Table S1. Climatic data from the sampling location of the varieties under study during the study period. Source: INFORIEGO (https://www.inforiego.org/opencms/opencms)

Sampling location: Arribes

Year	Mean T (ºC)	Max. T (ºC)	Min. T (ºC)	Rainfall (mm)
2014	12.9	35	-7.42	627
2015	13.0	36.9	-7.02	317
2016	12.7	37.5	-6.37	635
2017	13.2	37.9	-8.80	231
2023	13.3	39.2	-7.15	428
2024	13.4	38.2	-5.97	498

Sampling location: Valladolid

Year	Mean T (ºC)	Max. T (ºC)	Min. T (ºC)	Rainfall (mm)
2014	12.8	36.4	-6.27	449
2015	12.5	37.5	-6.34	376
2016	12.4	38.3	-8.05	462
2017	13.1	38.4	-8.26	205
2023	13.1	39.4	-6.54	423
2024	13.0	39.4	-5.37	460

Sampling location: Bierzo

Year	Mean T (ºC)	Max. T (ºC)	Min. T (ºC)	Rainfall (mm)
2017	13.1	38.0	-10.9	537
2018	11.9	37.5	-6.8	704
2019	12.2	36.9	-9.26	749
2020	13.0	37.6	-5.2	551
2023	12.7	39.0	-7.86	807
2024	12.8	39.0	-5.74	768

Sampling location: Tierra de Campos

Year	Mean T (ºC)	Max. T (ºC)	Min. T (ºC)	Rainfall (mm)
2014	12.2	35.9	-5.99	397
2015	11.8	37.0	-6.07	461
2016	11.7	37.5	-7.85	460
2017	12.2	37.7	-10.2	247
2023	12.3	39.1	-8.11	416
2024	12.4	39.8	-7.11	449

Table S2. MANOVA of the phenolic compounds of the grapes studied.

	Variety			Vintage			Variety x Vintage			
Compounds	**F-ratio**	***p*-value[1]**	**% Variety[2]**	**F-ratio**	***p*-value[1]**	**% Vintage[2]**	**F-ratio**	***p*-value[1]**	**% Interaction[2]**	**% residue[2]**
Total polyphenols	185	**0.000**	77.3	187	**0.000**	9.73	26.5	**0.000**	11.1	1.88
Total anthocyanins	440	**0.000**	86.2	360	**0.000**	8.81	21.1	**0.000**	4.14	0.88
Total tannins	273	**0.000**	78.9	67.2	**0.000**	2.43	59.9	**0.000**	17.3	1.30

[1] Values in bold show significant differences in each compound and factor considered (*p*-values < 0.001). [2] Percentage of attributable variance of the independent effect of variety and vintage, the interaction variety and vintage, and residue.

Table S3. MANOVA of the total phenolic compounds and color parameters of the wines studied.

	Variety			Vintage			Variety x Vintage			
Compounds	**F-ratio**	***p*-value[1]**	**% Variety[2]**	**F-ratio**	***p*-value[1]**	**% Vintage[2]**	**F-ratio**	***p*-value[1]**	**% Interaction[2]**	**% residue[2]**
Total polyphenols	1811	**0.000**	86.5	673	**0.000**	4.02	195	**0.000**	9.35	0.11
Total anthocyanins	361	**0.000**	93.1	113	**0.000**	5.02	10.6	**0.000**	2.72	0.58
Total tannins	1101	**0.000**	89.3	108	**0.000**	1.09	117	**0.000**	9.47	0.18
% polymeric anthocyanins	167	**0.000**	75.0	92.4	**0.000**	5.19	41.9	**0.000**	18.8	1.01
Total tartaric esters of HCA	716	**0.000**	93.7	140	**0.000**	2.28	28.8	**0.000**	3.76	0.29
Total flavonols	330	**0.000**	96.1	49.8	**0.000**	1.81	4.89	**0.000**	1.42	0.65
Color intensity	17465	**0.000**	90.8	1623	**0.000**	1.05	1566	**0.000**	8.14	0.01
Hue	676	**0.000**	86.5	70.1	**0.000**	1.12	94.7	**0.000**	12.1	0.29
% blue	4109	**0.000**	78.5	1.46	0.242	0.00	1123	**0.000**	21.5	0.04

[1] Values in bold show significant differences in each compound and factor considered (*p*-values < 0.001). [2] Percentage of attributable variance of the independent effect of variety and vintage, the interaction variety and vintage, and residue.

Table S4. MANOVA of the groups of non-anthocyanin phenolic compounds of the wines studied.

	Variety			Vintage			Variety x Vintage			
Compounds	**F-ratio**	***p*-value[2]**	**% variety[3]**	**F-ratio**	***p*-value[2]**	**% Vintage[3]**	**F-ratio**	***p*-value[2]**	**% Interaction[3]**	**% residue[3]**
HBA[1]	1294	**0.000**	74.2	15.5	**0.006**	0.11	446	**0.000**	25.6	0.13
HCA[1]	8590	**0.000**	61.6	8653	**0.000**	7.76	4267	**0.000**	30.6	0.02
HCATE[1]	2134	**0.000**	89.6	688	**0.000**	3.61	160	**0.000**	6.73	0.09
Flavanols	622	**0.000**	81.0	57.0	**0.000**	0.93	137	**0.000**	17.8	0.29
Phenolic alcohols	117	**0.000**	24.8	1965	**0.000**	51.9	108	**0.000**	22.9	0.48
Stilbenes	1010	**0.000**	70.2	381	**0.000**	3.31	379	**0.000**	26.4	0.16
Flavonol aglycones	665	**0.000**	69.1	625	**0.000**	8.12	217	**0.000**	22.5	0.23
Glycosilated flavonols	831	**0.000**	81.5	280	**0.001**	3.43	151	**0.000**	14.9	0.22
Ratio *t*-cou/*t*-caf[4]	5577	**0.000**	99.0	256	**0.000**	0.57	24.8	**0.000**	0.44	0.04

[1] HBA: Hydroxybenzoic acids; HCA: Hydroxycynnamic acids; HCATE: Hydroxycinnamic acid tartaric esters. [2] Values in bold show significant differences in each compound and factor considered (*p*-values < 0.01). [3] Percentage of attributable variance of the independent effect of variety and vintage, the interaction variety and vintage, and residue. [4] Ratio *trans*-coutaric to *trans*-caftaric acids.