SUPPLEMENTARY DATA
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Supplementary Material

SUPPLEMENTARY TABLE S1. Supporting data of investigated vineyards in the Vipava Valley.

Vineyard	Relief	Coordinates (WGS84)	Altitude (m)	Inclination (%)	Row orientation	Vineyard exposition	Soil description	Rootstock	Clone	Planting year	Prunning system	Root depth (m)	Available water content (mm)
Budihni	Non-terraced	N45.8821 E13.7435	63	/	North-south	/	Non-skeletal pseudogley, clay loam soil	Kober BB9	Massal selection	1980	Single - Guyot	135	169
Cvetroz	Non-terraced	N45.8629 E13.7778	69	/	East-West	/	Fertile loam soil	SO4	Inra-Entav 184	2005	Single - Guyot	130	187
Bice	Non-terraced	N45.8914 E13.7473	77	/	East-West	/	Skeletal alluvial soil, clay loam on marl	SO4	Unknown	1992	Single - Guyot	130	156
Kote	Non-terraced	N45.8950 E13.7444	66	/	North-South	/	Non-skeletal pseudogley, silty clay loam soil	SO4	Massal sellection	2004	Duble-Guyot	140	204
Steske	Non-terraced	N45.8745 E13.7634	65	/	Eeast-West	/	Deluvial soil silty loam	SO4	Masal selection	2002	Single - Guyot	160	238
Brnadovc	Terraced	N45.8965 E13.7439	75	40	East-West	South	Hyper skeletal flysch, silty clay loam soil	SO4	Unknown	1999	Single - Guyot	110	40
Mlace	Terraced	N45.8814 E13.7595	105	45	North-South	South east	Skeletal flysch, silty clay loam soil	SO4	Inra-Entav 181	2002	Single - Guyot	95	130
Stronc	Terraced	N45.8823 E13.7342	104	25	Norht-South	South east	Skeletal flysch, silty clay loam soil	Paulsen 1103	ISV FV4	2011	Single - Guyot	180	118
Zelodi	Terraced	N45.8928 E13.7542	124	30	East-West	South	Hyper skeletal flysch, silty clay loam soil	SO4	Massal selection	1997	Single - Guyot	130	105
Gmajna	Terraced	N45.8894 E13.7541	94	20	North-South	South -west	Hyper skeletal flysch, silty clay loam soil	SO4	Inra-Entav 519	2004	Duble-Guyot	140	68

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SUPPLEMENTARY TABLE S2. Leaf area, yield parameters, and seed colour of grape cv. Merlot and the basic wine parameters of the non-terraced and terraced vineyards in the 2019 and 2020 vintages in the Vipava Valley.

	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
2019										
Grape parameters										
Yield (kg)	1.6±0.22	1.7±0.6	2.43±0.49	1.6±0.24	2.7±0.41	0.55±0.31	0.61±0.1	0.85±0.24	0.87±0.3	0.91±0.37
Cluster number	13±1	15.5±3.54	19±1.73	16±3.61	17±2.65	10.67±0.76	9.33±1.15	10.67±1.89	13.25±3.18	11.67±2.75
Leaf area (m^2/vine)	5.74±0.91	2.43±0.17	3.14±1	2.99±0.48	3.58±0.93	1.53±0.16	1.94±0.16	2.3±0.15	2.3±0.39	2.03±0.11
Seed colour	4.93±0.75	4.14±0.49	4.76±0.71	5.6±0.6	4.45±0.55	4.7±0.49	5.67±0.62	5.43±0.6	5.42±0.67	4.68±0.58
Berry weight (g)	1.39±0.02	1.64±0.04	1.46±0.1	1.46±0.07	1.6±0.05	1.41±0.17	1.18±0.04	1.53±0.18	1.31±0.18	1.19±0.12
Skins weight (mg/berry)	266.25±0.75	263.6±1.07	260.41±1.06	257.22±1.02	254.04±1.06	249.76±14.91	246.57±26.02	284.15±7.12	260.85±20.99	208.56±19.28
Seeds weight (mg/berry)	72.52±4.9	79.47±3.38	88.44±1.09	87.4±4.17	70.74±5.34	85.11±4.47	68.01±2.27	57.12±4.99	71.06±1.98	72.36±12.79
Skin-to-flesh ratio (mg/g flesh)	262.59±17	202.95±5.4	235.01±20.47	230.87±13.21	199.62±7.67	234.9±20.7	285.26±38.74	251.28±25.96	233.39±4.13	233.37±55.41
Seed-to-flesh ratio(mg/g flesh)	71.49±2.06	61.22±4.16	79.77±6.19	78.34±3.23	55.51±2.96	80.07±7.1	78.58±5.64	74.06±2.99	74.38±13.55	79.31±8.74
Basic wine parameters										
Alcohol (vol. %)	12.76±0.11	12.1±0.07	12.5±0.33	12.13±0.17	12.35±0.06	11.87±0.32	13.11±0.8	12.44±0.47	13.2±0.6	12.96±0.08
Total dry extract (g/L)	27.8±0.1	24.8±0.3	27.2±0.7	24.6±0.3	24.4±0.3	26.9±2.0	28.4±1.0	29.3±0.8	29.0±0.8	27.1±0.9
Titratable acidity (g/L)	5.0±0.2	5.3±0.2	5.2±0.4	5.7±0.2	5.1±0.1	5.3±0.2	5.6±0.1	5.4±0.2	5.4±0.2	5.0±0.2
Ash (g/L)	3.41±0.16	2.84±0.11	3.02±0.36	2.52±0.28	2.67±0.07	3.06±0.24	3.25±0.4	2.91±0.08	3.29±0.21	2.84±0.26
pH value	3.92±0.05	3.73±0.03	3.86±0.03	3.46±0.02	3.76±0.02	3.83±0.09	3.65±0	3.77±0.08	3.83±0.06	3.81±0.08
2020										
Grape parameters										
Yield (kg)	3.60±0.80	2.40±0.76	2.88±0.54		3.48±0.39	0.96±0.02	1.16±0.30		2.4±0.24	1.98±0.23

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Cluster number	19±2.83	16.33±4.04	14.33±3.21	18±3	11±0.91	16.83±3.25	17.5±1.41	16.67±0.29
Leaf area (m^2/vine)	4.2±0.54	3.37±0.25	1.84±0.19	2.45±0.41	1.86±0.06	2.14±0.04	3.05±0.04	3.22±0.36
Seed colour	4.49±0.58	4.37±0.45	3.22±0.63	4.04±0.78	5.97±0.91	5.21±0.66	5.16±0.93	6.56±0.46
Berry weight (g)	1.91±0.03	1.95±0.05	1.95±0.02	1.98±0.04	1.5±0.14	1.47±0.07	1.53±0.01	1.19±0.07
Skins weight (mg/berry)	273.28±9.77	289.83±12.23	298.5±8.12	247.39±4.72	263.52±21.88	253.51±27.24	240.38±22.11	249.76±14.91
Seeds weight (mg/berry)	78.68±17.6	84.88±4.3	80.62±3.47	78.28±5.28	84.50±4.040	73.55±1.75		
Skin-to-flesh ratio (mg/g flesh)	176.08±7.16	184.55±14.63	189.51±7.47	149.28±1.21	262.14±52.84	232.49±27.24	192.27±27.05	201.99±26.35
Seed-to-flesh ratio(mg/g flesh)	54.6±6.88	54.05±4.5	51.2±2.91	47.3±4.3	80.24±6.68	66.68±6.37	70.54±8.05	65.24±4.04
Basic wine parameters								
Alcohol (vol. %)	12.34±0.25	11.53±0.05	11.62±0.27	11.27±0.43	12.75±0.22	12.83±0.33	12.38±0.24	12.61±0.21
Total dry extract (g/L)	26.1±0.2	23.2±0.4	25.3±1.9	23.8±0.4	25.8±1.25	30.2±0.2	25.30±0.9	24.00±0.6
Titratable acidity (g/L)	6.1±0.1	5.4±0.1	5.1±0.2	5.2±0.1	6.0±0.2	6.1±0.2	5.80±0.4	5.53±0.10
Ash (g/L)	3.66±0.23	3.19±0.23	4.04±0.09	3.43±0.13	3.33±0.32	3.43±0.38	3.60±0.18	2.74±0.35
pH value	3.82±0.08	3.78±0.05	3.75±0.43	3.92±0.35	3.57±0.34	3.7±0.1	3.88±0.06	3.65±0.06

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SUPPLEMENTARY TABLE 3. Concentrations of aromatic compounds in Merlot wines from non-terraced and terraced vineyards in the 2019 and 2020 vintages in the Vipava Valley.

	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
	2019									
Higher alcohols (mg/L)										
1,1-Diethoxyethane	16.6±10.3	33.1±11.2	18.9±6.2	21.6±5.0	28.2±16.5	21.5±10.5	34.5±6.4	18.9±7.8	30.2±10.0	40.3±8.3
Propan-1-ol	30.4±4.4	30.4±2.4	31.0±1.0	30.8±4.4	25.7±1.6	38.2±2.5	53.3±6.5	28.1±0.2	48.8±12.7	45.8±1.8
2-Methylpropan-1-ol	51.8±7.5	51.9±3.3	55.9±7.0	41.7±0.6	59.9±2.2	48.8±3.5	54.9±1.4	52.0±7.4	57.5±1.7	53.7±1.5
Butan-1-ol	1.1±0.2	1.1±0.1	1.1±0.04	0.9±0.1	1.1±0.1	1.1±0.2	1.4±0.1	1±0.1	1.6±0.1	1.7±0.01
2-Methylbutan-1-ol	69.5±7.2	79.4±01,0	88.1±3.0	77.7±4.5	78.4±1.7	87.8±4.4	84.9±4.3	69.2±3.1	90.6±3.4	97.3±0.7
3-Methyl-1-butanol	220.1±16.1	228.2±1.7	244.0±15.7	235.2±5.6	226.3±5.1	252.5±8.3	253.1±5	200.5±10.7	242.6±7.3	264.7±5.6
Ethyl acetate	49.3±2.9	34.4±7.1	49.7±2.7	30.7±3.6	46.1±0.6	43.2±7.5	56.9±4.5	57.2±10.0	66.1±6.6	35.2±4.2
Methanol	88.0±7.7	84.7±6.3	90.7±12.7	78.6±1.7	80.9±4.3	103.7±6.1	103.7±11.9	83.1±1.9	114.1±3.3	103.0±4.3
Esters (µg/L)										
Ethyl butanoate	87±11	87±7	84±17	80±13	89±7	60±9	79±16	71±2	80±7	71±19
3-Methylbutyl acetate	372±22	329±19	354±109	332±40	296±30	317±27	391±53	366±47	421±54	328±22
Ethyl hexanoate	174±18	193±8	179±4	210±16	197±12	172±14	164±16	160±12	172±9	193±13
Ethyl octanoate	139±5	183±6	157±6	155±11	177±20	134±16	132±14	127±2	133±23	152±3
Ethyl decanoate	43±2	49±2	48±3	48±1	46±4	47±4	47±7	40±3	45±8	52±1
Diethyl butanedioate	515±42	706±46	530±51	774±70	776±8	858±411	539±50	532±122	392±10	725±209
2-Phenylethyl acetate	45±6	27±4	36±10	22±1	25±6	27±3	35±4	40±7	42±2	25±2
Ethyl dodecanoate	3761±105	3251±68	3006±458	2278±19	3421±185	2563±154	2853±416	2850±185	3143±106	3187±90
Ethyl hexadecanoate	15±4	20±4	42±7	27±7	17±4	51±17	32±14	22±10	29±8	57±12

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	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
	2019									
Other compounds (µg/L)										
Hexan-1-ol	1733±269	1036±104	1602±70	1681±155	1690±239	1681±263	1227±71	1771±283	1717±161	1616±153
(3Z)-Hex-3-en-1-ol	13±1	12±1	12±1	18±1	13±2	15±3	10±1	14±2	12±2	15±1
Benzaldehyde	18±8	8±4	8±5	7±6	8±8	9±6	4±1	20±8	4±2	5±3
Phenylmethanol	269±17	940±163	208±85	161±25	983±215	430±185	405±84	378±163	178±17	291±65
Oxolan-2-one	9862±278	9692±781	10036±482	8237±403	9416±1167	7913±572	9404±120	10995±415	9004±586	8362±1363
IBMP (ng/L)	3.8±0.4	1.3±0.2	1.6±0.2	nd	2.3±0.6	nd	nd	nd	1.2±0.0	1.3±0.0
Higher alcohols (mg/L)					**2020**					
1,1-Diethoxyethane	8.2±0.9	10.7±3.5	15.1±6.4		15.9±4.4	15.2±15	'.8±1.9		23.8±2.9	15.3±3.5
Propan-1-ol	39.9±4.4	35.6±1.5	40.6±2.5		34.1±2.0	47.3±4.3	39.9±2.7		42.9±6.2	43.9±3.3
2-Methylpropan-1-ol	64.9±6.0	62.3±0.9	59.4±0.6		65.9±3.9	59.6±1.2	69.6±1.5		61.1±1.6	61.9±1.2
Butan-1-ol	1.3±0.2	1.3±0.1	1.5±0.1		1.1±0.19	1.3±0.2	1.4±0.2		1.5±0.2	1.5±0.2
2-Methylbutan-1-ol	91.5±0.5	87.0±1.2	82.1±5.9		73.3±8.4	91.1±3.9	84.0±5.6		88.8±1.4	88.1±1.8
3-Methyl-1-butanol	287.5±4.2	278.6±5.5	267.9±22.1		243.1±27.8	277.4±5.0	268.1±12.7		272.0±18.9	274.0±3.5
Ethyl acetate	55.1±2.8	36.4±4.6	42.3±9.9		22.5±23.3	63.2±7.9	64.2±5.4		52.4±6.1	64.8±9.1
Methanol	98.4±10.0	67.9±5.6	74.6±8.9		84.7±14.3	68.9±6.0	123.7±3.6		103.8±11.2	68.9±16.4
Esters (µg/L)										
Ethyl butanoate	43±2	44±3	45±13		46±7	33±10	34±3		47±5	37±4
3-Methylbutyl acetate	148±9	104±4	104±7		116±13	148±25	115±17		141±15	105±18
Ethyl hexanoate	85±4	87±3	101±9		90±5	79±9	73±4		88±11	75±6
Ethyl octanoate	76±6	89±6	97±15		99±8	78±6	61±8		79±10	76±7
Ethyl decanoate	52±32	86±32	68±27		59±24	51±24	48±28		43±15	56±25
Diethyl butanedioate	2243±431	2892±114	2690±401		2690±778	2385±167	2481±363		3006±287	2369±45
2-Phenylethyl acetate	12±0.3	9±0.5	10±2		9±0.4	15±1	14±1		13±1	11±1
Ethyl dodecanoate	26±32	47±22	26±16		26±18	21±20	27±35		17±12	28±30
Ethyl hexadecanoate	78±63	74±20	43±17		53±12	87±37	52±1		75±10	55±26

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	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
Terraces					**2020**					
Other compounds (µg/L)										
Hexan-1-ol	686±94	583±28	869±72		734±82	592±17	665±171		749±39	548±76
(3Z)-Hex-3-en-1-ol	10±2	8±0.5	13±7		12±1	7±0.5	8±2		9±0.5	8±0.5
Benzaldehyde	1±0.3	2±0.2	2±0.6		3±1	1±0.2	2±1		2±0.5	2±1
Phenylmethanol	323±94	890±145	870±350		755±137	232±31	375±117		595±339	327±24
Oxolan-2-one	5929±678	5234±458	4145±1676		5329±1711	7308±160	5955±571		6755±137	4513±386

The data represent mean ± standard deviation of wines vinificated in triplicates for each vineyard. nd, not detected.

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SUPPLEMENTARY TABLE 4. Phenols in Merlot wines (CI – colour intensity, TA – total anthocyanins, TP – total polyphenols, VAN – vanillin index, PAs – proanthocyanidins) and the structural characteristics of the PAs (mDP – mean degree of polymerisation, % G – percentage of galloylation, % P – percentage of prodelphinidins). The data represent mean ± standard deviation of wines vinificated in triplicates for each vineyard.

	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
	2019									
Chromatic properties										
CI	12.33±0.35	10.95±0.85	11.71±0.64	11.03±0.56	10.94±1.01	11.6±0.78	12.32±0.45	12.12±0.58	13.86±0.39	13.51±0.1
Hue	0.75±0.03	0.74±0.08	0.75±0.04	0.66±0.01	0.8±0.01	0.67±0.05	0.68±0.02	0.71±0.07	0.7±0.02	0.71±0.05
Phenol concentration (mg/L)										
TA	785±36	479±39	691±48	611±33	445±33	689±56	757±30	667±97	822±20	782±37
TP	1242±55	1254±85	1310±48	1220±52	1053±24	1256±19	1615±34	1404±43	1377±102	1386±16
VAN	1312±43	1773±71	1497±151	1714±107	1330±120	1348±110	1689±66	1773±127	1385±118	1364±80
PAs	2402±189	2849 ±126	2256±549	1288±87	1161±32	2237±30	3394±1164	2712±327	2677±58	2469±27
Structural characteristics of PAs										
mDP	3.91±0.09	4.33±0.02	4.16±0.31	4.64±0.09	3.74±0.11	3.91±0.38	4.27±0.39	3.61±0.25	4.25±0.31	3.85±0.12
%G	11.45±0.17	11.54±0.15	13.57±0.03	12.28±0.35	12.18±1.23	13.82±2.31	14.03±1.75	15.24±2.32	19.5±1.57	16.68±0.6
%P	23.1±0.38	20.95±0.64	18.49±1.07	22±4.39	25.22±2.65	18.9±2.19	20.65±1.02	14.6±2.38	18.24±2.55	19.95±1.74
	2020									
Chromatic properties										
CI	8.63±1.17	6.35±0.54	6.06±0.51		10.2±2.09	12.96±1.21	9.6±1.55		14.75±0.74	12.79±0.27
Hue	0.74±0.04	0.83±0.05	0.85±0.16		0.76±0.1	0.7±0.05	0.7±0.04		0.63±0.02	0.6±0.01
Phenol concentration (mg/L)										
TA	536±16	413±12	416±10		380±63	830±28	583±55		678±126	810±42
TP	1277±108	1125±134	949±45		933±85	1427±44	1467±66		1131±74	1346±58
VAN	1172±93	1114±44	840±61		984±146	983±32	1388±31		849±71	981±68
PAs	2115±191	2213±190	1721±190		1652±131	2527±270	2676±99		2274±76	2635±217
Structural characteristics of PAs										
mDP	5.29±0.6	4.73±0.17	4.19±0.1		3.79±0.11	5.35±0.02	4.58±0.52		4.4±0.27	4.95±1.05
%G	19.3±1.58	16.98±1.14	15.57±2.7		16.45±2.95	16.82±2.2	17.76±0.49		15.08±1.28	15.48±0.38
%P	18.98±1.38	19.51±1.37	18.41±0.3		18.17±1.38	21.31±2.49	16.52±1.19		22.48±3.07	22.46±2.32

SUPPLEMENTARY DATA
Mihelčič, A., Vanzo, A., Sivilotti, P., Vrščaj, B., & Lisjak, K. (2023).
An investigation of vine water status as a major factor in the quality of Merlot wine produced in terraced and non-terraced vineyards in the Vipava Valley, Slovenia. *OENO One, 57*(2).
https://doi.org/10.20870/oeno-one.2023.57.2.7239

SUPPLEMENTARY TABLE 5. Ranking totals (n = 10 tasters, intensity scale 0-7) for sensory attributes regarding colour intensity, fruitiness, astringency, midtaste, overall quality, and total Buxbaum score of Merlot wines from terraces and plain vineyards in 2019 and 2020.

	Budihni	Cvetroz	Bice	Kote	Steske	Brnadovc	Mlace	Stronc	Zelodi	Gmajna
	Non-terraced					Terraced				
	2019									
Intensity	29.5±5.0	13.3±3.2	26.3±3.8	14.7±1.2	8.0±1.0	26.3±3.8	35.0±4.6	26.5±12	36.7±2.1	36.3±1.2
Fruitiness	22.7±3.2	16.0±6.0	19.5±7.8	14.0±6.6	11.0±5.3	19.5±7.8	33.0±5.3	33.5±7.8	35.3±6.4	31.0±4.6
Astringency	28.0±5.7	20.0±6.2	24.7±3.8	18.0±3.6	19.7±6.4	24.7±3.8	28.7±5.02	30.7±2.5	27.0±2.0	28.3±4.2
Midpalate	25.5±3.5	14.7±2.5	23.3±2.3	24.7±4.5	17.3±6.4	23.3±2.3	32.3±1.2	26.0±1.7	31.5±2.1	30.0±2.0
Overall quality	25.0±7.1	13.3±3.2	26.0±3.5	16.0±1.0	16.0±4.6	26.0±3.5	28.7±5.0	25.3±4.0	34.3±1.2	30.3±6.8
Total Buxbaum	16.9±0.5	16.6±0.3	17.2±0.1	16.8±0.1	16.4±0.2	17.2±0.1	17.2±0.3	17.2±0.2	17.3±0.1	17.1±0.2
	2020									
Intensity	30.7±6.4	19.3±10.2	13.7±4.5		14.0±1.2	13.7±4.5	28.7±3.2		37.3±11.0	45.3±2.3
Fruitiness	29.7±6.7	21.3±3.8	24.3±7.2		21.0±4.4	24.3±7.2	40.0±4.6		31.0±8.3	27.7±4.0
Astringency	31.7±8.5	23.3±6.4	22.0±5.2		24.0±9.0	22.0±5.2	34.3±4.5		25.5±9.1	37.0±4.0
Midpalate	30.0±8.1	22.0±5.6	17.0±4.6		15.0±10.4	17.0±4.6	32.7±4.2		28.0±5.6	40.3±3.1
Overall quality	29.5±9.8	21.7±2.5	19.0±6.9		15.7±7.0	19.0±6.9	33.3±2.5		29.5±12.0	34.7±8.1
Total Buxbaum	16.7±0.4	16.4±0.3	16.4±0.4		16.3±0.3	16.4±0.4	16.9±0.1		17.0±1.4	16.9±0.2

The data represent mean ± standard deviation of wines vinificated in triplicates for each vineyard.