GHIJ	1310 ± 111 KLM	1594 ± 130 IJKLM	22.22 ± 2.28 P	18.27 ± 2.03 GH
NEG	584 ± 19 JK	153.9 ± 2.4 ABCDE	8.68 ± 0.41 CD	1.52 ± 0.43 JKLM	1.27 ± 0.22 NO	707 ± 20 EF	1534 ± 121 IJKL	9.96 ± 0.66 L	4.60 ± 0.08 F
NA	709 ± 13 GH	294.5 ± 15.2 DEFGHI	14.96 ± 0.24 IJ	2.17 ± 0.04 MNO	2.31 ± 0.28 P	966 ± 94 GHI	1998 ± 55 NOP	6.80 ± 0.48 IJK	3.29 ± 0.44 B
NT	872 ± 51 D	133 ± 7.4 ABCD	11.49 ± 0.33 G	2.17 ± 0.049 GHIJ	1.52 ± 0.41 LMN	1615 ± 144 O	2399 ± 332 QRST	17.48 ± 2.53 O	11.75 ± 0.89 D
PN	1713 ± 56 R	199.6 ± 3.4 ABCDEF	19.67 ± 1.76 N	1.94 ± 0.36 EFG	2.47 ± 0.59 O	315 ± 10 Q	4829 ± 748 U	24.20 ± 3.85 P	16.16 ± 1.58 IJK
PD	2000 ± 18 A	672 ± 0.6 A	3.86 ± 0.31 A	2.82 ± 0.11 HIJK	0.82 ± 0.02 GH	116 ± 0	362 ± 29 A	5.39 ± 0.48 GHIJ	1.73 ± 0.01 C
PP	659 ± 27 HI	127.3 ± 2.9 ABCD	10.30 ± 0.17 EF	2.33 ± 0.69 FGHI	1.33 ± 0.19 MN	1054 ± 97 HI	1990 ± 582 MNOP	15.69 ± 4.86 NO	8.28 ± 0.79 E
S1	369 ± 6 OP	104.2 ± 0.8 ABCDE	7.30 ± 0.09 B	1.47 ± 0.78 JKLM	1.39 ± 0.10 MN	363 ± 68 BC	796 ± 38 BCD	7.64 ± 0.41 JKL	3.48 ± 0.67 G
S2	1000 ± 41 C	159.9 ± 1.8 ABC	14.24 ± 0.43 I	3.00 ± 0.35 EF	1.98 ± 0.52 IJK	1471 ± 96 MNO	2223 ± 353 PQRS	13.92 ± 2.32 MN	9.19 ± 0.52 E
S3	773 ± 39 EF	127.2 ± 3.0 ABCD	9.79 ± 0.14 E	1.44 ± 0.55 JKLM	1.14 ± 0.35 NO	1117 ± 30 IJ	1580 ± 192 IJKL	12.45 ± 1.78 M	8.79 ± 0.44 E
SS	610 ± 9 IJ	245.0 ± 6.5 ABCDEFG	18.32 ± 0.09 M	2.41 ± 1.09 FGHI	3.50 ± 0.31 E	641 ± 61 E	1422 ± 339 HIJK	5.81 ± 1.41 HIJK	2.62 ± 0.30 GHI
TT	331 ± 2 PQ	268.2 ± 3.7 CDEFG	12.87 ± 0.26 H	1.30 ± 0.34 KLMN	2.53 ± 0.11 FGH	275 ± AB	801 ± 212 BCD	2.99 ± 0.81 ABCDEFG	1.03 ± 0.33 K