Supplementary captions

Supplemental Figure 1: Chromatographs of sugars, simple organic acids and phenolic compounds in cultivars of blackcurrant: a. LC chromatograph of phenolics in black-fruited cultivars; b. LC chromatograph of phenolics in green-fruited cultivars; c. GC chromatograph of sugars, simple organic acids in all cultivars. The information of each peak was referred in **Table 1**.

Supplemental Figure 2: Comparison of Lithuanian cultivars with PLS regression models: based on their chemical composition (n=X) a. all Lithuanian cultivars (n=2400), 93% of the chemical variables explained 97% of the variation among the cultivars in 7 factors; b. the comparison between groups A and B (n=2400), 71% of the chemical variables explained 98% of the variation among the cultivars in 4 factors; c. the comparison within group A (n=1440), 94% of the chemical variables explained 99% of the variation among the cultivars in 6 factors; d. the comparison within group B (n=960), 73% of the chemical variables explained 100% of the variation among the cultivars in 2 factors. In the loading plots, the names of cultivars and groups are in red bold italic font and the identified phenolic compounds are in blue font. The full names of compounds are referred in **Table 1.**

Supplemental Table 1: Information of blackcurrant (*Ribes nigrum*) cultivars studied.

Supplemental Table 2: Concentrations of the main groups of phenolic compounds in *Ribes nigrum* fruits.

Supplemental Table 3: Concentrations of simple organic acids and sugars in *Ribes nigrum* fruits.

Supplemental Table 4: Climatic factors recorded at Piikkiö, Kaarina, Finland (latitude 60°23′ N, longitude 22°33′ E, altitude ca. 5 m) from 20th July to 20th August of year 2014 and 2015.

Supplemental Table 5: Concentrations of individual compounds identified in *Ribes nigrum* fruits (attached with an Excel file).

Supplemental Table 6: Information of external standards applied in quantification of phenolic compounds from *Ribes nigrum* fruits.

Supplemental Table 1 Information of blackcurrant (*Ribes nigrum*) cultivars studied

Cultivar	Country of origin	Harvest date	
		Year 2014	Year 2015
Ben Dorain	Scotland, UK	August 20	August 19
Ben Gairn	Scotland, UK	August 11	August 13
Ben Hope	Scotland, UK	August 19	August 18
Ben Starav	Scotland, UK	August 13	August 20
Ben Tirran	Scotland, UK	August 20	August 18
Ben Tron	Scotland, UK	August 2	August 11
S 18/2/23 (Unnamed breeding line)	Scotland, UK	August 20	August 25
Ben Finlay	Scotland, UK	August 5	August 13
9154-3 (Unnamed breeding line)	Scotland, UK	August 11	August 21
Almiai	Lithuania	August 2	August 10
Dainiai	Lithuania	August 7	August 13
Gagatai	Lithuania	August 7	August 12
Joniniai	Lithuania	August 4	August 12
Tauriai	Lithuania	August 2	August 12
Mara	Latvia	August 14	August 25
Marski	Finland	August 19	August 13
Mikael	Finland	August 20	August 10
Mortti	Finland	August 21	August 18
Vilma (Green-fruited)	Finland	August 14	August 12
Venny (Green-fruited)	Finland	August 14	August 13
Tisel	Poland	August 4	August 13

Supplemental Table 2 Concentrations (mg/100 g, dry weight, n=3) of the main groups of phenolic compounds in *Ribes nigrum* fruits*

Cultivar	Anthocyanins													
	delphinidins		cyanidins		petunidins		pelargonidins		peonidins		malvidins		total	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Ben Dorain	1258.8 ±60.7^{bc}	931.2 ±12.0^{bcd}	795.5 ±24.9^{bc}	737.2 ±66.8^{cd}	14.2 ±0.5^{defg}	12.6 ±0.7^{def}	25.6 ±1.1^{de}	21.7 ±1.7^{cdefg}	13.8 ±0.5^{cde}	14.7 ±0.3^{cdef}	17.2 ±0.9^{defg}	16.2 ±1.6^{fghi}	2125.1 ±64.4^{bc}	1733.7 ±70.7^{bcd}
Ben Gairn	803.3 ±195.1^{defg}	1020.5 ±186.9^{b}	440.7 ±93.6^{ghi}	653.0 ±111.2^{de}	14.0 ±1.5^{efgh}	18.5 ±2.8^{ab}	19.5 ±3.3^{ef}	24.6 ±3.3^{bcd}	10.8 ±0.8^{hi}	13.1 ±1.6^{efghi}	14.6 ±1.9^{g}	17.6 ±2.5^{efgh}	1302.8 ±295.3^{efg}	1747.5 ±307.3^{bcd}
Ben Hope	1468.7 ±42.6^{ab}	699.7 ±43.9^{bcdefg}	982.0 ±20.3^{a}	568.5 ±18.5^{de}	16.4 ±0.5^{bcd}	6.2 ±0.3^{g}	27.8 ±2.5^{cd}	17.5 ±1.0^{efgh}	16.8 ±0.4^{a}	13.9 ±0.2^{defgh}	20.4 ±2.2^{cde}	14.2 ±0.8^{hi}	2532.1 ±34.6^{ab}	1320.0 ±63.7^{cdef}
Ben Starav	1087.1 ±105.8^{cd}	723.7 ±21.0^{bcdefg}	703.5 ±59.7^{bcde}	586.7 ±29.6^{de}	13.8 ±0.9^{efgh}	12.5 ±0.5^{def}	25.9 ±2.8^{de}	17.8 ±0.8^{efgh}	13.5 ±0.7^{def}	14.2 ±0.4^{cdefg}	18.0 ±2.0^{cdefg}	14.1 ±0.7^{hi}	1861.8 ±170.4^{cd}	1369.0 ±51.4^{cdef}
Ben Tirran	983.8 ±178.1^{cde}	890.4 ±33.8^{bcde}	577.8 ±116.7^{efg}	577.0 ±18.4^{de}	13.7 ±0.8^{efgh}	13.1 ±0.2^{def}	21.4 ±2.1^{def}	21.8 ±1.4^{cdefg}	13.3 ±0.7^{def}	14.2 ±0.3^{cdefg}	15.5 ±1.0^{efg}	16.4 ±0.5^{fghi}	1625.5 ±292.4^{de}	1533.0 ±21.5^{bcde}
Ben Tron	1479.1 ±196.7^{ab}	1573.8 ±96.7^{a}	774.4 ±102.3^{bcd}	1017.2 ±30.8^{a}	18.8 ±1.4^{a}	16.5 ±0.8^{bc}	41.0 ±2.7^{a}	45.6 ±4.0^{a}	15.7 ±0.7^{ab}	17.2 ±0.7^{ab}	27.9 ±2.0^{ab}	32.3 ±2.1^{a}	2357.1 ±301.1^{ab}	2702.6 ±123.0^{a}
S 18/2/23	297.2 ±47.2^{i}	321.7 ±35.7^{hi}	187.9 ±29.3^{j}	290.7 ±21.6^{h}	6.5 ±0.2^{i}	6.5 ±0.3^{g}	15.6 ±1.1^{f}	16.7 ±0.8^{fgh}	11.2 ±0.4^{ghi}	11.2 ±0.2^{i}	13.4 ±0.9^{g}	15.9 ±0.3^{ghi}	531.8 ±78.6^{i}	662.6 ±55.9^{g}
Ben Finlay	791.2 ±58.1^{defg}	991.6 ±88.2^{bc}	446.4 ±10.8^{ghi}	961.3 ±99.9^{ab}	13.1 ±0.2^{fgh}	19.7 ±2.0^{a}	19.3 ±0.4^{ef}	25.5 ±1.6^{bcd}	11.3 ±0.3^{ghi}	16.5 ±1.3^{bc}	14.9 ±0.8^{fg}	23.3 ±0.7^{cd}	1296.3 ±45.6^{efgh}	2038.0 ±193.6^{b}
9154-3	644.2 ±128.0^{fgh}	268.7 ±22.7^{i}	460.2 ±81.9^{fghi}	327.7 ±20.5^{gh}	12.6 ±0.3^{fgh}	12.6 ±0.6^{def}	20.5 ±1.3^{ef}	13.9 ±0.6^{h}	12.5 ±0.2^{efg}	12.0 ±0.1^{ghi}	19.7 ±1.3^{cdef}	15.6 ±0.8^{ghi}	1169.6 ±212.6^{efgh}	650.5 ±35.7^{g}
Almiai	838.9 ±83.4^{def}	649.9 ±45.2^{cdefgh}	592.7 ±28.3^{defg}	538.7 ±48.0^{defg}	15.5 ±0.5^{cde}	13.8 ±0.4^{cdef}	28.3 ±2.3^{cd}	20.3 ±0.9^{defgh}	14.9 ±0.5^{bcd}	14.8 ±0.7^{bcdef}	21.3 ±1.9^{cd}	16.7 ±0.4^{fgh}	1511.6 ±109.2^{def}	1254.1 ±85.4^{def}
Dainiai	709.3 ±134.2^{efgh}	873.8 ±108.7^{bcde}	527.3 ±74.0^{efgh}	921.5 ±130.5^{abc}	14.0 ±1.2^{defgh}	16.4 ±1.3^{bc}	25.3 ±4.0^{de}	27.8 ±1.0^{bc}	13.7 ±1.0^{cde}	19.3 ±1.7^{a}	22.4 ±2.8^{c}	28.2 ±1.7^{ab}	1312.0 ±215.9^{efg}	1886.9 ±241.0^{bc}
Gagatai	1288.8 ±120.5^{bc}	807.2 ±47.7^{bcdef}	851.0 ±103.8^{ab}	752.0 ±51.2^{bcd}	18.4 ±0.6^{ab}	14.6 ±0.4^{cde}	44.0 ±2.0^{a}	25.3 ±1.0^{bcd}	16.2 ±0.9^{ab}	16.2 ±1.1^{bcd}	29.7 ±2.0^{a}	20.4 ±0.4^{def}	2248.1 ±224.7^{abc}	1635.6 ±101.8^{bcde}
Joniniai	406.2 ±63.3^{hi}	446.1 ±32.7^{ghi}	335.5 ±15.7^{ij}	551.4 ±82.5^{def}	12.1 ±0.3^{gh}	12.2 ±0.8^{ef}	23.9 ±2.1^{de}	23.7 ±1.2^{bcde}	12.0 ±0.3^{fgh}	13.9 ±0.7^{defgh}	20.2 ±0.7^{cde}	22.8 ±2.0^{d}	810.0 ±82.3^{hi}	1070.1 ±80.4^{efg}
Tauriai	547.5 ±18.5^{fghi}	436.9 ±31,1^{ghi}	409.8 ±28.1^{ghi}	334.5 ±21.9^{fgh}	17.3 ±0.4^{abc}	14.5 ±0.3^{cde}	33.7 ±2.0^{bc}	25.9 ±2.1^{bcd}	12.2 ±0.3^{efgh}	13.6 ±0.2^{efghi}	28.5 ±1.6^{a}	21.8 ±1.2^{de}	1049.2 ±49.6^{fgh}	847.1 ±52.9^{fg}
Mara	1703.9 ±37.3^{a}	549.7 ±45.9^{efghi}	840.1 ±23.4^{ab}	329.6 ±24.2^{fgh}	18.3 ±0.6^{ab}	15.0 ±0.2^{cde}	38.0 ±2.3^{ab}	23.0 ±1.8^{cdef}	15.2 ±0.1^{abc}	14.7 ±0.2^{bcdef}	22.8 ±1.5^{bc}	17.2 ±0.8^{fgh}	2638.4 ±55.7^{a}	949.2 ±73.0^{fg}
Marski	1676.1 ±30.0^{a}	981.7 ±401.0^{bc}	792.2 ±6.2bc	502.2 ±192.3^{efgh}	12.2 ±1.2^{gh}	8.3 ±1.2^{g}	37.3 ±3.2^{ab}	23.3 ±5.5^{bcde}	13.4 ±0.4^{def}	13.4 ±1.5^{efghi}	21.8 ±2.0^{cd}	16.3 ±2.7^{fghi}	2552.8 ±34.6^{ab}	1545.3 ±603.7^{bcde}
Mikael	590.8 ±17.7^{fghi}	386.5 ±29.8^{ghi}	635.2 ±40.0^{cdef}	690.1 ±9.9^{de}	14.6 ±0.2^{def}	13.1 ±0.5^{def}	22.9 ±0.6^{de}	16.1 ±0.8^{gh}	12.4 ±0.2^{efgh}	12.6 ±0.4^{fghi}	21.2 ±1.4^{cd}	19.7 ±1.3^{defg}	1297.1 ±33.1^{efgh}	1138.2 ±39.1^{efg}
Mortti	660.2 ±22.9^{fgh}	452.8 ±112.0^{fghi}	360.4 ±4.7^{hij}	310.5 ±63.7^{h}	11.7 ±0.5^{h}	11.4 ±0.6^{f}	19.1 ±0.4^{ef}	14.9 ±1.8^{h}	10.1 ±0.2^{i}	11.5 ±0.7^{hi}	13.0 ±0.1^{g}	12.3 ±1.0^{i}	1074.4 ±27.6^{fgh}	813.4 ±179.2^{fg}
Vilma (green)	n.d.**	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Venny (green)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Tisel	506.9 ±7.2^{ghi}	619.1 ±40.0^{defghi}	363.9 ±35.6^{hij}	637.5 ±57.8^{de}	13.0 ±0.8^{fgh}	15.3 ±0.4^{cd}	28.0 ±2.6^{cd}	29.7 ±1.4^{b}	10.7 ±0.6^{hi}	15.5 ±0.2^{bcde}	20.8 ±2.9^{cd}	27.5 ±1.3^{bc}	943.4 ±49.7^{ghi}	1344.7 ±100.4^{cdef}

(**Supplemental Table 2** continued)

Cultivar	Flavan-3-ols						Derivatives of phenolic acids							
	(epi)galloylcatechin		(epi)catechin		total		caffeic acid		coumaric acid		ferulic acid		total	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Ben Dorain	5.7 ±0.1^{efg}	6.2 ±0.2^{gh}	7.4 ±0.6^{cdefg}	9.5 ±0.3^{bcde}	13.1 ±0.7^{defgh}	15.7 ±0.4^{defg}	4.2 ±0.2^{d}	7.2 ±0.2^{bcd}	7.9 ±0.4^{def}	11.5 ±0.3^{efg}	2.6 ±0.2^{fg}	2.8 ±0.1^{efg}	14.6 ±0.4^{efg}	21.5 ±0.5^{fghi}
Ben Gairn	4.3 ±0.1^{kl}	6.1 ±0.4^{gh}	7.4 ±0.5^{cdefg}	9.9 ±0.5^{bc}	11.7 ±0.5^{fghi}	16.0 ±0.8^{defg}	2.7 ±0.1^{e}	4.3 ±0.3^{f}	7.0 ±0.2^{fg}	13.8 ±0.9^{de}	1.7 ±0.1^{hi}	2.2 ±0.1^{ghi}	11.3 ±0.2^{hij}	20.3 ±1.2^{ghij}
Ben Hope	8.5 ±0.4^{b}	8.2 ±0.2^{bcde}	8.5 ±0.8^{cde}	9.3 ±1.0^{bcdef}	17.0 ±1.2^{b}	17.5 ±1.1^{bcde}	4.1 ±0.5^{d}	6.1 ±0.6^{cde}	14.9 ±1.4^{a}	21.9 ±1.0^{b}	2.7 ±0.4^{efg}	3.5 ±0.4^{cde}	21.6 ±2.3^{ab}	31.5 ±2.0^{b}
Ben Starav	5.2 ±0.2^{ghij}	5.8 ±0.4^{ghi}	6.4 ±0.2^{fghi}	7.0 ±0.4^{fg}	11.5 ±0.3^{ghi}	12.8 ±0.8^{ghi}	4.3 ±0.2^{d}	5.8 ±0.2^{de}	7.4 ±0.4^{efg}	9.6 ±0.7^{fgh}	1.7 ±0.0^{hi}	2.0 ±0.1^{hij}	13.4 ±0.6^{fgh}	17.4 ±0.9^{ijk}
Ben Tirran	6.5 ±0.3^{cde}	8.8 ±0.4^{abc}	11.5 ±0.7^{a}	14.1 ±1.2^{a}	18.0 ±0.9^{ab}	23.0 ±1.4^{a}	5.6 ±0.1^{b}	9.2 ±0.4^{a}	12.9 ±0.8^{b}	23.0 ±1.9^{b}	4.1 ±0.3^{a}	5.0 ±0.3^{a}	22.6 ±1.2^{a}	37.2 ±2.6^{a}
Ben Tron	9.6 ±0.1^{a}	9.0 ±0.2^{ab}	10.6 ±0.3^{ab}	11.2 ±0.5^{b}	20.1 ±0.4^{a}	20.2 ±0.6^{abc}	10.7 ±0.2^{a}	10.3 ±0.2^{a}	9.1 ±0.2^{cde}	9.9 ±0.2^{fgh}	3.4 ±0.2^{bc}	4.0 ±0.1^{bc}	23.3 ±0.5^{a}	24.2 ±0.1^{efgh}
S 18/2/23	7.0 ±0.2^{c}	5.9 ±0.2^{ghi}	8.8 ±0.3^{c}	9.4 ±0.3^{bcdef}	15.8 ±0.4^{bc}	15.3 ±0.5^{defgh}	5.9 ±0.3^{b}	7.8 ±0.7^{b}	10.8 ±0.5^{c}	20.2 ±1.9^{bc}	2.5 ±0.1^{fg}	3.2 ±0.1^{def}	19.2 ±0.7^{bc}	31.2 ±2.5^{bc}
Ben Finlay	7.8 ±0.4^{b}	7.6 ±0.2^{ef}	6.8 ±0.2^{efghi}	9.7 ±0.6^{bcd}	14.6 ±0.2^{cd}	17.3 ±0.9^{bcde}	4.3 ±0.0^{d}	5.1 ±0.3^{ef}	13.2 ±0.3^{ab}	19.9 ±1.3^{bc}	4.0 ±0.0^{ab}	4.8 ±0.4^{a}	21.4 ±0.4^{ab}	29.8 ±2.0^{bcd}
9154-3	6.8 ±0.3^{cd}	9.7 ±0.4^{a}	5.9 ±0.2^{ghi}	7.5 ±0.6^{cdefg}	12.7 ±0.3^{defgh}	17.2 ±1.0^{bcde}	4.1 ±0.2^{d}	6.7 ±0.2^{bcd}	9.6 ±0.1^{cd}	17.8 ±0.9^{c}	3.2 ±0.0^{cde}	4.3 ±0.2^{ab}	16.9 ±0.3^{cde}	28.8 ±1.4^{bcde}
Almiai	4.8 ±0.1^{hijkl}	8.4 ±1.0^{bcde}	5.4 ±0.6^{hi}	9.6 ±1.2^{bcd}	10.2 ±0.5^{i}	18.0 ±2.1^{bcd}	4.3 ±0.4^{d}	9.7 ±0.7^{a}	5.8 ±0.4^{ghi}	12.1 ±2.2^{ef}	2.2 ±0.3^{fgh}	2.5 ±0.4^{fgh}	12.4 ±0.5^{ghi}	24.3 ±3.1^{efgh}
Dainiai	6.0 ±0.1^{def}	7.6 ±0.1^{def}	6.8 ±0.4^{efghi}	7.4 ±0.2^{defg}	12.8 ±0.5^{defgh}	15.1 ±0.2^{defgh}	5.7 ±0.4^{b}	6.5 ±0.4^{bcd}	10.0 ±0.8^{c}	10.3 ±0.2^{efgh}	2.6 ±0.3^{efg}	2.3 ±0.1^{ghi}	18.3 ±1.5^{cd}	19.0 ±0.6^{hijk}
Gagatai	7.0 ±0.1^{c}	7.8 ±0.2^{cdef}	7.2 ±0.3^{cdefgh}	8.3 ±0.3^{cdefg}	14.2 ±0.4^{cde}	16.2 ±0.3^{def}	5.4 ±0.3^{bc}	7.6 ±0.9^{b}	7.4 ±0.4^{efg}	11.3 ±0.5^{efg}	2.8 ±0.2^{def}	2.2 ±0.2^{ghi}	15.5 ±0.8^{def}	21.1 ±1.2^{fghi}
Joniniai	4.6 ±0.2^{ijkl}	6.3 ±0.5^{gh}	8,5 ±0.7^{cde}	9.6 ±1.0^{bcd}	13.1 ±0.9^{defgh}	16.0 ±1.4^{defg}	4.4 ±0.3^{d}	6.9 ±0.4^{bcd}	3.9 ±0.3^{i}	5.2 ±0.2^{i}	1.7 ±0.1^{hi}	1.5 ±0.0^{ijk}	10.1 ±0.6^{ij}	13.6 ±0.4^{klm}
Tauriai	5.6 ±0.2^{fgh}	5.7 ±0.1^{ghi}	5.5 ±0.5^{hi}	6.5 ±0.4^{g}	11.1 ±0.7^{hi}	12.2 ±0.5^{hi}	2.7 ±0.1^{e}	2.8 ±0.2^{g}	7.0 ±0.4^{fg}	7.2 ±0.4^{hi}	1.7 ±0.1^{hi}	1.5 ±0.1^{ijk}	11.4 ±0.5^{hij}	11.5 ±0.6^{lm}
Mara	4.4 ±0.0^{jkl}	5.3 ±0.1^{hi}	7.8 ±0.8^{cdef}	8.3 ±0.5^{cdefg}	12.1 ±0.8^{efghi}	13.6 ±0.6^{fghi}	2.3 ±0.2^{e}	2.7 ±0.3^{g}	4.8 ±0.2^{hi}	4.6 ±0.5^{i}	1.4 ±0.1^{i}	1,1 ±0.0^{k}	8.5 ±0.6^{j}	8.4 ±0.8^{m}
Marski	6.0 ±0.1^{ef}	6.3 ±0.3^{gh}	8.1 ±0.1^{cdef}	7.9 ±0.8^{cdefg}	14.1 ±0.2^{cdef}	14.2 ±1.1^{efghi}	2.2 ±0.0^{e}	2.7 ±0.1^{g}	6.5 ±0.3^{fgh}	10.6 ±0.2^{efgh}	2.2 ±0.1^{fgh}	1.9 ±0.2^{hij}	10.9 ±0.4^{hij}	15.2 ±0.4^{ijkl}
Mikael	6.8 ±0.3^{cd}	6.8 ±0.4^{fg}	6.9 ±0.7^{defgh}	6.3 ±0.2^{g}	13.7 ±1.0^{cdefg}	13.1 ±0.6^{fghi}	4.5 ±0.3^{cd}	4.9 ±0.3^{ef}	6.7 ±0.1^{fg}	9.7 ±0.8^{fgh}	3.4 ±0.3^{bcd}	2.8 ±0.5^{efg}	14.6 ±0.5^{efg}	17.4 ±1.3^{ijk}
Mortti	5.2 ±0.1^{fghi}	8.8 ±0.2^{abcd}	5.0 ±0.2^{i}	8.2 ±0.3^{cdefg}	10.2 ±0.4^{i}	17.0 ±0.4^{cde}	2.1 ±0.1^{e}	4.5 ±0.5^{f}	6.9 ±0.2^{fg}	16.7 ±1.1^{cd}	2.1 ±0.2^{gh}	3.8 ±0.1^{bcd}	11.1 ±0.5^{hij}	25.0 ±1.5^{defg}
Vilma (green)	4.8 ±0.4^{ijkl}	5.7 ±0.4^{ghi}	8.7 ±1.2^{cd}	14.6 ±1.8^{a}	13.5 ±1.4^{cdefg}	20.4 ±2.1^{ab}	4.6 ±0.5^{cd}	7.3 ±0.6^{bc}	9.0 ±0.7^{cde}	28.5 ±2.4^{a}	2.1 ±0.2^{gh}	3.4 ±0.3^{cde}	15.7 ±1.1^{def}	39.2 ±3.3^{a}
Venny (green)	5.1 ±0.5^{ghijk}	5.9 ±0.4^{ghi}	6.9 ±1.0^{defgh}	7.2 ±0.9^{efg}	11.9 ±1.4^{efghi}	13.1 ±1.2^{fghi}	3.8 ±0.3^{d}	4.4 ±0.1^{f}	10.0 ±1.4^{c}	19.3 ±2.3^{bc}	1.8 ±0.3^{hi}	2.3 ±0.2^{gh}	15.6 ±1.8^{def}	26.0 ±2.6^{cde}
Tisel	4.2 ±0.0^{l}	4.9 ±0.0^{i}	5.9 ±0.1^{ghi}	6.6 ±0.5^{g}	10.1 ±0.1^{i}	11.5 ±0.4^{i}	1.8 ±0.0^{e}	2.4 ±0.1^{g}	6.2 ±0.1^{fgh}	7.7 ±0.6^{ghi}	1.3 ±0.1^{i}	1.3 ±0.0^{ijk}	9.3 ±0.2^{j}	11.3 ±0.7^{lm}

(**Supplemental Table 2** continued)

Cultivar	Flavonols										Other phenolics		Sum of content of phenolics	
	myricetins		quercetins		kaempferols		isorhamnetins		total					
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Ben Dorain	23.9 ±2.8^{cde}	19.1 ±1.2^{defg}	9.7 ±0.6^{cde}	13.5 ±0.7^{de}	3.1 ±0.2^{defg}	5.4 ±0.5^{ghi}	0.8 ±0.2^{abcdef}	1.4 ±0.3^{defgh}	37.4 ±3.9^{defg}	39.4 ±2.7^{def}	1.7 ±0.1^{ef}	1.8 ±0.1^{jk}	2192.0 ±67.2^{bcd}	1812.0 ±67.4^{bcd}
Ben Gairn	11.1 ±1.3^{i}	14.3 ±1.0^{hij}	6.2 ±0.3^{ghi}	13.5 ±1.0^{de}	1.8 ±0.1^{fg}	4.6 ±0.0^{hi}	0.4 ±0.0^{cdef}	1.2 ±0.1^{defgh}	19.4 ±1.5^{i}	33.5 ±1.8^{fgh}	2.3 ±0.1^{d}	1.8 ±0.1^{k}	1347.6 ±294.3^{fghi}	1819.1 ±303.7^{bcd}
Ben Hope	28.0 ±1.4^{bc}	18.2 ±1.5^{efgh}	10.6 ±0.6^{bcd}	12.7 ±0.3^{ef}	3.5 ±0.7^{de}	6.8 ±0.8^{fghi}	1.3 ±0.3^{abc}	1.4 ±0.2^{defgh}	43.4 ±0.3^{cd}	39.0 ±0.8^{defg}	2.2 ±0.2^{def}	2.1 ±0.1^{ghijk}	2616.3 ±37.2^{ab}	1410.2 ±65.8^{cdefg}
Ben Starav	20.7 ±0.7^{def}	16.2 ±1.6^{fgh}	6.5 ±0.2^{ghi}	9.1 ±1.0^{fgh}	2.1 ±0.2^{efg}	4.3 ±0.3^{i}	0.1 ±0.0^{f}	0.5 ±0.1^{h}	29.3 ±1.0^{gh}	30.0 ±2.9^{ghi}	2.2 ±0.1^{def}	2.7 ±0.1^{efgh}	1918.2 ±170.4^{cde}	1431.9 ±55.9^{cdefg}
Ben Tirran	24.6 ±2.0^{cd}	24.8 ±0.9^{abc}	6.5 ±0.4^{ghi}	11.0 ±0.3^{efg}	2.8 ±0.2^{defg}	6.3 ±0.5^{fghi}	0.8 ±0.2^{abcdef}	1.0 ±0.0^{gh}	34.7 ±2.2^{efgh}	43.0 ±0.6^{bcde}	3.1 ±0.0^{c}	2.9 ±0.2^{cdefg}	1703.9 ±291.2^{def}	1639.2 ±20.0^{bcdef}
Ben Tron	33.1 ±2.6^{ab}	21.5 ±0.9^{cde}	12.5 ±0.7^{b}	14.5 ±0.9^{cde}	7.7 ±0.7^{a}	10.2 ±0.6^{cde}	1.1 ±0.2^{abcd}	2.4 ±0.6^{abcde}	54.3 ±2.3^{a}	48.6 ±2.6^{bc}	3.0 ±0.2^{c}	3.0 ±0.1^{cdef}	2457.9 ±303.5^{ab}	2798.6 ±124.1^{a}
S 18/2/23	17.0 ±1.9^{fgh}	16.1 ±2.8^{fghi}	8.5 ±0.9^{defg}	10.8 ±0.8^{efg}	3.1 ±0.1^{defg}	4.8 ±0.4^{hi}	1.0 ±0.1^{abcde}	1.5 ±0.1^{cdefgh}	29.5 ±2.7^{gh}	33.2 ±3.4^{fghi}	2.1 ±0.1^{def}	2.6 ±0.0^{fghij}	598.4 ±80.2^{j}	744.9 ±55.3^{h}
Ben Finlay	20.7 ±3.0^{def}	25.7 ±1.3^{ab}	5.8 ±0.4^{hij}	16.7 ±2.0^{bcd}	5.8 ±0.9^{b}	16.0 ±0.9^{a}	0.3 ±0.0^{def}	1.0 ±0.3^{fgh}	32.6 ±2.5^{fgh}	59.5 ±4.5^{a}	n.d.	n.d.	1364.9 ±48.8^{fgh}	2144.6 ±186.3^{b}
9154-3	14.5 ±1.1^{ghi}	15.2 ±1.0^{ghij}	9.7 ±0.1^{cde}	16.8 ±1.0^{bcd}	5.4 ±0.3^{bc}	11.7 ±0.9^{bc}	0.9 ±0.0^{abcdef}	2.0 ±0.3^{bcdefg}	30.5 ±1.0^{gh}	45.7 ±2.7^{bcde}	1.9 ±0.2^{def}	2.6 ±0.3^{fghi}	1231.7 ±211.7^{fghi}	744.9 ±39.8^{h}
Almiai	18.7 ±0.7^{efg}	17.7 ±1.5^{efgh}	5.9 ±0.6^{hi}	14.0 ±1.0^{de}	3.5 ±0.6^{de}	8.6 ±1.9^{def}	1.0 ±0.1^{abcde}	2.9 ±0.3^{ab}	29.1 ±1.2^{h}	43.2 ±3.8^{bcde}	2.3 ±0.4^{de}	4.2 ±0.6^{a}	1565.6 ±110.1^{efg}	1343.7 ±78.3^{defg}
Dainiai	30.5 ±3.1^{b}	22.5 ±1.8^{bcd}	10.7 ±1.5^{bcd}	18.1 ±1.3^{bc}	3.4 ±0.8^{de}	6.6 ±0.5^{fghi}	1.6 ±0.4^{a}	3.2 ±0.5^{ab}	46.2 ±5.7^{bc}	50.5 ±1.0^{ab}	3.8 ±0.2^{b}	3.4 ±0.3^{bcde}	1393.0 ±218.8^{fgh}	1974.9 ±240.1^{bc}
Gagatai	37.5 ±2.4^{a}	19.6 ±1.5^{def}	9.8 ±0.8^{cd}	13.0 ±0.4^{def}	4.1 ±0.2^{cd}	7.8 ±0.2^{efg}	1.4 ±0.1^{ab}	2.8 ±0.2^{abc}	52.9 ±3.3^{ab}	43.3 ±1.6^{bcde}	2.3 ±0.0^{d}	2.7 ±0.1^{defgh}	2333.0 ±223.8^{abc}	1718.9 ±100.0^{bcde}
Joniniai	15.6 ±2.0^{fghi}	11.9 ±1.1^{ijk}	9.1 ±0.4^{cdef}	25.4 ±2.3^{a}	3.9 ±0.3^{cd}	8.5 ±0.6^{def}	0.7 ±0.1^{bcdef}	1.4 ±0.2^{defgh}	29.2 ±2.5^{h}	47.3 ±3.2^{bcd}	3.3 ±0.1^{bc}	3.5 ±0.2^{abc}	865.7 ±78.9^{ij}	1150.6 ±85.5^{fgh}
Tauriai	11.2 ±0.4^{hi}	11.1 ±1.0^{ijk}	4.8 ±0.2^{ij}	6.3 ±0.6^{h}	3.8 ±0.2^{cd}	6.3 ±0.8^{fghi}	1.0 ±0.2^{abcde}	1.5 ±0.4^{cdefgh}	20.8 ±0.5^{i}	25.1 ±1.7^{hi}	2.1 ±0.1^{def}	2.1 ±0.1^{hijk}	1094.5 ±50.6^{ghi}	898.1 ±50.6^{gh}
Mara	31.4 ±2.8^{b}	27.5 ±1.7^{a}	5.2 ±0.3^{hij}	9.3 ±1.1^{fgh}	3.3 ±0.4^{def}	6.4 ±1.3^{fghi}	1.0 ±0.6^{abcde}	3.1 ±1.3^{ab}	41.0 ±2.0^{cde}	46.4 ±5.2^{bcde}	1.6 ±0.0^{f}	2.6 ±0.1^{fghi}	2701.6 ±55.2^{a}	1020.2 ±78.7^{gh}
Marski	29.2 ±1.0^{bc}	19.2 ±0.9^{defg}	7.3 ±0.8^{efgh}	9.2 ±0.3^{fgh}	4.1 ±0.3^{cd}	7.1 ±0.3^{fgh}	1.2 ±0.2^{abc}	2.1 ±0.1^{abcdefg}	41.8 ±2.2^{cde}	37.7 ±1.4^{efg}	3.4 ±0.1^{bc}	3.5 ±0.2^{bcd}	2623.0 ±36.9^{ab}	1615.9 ±600.9^{bcdef}
Mikael	19.4 ±2.1^{defg}	9.6 ±0.7^{k}	15.7 ±1.2^{a}	18.4 ±1.0^{bc}	4.2 ±0.3^{cd}	7.8 ±0.5^{efg}	1.4 ±0.3^{ab}	2.5 ±0.4^{abcd}	40.7 ±3.7^{cdef}	38.3 ±2.2^{defg}	4.7 ±0.4^{a}	3.9 ±0.3^{ab}	1370.8 ±28.4^{fgh}	1210.9 ±42.1^{efgh}
Mortti	12.6 ±0.6^{hi}	19.1 ±1.3^{defg}	3.5 ±0.3^{j}	8.7 ±0.6^{gh}	1.7 ±0.3^{g}	5.0 ±0.4^{hi}	0.2 ±0.1^{ef}	1.1 ±0.1^{efgh}	18.0 ±1.3^{i}	33.9 ±1.8^{fgh}	1.8 ±0.0^{def}	2.0 ±0.1^{ijk}	1115.5 ±26.3^{ghi}	891.2 ±181.3^{gh}
Vilma (green)	1.5 ±0.5^{j}	2.7 ±0.7^{l}	11.5 ±1.7^{bc}	20.5 ±3.3^{b}	5.3 ±0.6^{bc}	14.3 ±1.4^{ab}	1.1 ±0.4^{abcd}	3.4 ±0.8^{a}	19.3 ±3.1^{i}	40.9 ±5.7^{cdef}	2.2 ±0.2^{def}	3.5 ±0.4^{bcd}	50.7 ±4.6^{k}	103.9 ±11.4^{i}
Venny (green)	1.7 ±0.3^{j}	1.7 ±0.1^{l}	9.3 ±0.6^{cde}	11.5 ±1.1^{efg}	5.1 ±1.1^{bc}	8.7 ±1.0^{def}	1.4 ±0.5^{ab}	2.3 ±0.3^{abcdef}	17.5 ±2.1^{i}	24.3 ±2.4^{i}	2.0 ±0.2^{def}	2.2 ±0.1^{ghijk}	46.9 ±4.7^{k}	65.6 ±4.2^{i}
Tisel	16.0 ±0.1^{fghi}	16.1 ±0.4^{fghi}	6.7 ±0.2^{fghi}	10.9 ±0.9^{efg}	6.0 ±0.6^{b}	10.9 ±0.5^{cd}	0.6 ±0.1^{bcdef}	1.4 ±0.0^{defgh}	29.4 ±1.1^{gh}	39.2 ±1.9^{def}	3.1 ±0.3^{c}	3.4 ±0.0^{bcde}	995.3 ±51.2^{hij}	1410.2 ±103.5^{cdefg}

* Statistical differences based on one way-ANOVA and Tukey's post hoc test ($p<0.05$), and significant differences among cultivars shown with superscript letters a-m; ** n.d. means not detected.

Supplemental Table 3 Concentrations (mg/g, dry weight, n=3) of simple organic acids and sugars in *Ribes nigrum* fruits*

Cultivar	Simple acid									
	malic acid		citric acid		quinic acid		ascorbic acid		total	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Ben Dorain	4.8 ±0.2^{a}	5.6 ±0.8^{a}	37.1 ±2.3^{bcd}	43.5 ±3.4^{bcd}	0.2 ±0.0^{defg}	0.3 ±0.0^{def}	1.2 ±0.3^{def}	1.2 ±0.2^{cd}	43.2 ±2.3^{b}	50.6 ±4.1^{b}
Ben Gairn	2.2 ±0.1^{defg}	2.8 ±0.3^{fgh}	19.8 ±0.2^{efg}	32.8 ±3.6^{fghi}	0.1 ±0.0^{defg}	0.3 ±0.0^{cde}	0.6 ±0.0^{fgh}	0.7 ±0.3^{def}	22.7 ±0.0^{efgh}	36.6 ±4.0^{def}
Ben Hope	3.1 ±0.3^{cd}	4.5 ±0.8^{abcd}	24.3 ±3.0^{e}	20,9 ±1.1^{j}	0.1 ±0.0^{fg}	0.2 ±0.0^{defg}	1.4 ±0.3^{bcde}	1.7 ±0.4^{bc}	28.9 ±3.5^{de}	27.3 ±2.2^{f}
Ben Starav	2.1 ±0.5^{efgh}	3.6 ±0.5^{cdefg}	24.0 ±2.9^{e}	42.3 ±3.3^{bcde}	0.2 ±0.0^{defg}	0.3 ±0.0^{cde}	0.9 ±0.2^{efg}	1.3 ±0.1^{cd}	27.1 ±3.6^{def}	47.5 ±3.8^{bc}
Ben Tirran	3.1 ±0.2^{cd}	5.0 ±0.2^{ab}	48.4 ±1.1^{a}	44.0 ±4.1^{bc}	0.1 ±0.0^{defg}	0.2 ±0.0^{defg}	1.7 ±0.2^{bcd}	2.3 ±0.1^{ab}	53.2 ±0.7^{a}	51.6 ±4.0^{b}
Ben Tron	2.7 ±0.2^{cdef}	2.6 ±0.2^{fgh}	37.3 ±0.9^{bcd}	32.2 ±1.7^{fghi}	0.1 ±0.0^{defg}	0.2 ±0.0^{fgh}	1.3 ±0.2^{cde}	0.8 ±0.1^{def}	41.4 ±0.7^{b}	35.8 ±2.0^{def}
S 18/2/23	4.1 ±0.1^{ab}	3.6 ±0.4^{cdefg}	40.3 ±1.9^{b}	29.4 ±1.8^{ghij}	0.2 ±0.0^{defg}	0.1 ±0.0^{gh}	1.3 ±0.1^{cde}	1.0 ±0.1^{de}	45.9 ±1.8^{b}	34.2 ±2.2^{ef}
Ben Finlay	2.5 ±0.6^{defg}	4.5 ±0.2^{abcd}	22.8 ±3.1^{ef}	27.6 ±0.5^{hij}	0.1 ±0.0^{defg}	0.3 ±0.0^{def}	1.4 ±0.2^{bcde}	1.8 ±0.0^{bc}	26.8 ±4.0^{def}	34.2 ±0.3^{ef}
9154-3	4.7 ±0.5^{a}	4.3 ±0.4^{abcde}	16.8 ±0.9^{fgh}	28.2 ±1.2^{ghij}	0.1 ±0.0^{efg}	0.2 ±0.0^{defg}	0.7 ±0.1^{fgh}	0.9 ±0.4^{def}	22.3 ±1.1^{efgh}	33.6 ±1.5^{ef}
Almiai	2.9 ±0.2^{cde}	3.6 ±0.3^{cdefg}	38.2 ±3.6^{bc}	40.3 ±4.8^{bcdef}	0.2 ±0.0^{cde}	0.2 ±0.0^{defg}	1.9 ±0.2^{bc}	0.9 ±0.4^{def}	43.2 ±3.6^{b}	45.0 ±5.5^{bcd}
Dainiai	4.9 ±0.3^{a}	4.8 ±0.2^{abc}	22.5 ±3.0^{ef}	33.2 ±3.4^{efghi}	0.6 ±0.1^{a}	0.4 ±0.0^{bc}	1.1 ±0.2^{def}	0.9 ±0.1^{def}	29.0 ±2.9^{de}	39.3 ±3.7^{cde}
Gagatai	2.4 ±0.4^{defg}	3.0 ±0.6^{efg}	18.2 ±2.6^{efgh}	34.2 ±2.2^{defgh}	0.1 ±0.0^{fg}	0.2 ±0.0^{fgh}	0.6 ±0.1^{fgh}	0.3 ±0.1^{f}	21.4 ±2.1^{fgh}	37.8 ±2.0^{cde}
Joniniai	4.3 ±0.2^{ab}	4.5 ±0.4^{abcd}	31.7 ±1.9^{cd}	37.2 ±0.6^{bcdefg}	0.4 ±0.0^{b}	0.6 ±0.1^{a}	2.5 ±0.1^{a}	2.2 ±0.3^{ab}	38.9 ±2.0^{bc}	44.5 ±1.3^{bcd}
Tauriai	3.4 ±0.1^{bc}	3.9 ±0.4^{bcdef}	24.2 ±3.3^{e}	46.4 ±5.2^{b}	0.2 ±0.1^{cd}	0.3 ±0.1^{cde}	1.2 ±0.4^{def}	1.2 ±0.2^{cd}	29.0 ±3.8^{de}	51.8 ±5.2^{b}
Mara	1.2 ±0.1^{hi}	1.6 ±0.2^{h}	30.9 ±1.1^{d}	64.2 ±3.7^{a}	0.1 ±0.0^{fg}	0.1 ±0.0^{h}	0.9 ±0.3^{efg}	0.6 ±0.0^{def}	33.1 ±1.3^{cd}	66.5 ±3.8^{a}
Marski	1.9 ±0.1^{fgh}	3.4 ±0.4^{defg}	21.3 ±2.5^{ef}	34.4 ±1.4^{defgh}	0.2 ±0.0^{cdef}	0.3 ±0.0^{def}	0.3 ±0.1^{h}	0.3 ±0.1^{f}	23.6 ±2.5^{efgh}	38.3 ±1.8^{cde}
Mikael	0.8 ±0.1^{i}	2.3 ±0.3^{gh}	13.1 ±0.6^{h}	36.3 ±2.9^{cdefgh}	0.1 ±0.0^{g}	0.2 ±0.0^{efgh}	0.2 ±0.1^{h}	0.4 ±0.1^{ef}	14.2 ±0.6^{i}	39.2 ±3.4^{cde}
Mortti	2.5 ±0.5^{defg}	3.6 ±0.7^{cdefg}	14.0 ±1.3^{gh}	28.3 ±0.3^{ghij}	0.1 ±0.0^{defg}	0.2 ±0.1^{defg}	0.5 ±0.2^{gh}	0.6 ±0.3^{def}	17.1 ±1.9^{hi}	32.7 ±0.9^{ef}
Vilma (green)	1.6 ±0.1^{ghi}	2.4 ±0.3^{gh}	16.4 ±0.2^{fgh}	27.6 ±2.6^{hij}	0.2 ±0.0^{defg}	0.2 ±0.0^{efg}	0.8 ±0.1^{efgh}	0.7 ±0.0^{ef}	19.0 ±0.0^{ghi}	30.9 ±2.3^{ef}
Venny (green)	2.0 ±0.2^{efgh}	2.9 ±0.4^{fgh}	19.8 ±0.8^{efg}	32.9 ±3.7^{fghi}	0.3 ±0.1^{bc}	0.4 ±0.0^{b}	1.2 ±0.1^{def}	0.9 ±0.1^{def}	23.3 ±0.8^{efgh}	37.1 ±4.0^{def}
Tisel	2.8 ±0.0^{cde}	3.5 ±0.0^{cdefg}	20.0 ±0.9^{efg}	24.1 ±2.9^{ij}	0.2 ±0.0^{cdef}	0.4 ±0.0^{bcd}	2.0 ±0.1^{ab}	2.5 ±0.1^{a}	25.0 ±0.9^{efg}	30.5 ±2.9^{ef}

(Supplemental Table 3 continued**)**

Cultivar	Sugars							
	fructose		glucose		sucrose		total	
	2014	2015	2014	2015	2014	2015	2014	2015
Ben Dorain	78.9 ±1.6^{abcd}	117.1 ±2.9^{abc}	54.4 ±2.3^{abcde}	83.1 ±2.9^{abcd}	4.3 ±0.5^{def}	3.4 ±0.7^{fghi}	137.6 ±2.9^{abc}	203.7 ±5.2^{ab}
Ben Gairn	52.6 ±3.0^{efg}	99.1 ±2.7^{bcde}	42.3 ±2.0^{efgh}	75.1 ±0.8^{bcde}	5.7 ±0.4^{bcd}	4.5 ±0.3^{efgh}	100.6 ±5.4^{defg}	178.8 ±3.8^{abc}
Ben Hope	51.1 ±6.2^{efg}	112.6 ±10.3^{abc}	35.4 ±4.5^{fgh}	72.8 ±10.7^{cde}	3.7 ±0.3^{defg}	5.0 ±0.7^{efg}	90.2 ±10.8^{fg}	190.4 ±20.5^{ab}
Ben Starav	62.5 ±7.3^{de}	115.2 ±6.0^{abc}	41.1 ±5.7^{efgh}	80.5 ±12.8^{abcde}	5.0 ±0.8^{bcde}	9.9 ±0.8^{bc}	108.6 ±13.7^{cdef}	205.6 ±17.8^{ab}
Ben Tirran	73.1 ±4.4^{abcd}	124.3 ±1.6^{a}	55.1 ±3.1^{abcde}	88.5 ±5.4^{abcd}	3.0 ±0.2^{efghi}	8.6 ±2.4^{cd}	131.2 ±7.4^{abcd}	221.4 ±3.2^{a}
Ben Tron	82.9 ±1.9^{abc}	114.8 ±2.5^{abc}	65.3 ±1.0^{ab}	80.6 ±1.5^{abcde}	0.9 ±0.1^{ij}	0.5 ±0.1^{k}	149.1 ±2.9^{ab}	195.9 ±2.6^{ab}
S 18/2/23	54.4 ±2.7^{ef}	75.8 ±9.3^{ef}	45.3 ±2.3^{defg}	57.9 ±8.7^{ef}	3.2 ±0.3^{efgh}	6.1 ±0.8^{de}	102.9 ±5.1^{def}	139.9 ±17.9^{cd}
Ben Finlay	38.4 ±0.4^{fg}	68.1 ±1.8^{f}	27.3 ±0.3^{h}	43.1 ±1.1^{f}	0.5 ±0.0^{j}	1.8 ±0.2^{ijk}	66.2 ±0.2^{g}	113.0 ±2.7^{d}
9154-3	50.6 ±0.8^{efg}	81.5 ±3.6^{def}	44.2 ±1.3^{efg}	58.8 ±2.1^{ef}	0.4 ±0.0^{j}	2.3 ±0.3^{hijk}	95.2 ±1.9^{efg}	142.5 ±5.9^{cd}
Almiai	84.3 ±4.1^{ab}	115.9 ±14.1^{abc}	62.0 ±3.1^{abc}	83.6 ±11.8^{abcd}	2.4 ±0.3^{fghij}	0.5 ±0.1^{k}	148.6 ±7.1^{ab}	200.0 ±25.9^{ab}
Dainiai	68.8 ±6.2^{bcde}	95.8 ±8.4^{de}	61.9 ±4.9^{abc}	74.5 ±5.3^{bcde}	12.1 ±1.7^{a}	11.3 ±0.5^{b}	142.8 ±12.6^{abc}	181.6 ±13.0^{abc}
Gagatai	66.5 ±0.6^{bcde}	111.8 ±15.5^{abc}	54.6 ±1.7^{abcde}	87.0 ±11.7^{abcd}	1.3 ±0.1^{hij}	0.6 ±0.1^{jk}	122.3 ±2.0^{bcdef}	199.5 ±27.2^{ab}
Joniniai	74.7 ±7.3^{abcd}	99.4 ±3.9^{bcde}	67.2 ±6.7^{ab}	82.9 ±3.5^{abcd}	7.3 ±1.8^{b}	3.7 ±0.5^{efghi}	149.2 ±14.1^{ab}	186.0 ±7.7^{abc}
Tauriai	87.6 ±7.4^{a}	118.1 ±13.0^{abc}	69.3 ±7.2^{a}	99.6 ±10.7^{a}	4.9 ±0.8^{cde}	3.1 ±0.4^{ghij}	161.8 ±15.2^{a}	220.7 ±23.6^{a}
Mara	76.6 ±16.7^{abcd}	116.3 ±7.3^{abc}	53.6 ±13.2^{bcde}	85.4 ±8.1^{abcd}	1.5 ±0.3^{ghij}	0.5 ±0.0^{k}	131.6 ±30.1^{abcd}	202.2 ±13.1^{ab}
Marski	65.5 ±8.0^{cde}	106.2 ±10.0^{abc}	59.8 ±7.2^{abcd}	91.2 ±7.3^{abcd}	3.1 ±0.6^{efghi}	4.1 ±0.3^{efghi}	128.4 ±15.0^{abcde}	201.5 ±17.1^{ab}
Mikael	34.0 ±2.3^{g}	107.7 ±6.7^{abc}	31.1 ±2.0^{gh}	92.3 ±4.5^{abc}	2.4 ±0.4^{fghij}	2.3 ±0.2^{hijk}	67,6 ±4.3^{g}	202.3 ±11.2^{ab}
Mortti	50.3 ±1.7^{efg}	107.4 ±8.4^{abc}	47.0 ±2.0^{cdef}	88.1 ±10.2^{abcd}	5.3 ±1.0^{bcde}	5.6 ±0.3^{ef}	102.5 ±4.1^{def}	201.1 ±18.6^{ab}
Vilma (green)	67.1 ±3.4^{bcde}	120.7 ±1.9^{ab}	53.4 ±2.3^{bcde}	97.6 ±2.1^{ab}	6.7 ±0.7^{bc}	4.7 ±0.5^{efgh}	127.3 ±5.6^{bcde}	222.9 ±3.4^{a}
Venny (green)	73.5 ±1.5^{abcd}	96.2 ±2.0^{bcde}	49.6 ±0.8^{cdef}	68.9 ±1.8^{de}	2.6 ±0.3^{fghij}	0.9 ±0.1^{jk}	125.7 ±1.9^{bcde}	166.0 ±3.5^{bc}
Tisel	65.3 ±7.7^{cde}	106.2 ±4.5^{abcd}	49.2 ±5.7^{cdef}	82.6 ±4.3^{abcd}	3.6 ±0.8^{defg}	16.8 ±1.7^{a}	118.1 ±12.8^{bcdef}	205.6 ±10.6^{ab}

* Statistical differences based on one way-ANOVA and Tukey's post hoc test ($p<0.05$), and significant differences among cultivars shown with superscript letters a-k.

Supplemental Table 4 Climatic factors recorded at Piikkiö, Kaarina, Finland (latitude 60°23′ N, longitude 22°33′ E, altitude ca. 5 m) from 20th July to 20th August of year 2014 and 2015

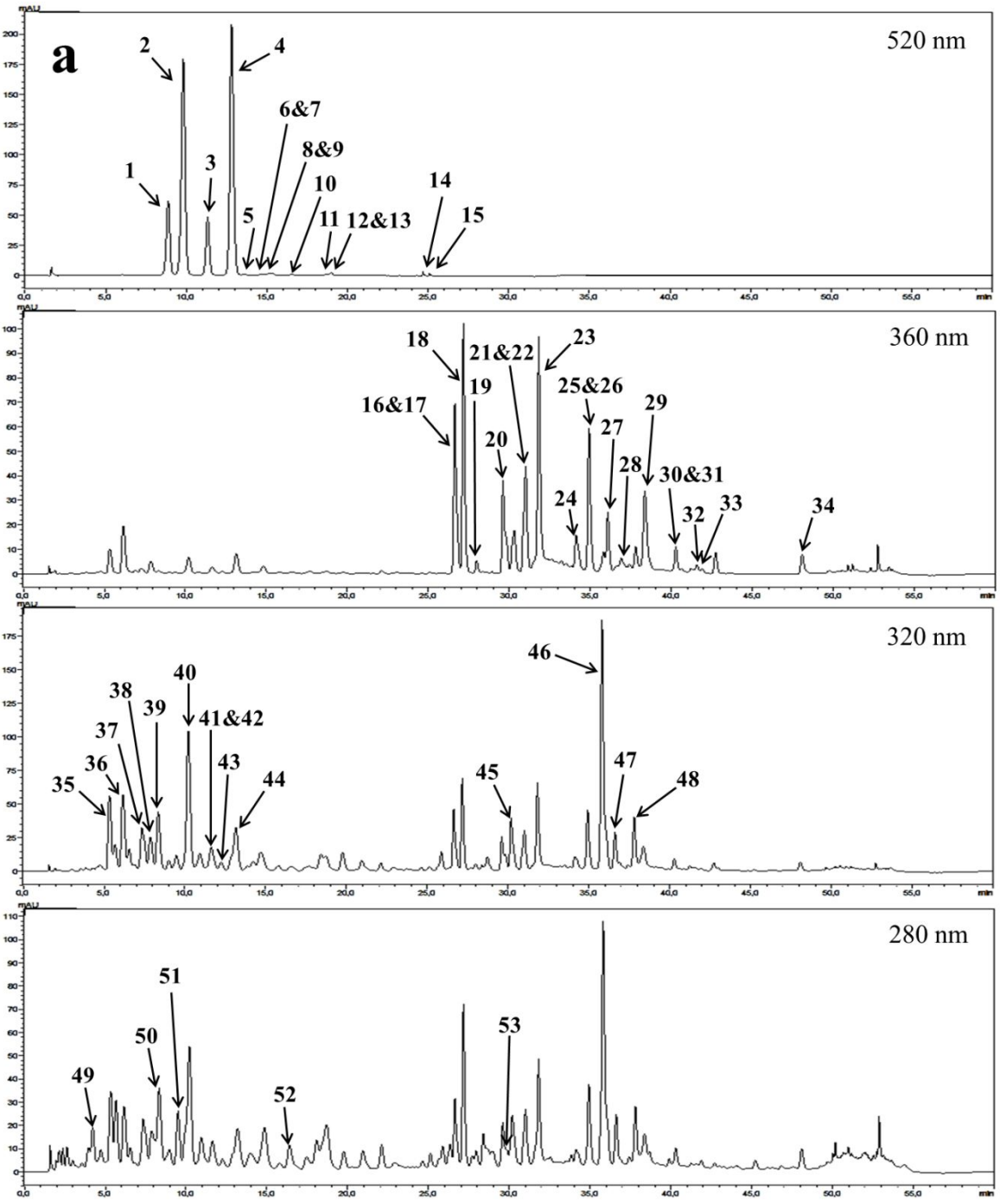
Climatic factors	Year 2014	Year 2015
Mean daily temperature (° C)	20.0	15.9
Mean daily maximum temperature (° C)	26.1	21.7
Mean daily minimum temperature (° C)	13.9	9.7
Degree days (DD °C) increase*	468	338
Mean daily global radiation (kJ/m^2)	18005	18153
Precipitation (mm)	202	34

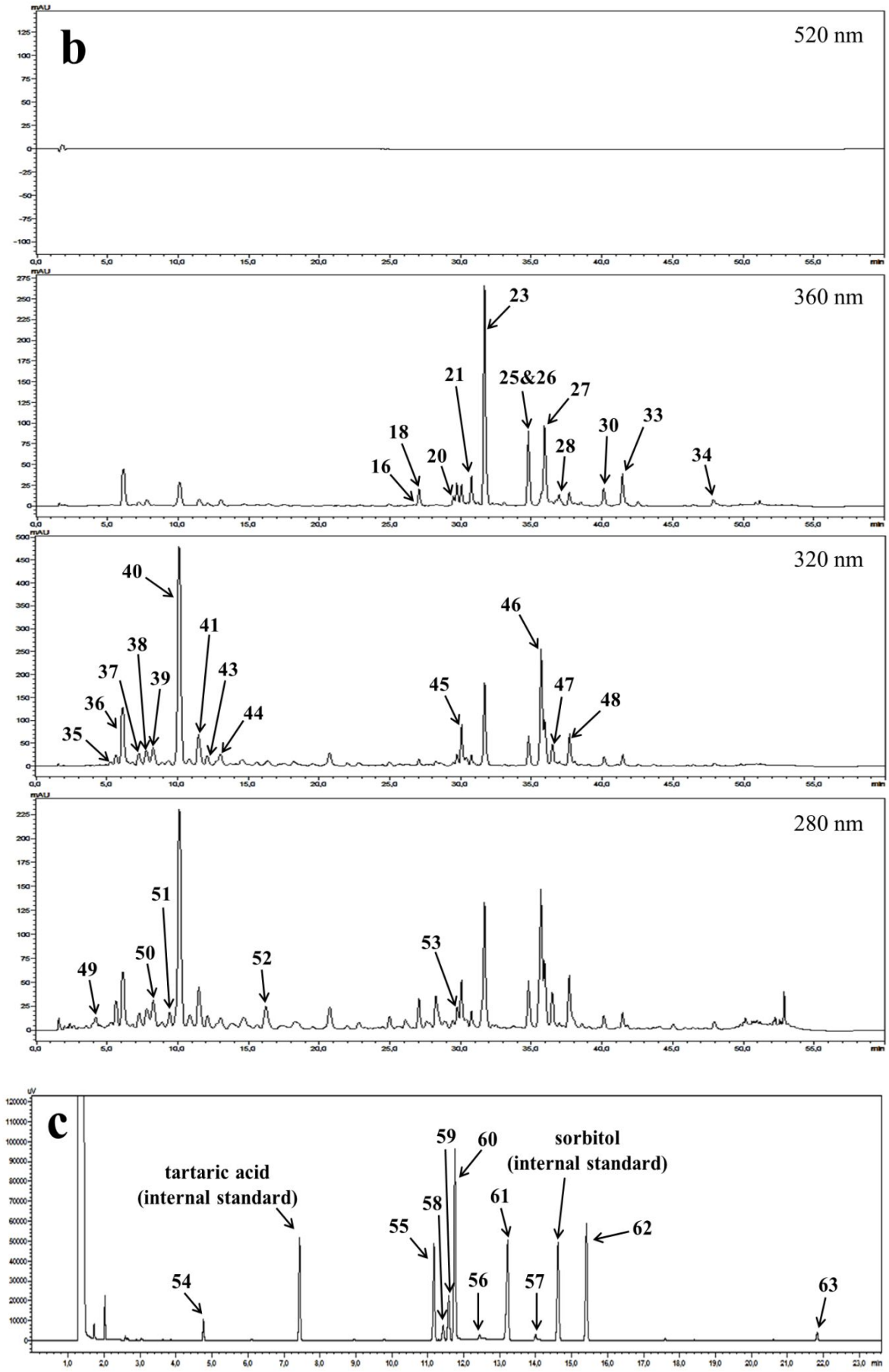
*Effective temperature sum (°¨C DD, base +5°C)

Supplemental Table 6 Information of external standards applied in quantification of phenolic compounds from *Ribes nigrum* fruits

Compounds	Equation*	R^2 value	quantified to
Anthocyanins			
delphinidin 3-*O*-glucoside	$y = 6\times10^{-8} x + 0.0013$	0.9964	anthocyanins except cyanidin 3-*O*-rutinoside, cyanidin 3-*O*-glucoside, and cyanidin 3-*O*-(6"-coumaroyl)-glucoside
cyanidin 3-*O*-rutinoside	$y = 4\times10^{-8} x - 0.001$	0.9998	cyanidin 3-*O*-rutinoside
cyanidin 3-*O*-glucoside	$y = 3\times10^{-8} x + 0.0026$	0.9990	cyanidin 3-*O*-glucoside and cyanidin 3-*O*-(6"-coumaroyl)-glucoside
Flavonols			
myricetin 3-*O*-galactoside	$y = 6\times10^{-8} x + 0.0007$	0.9987	myricetin 3-*O*-galactoside
myricetin 3-*O*-glucoside	$y = 6\times10^{-8} x + 0.0009$	0.9960	myricetin aglycone and glycosides except myricetin 3-*O*-galactoside
quercetin 3-*O*-rutinoside	$y = 6\times10^{-8} x - 0.0001$	1.0000	quercetin 3-*O*-rutinoside
quercetin 3-*O*-galactoside	$y = 5\times10^{-8} x + 0.0006$	0.9998	quercetin 3-*O*-galactoside
quercetin 3-*O*-glucoside	$y = 5\times10^{-8} x + 0.00003$	1.0000	quercetin aglycone and glycosides except quercetin 3-*O*-rutinoside and quercetin 3-*O*-galactoside
kaempferol 3-*O*-rutinoside	$y = 6\times10^{-8} x - 0.0004$	0.9998	kaempferol 3-*O*-rutinoside
kaempferol 3-*O*-glucoside	$y = 6\times10^{-8} x + 0.00004$	0.9999	kaempferol glycosides except kaempferol 3-*O*-rutinoside
isorhamnetin 3-*O*-glucoside	$y = 6\times10^{-8} x - 0.0011$	0.9994	isorhamnetin glycosides
Phenolic acid derivatives			
5-*O*-caffeoylquinic acid	$y = 3\times10^{-8} x - 0.0016$	0.9992	5-*O*-caffeoylquinic acid
caffeic acid	$y = 2\times10^{-8} x + 0.0004$	0.9996	caffeic acid derivatives except 5-*O*-caffeoylquinic acid
p-coumaric acid	$y = 2\times10^{-8} x - 0.0002$	1.0000	coumaric acid derivatives
trans-ferulic acid	$y = 2\times10^{-8} x - 0.0002$	1.0000	ferulic acid derivatives
Flavan-3-ols and other phenolics			
(+)-catechin	$y = 9\times10^{-8} x + 0.0079$	0.9948	Flavan-3-ols except (-)-epicatechin, and other phenolic compounds
(-)-epicatechin	$y = 2\times10^{-7} x - 0.0098$	0.9975	(-)-epicatechin

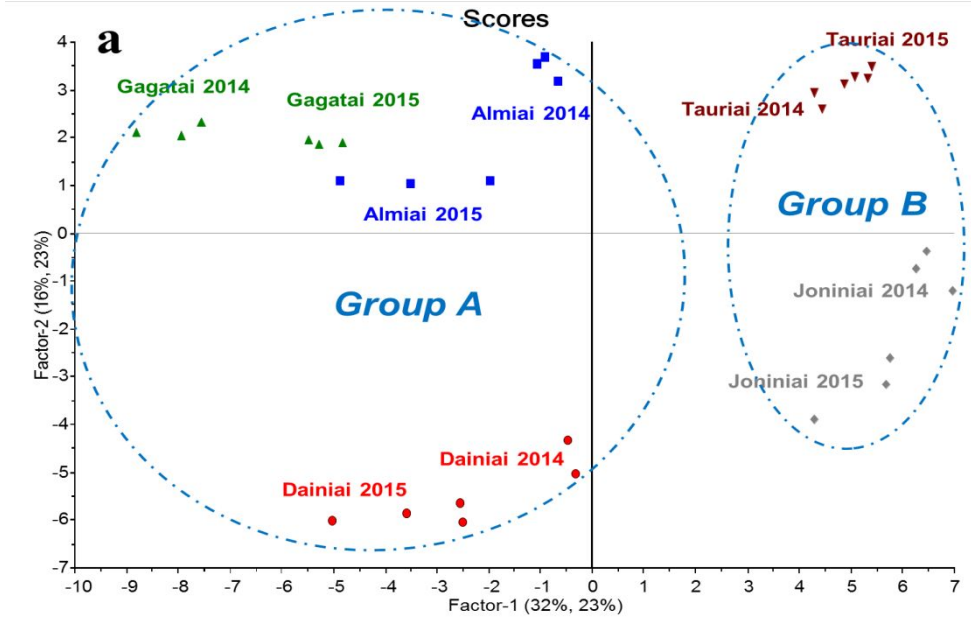
* The equation was expressed as $y = A x + B$, where "y" was the concentration of phenolics (mg/mL), and "x" was the area under curve in LC chromatograph.

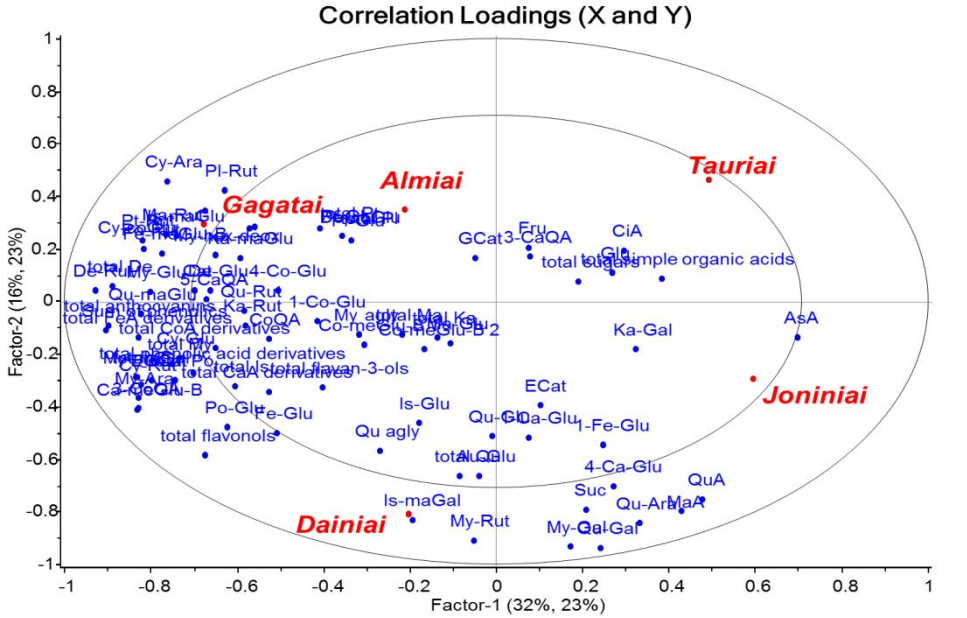

a
520 nm
1
2
3
4
5
6&7
8&9
10
11
12&13
14
15
360 nm
16&17
18
19
20
21&22
23
24
25&26
27
28
29
30&31
32
33
34
320 nm
35
36
37
38
39
40
41&42
43
44
45
46
47
48
280 nm
49
50
51
52
53

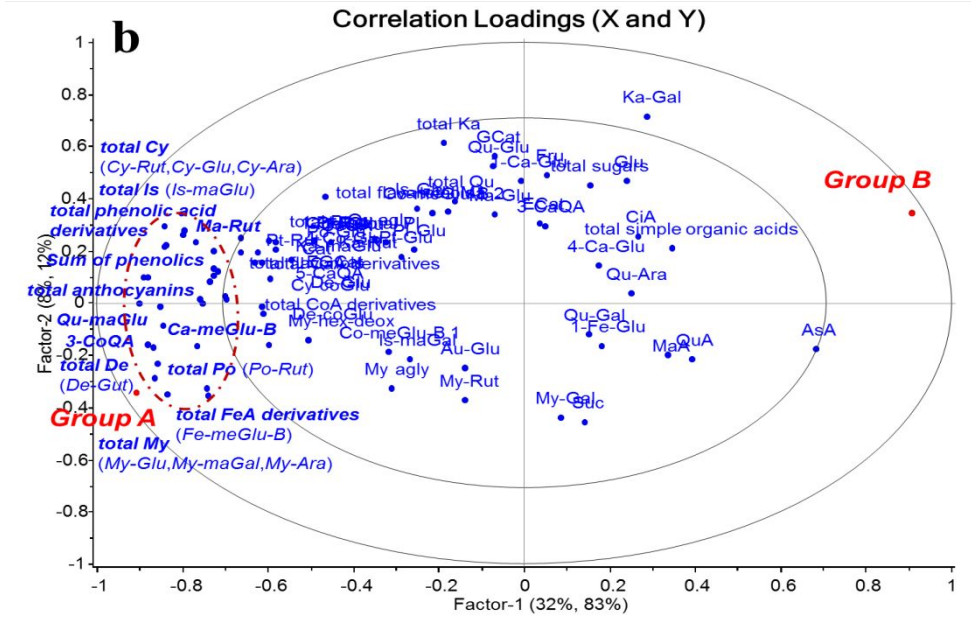


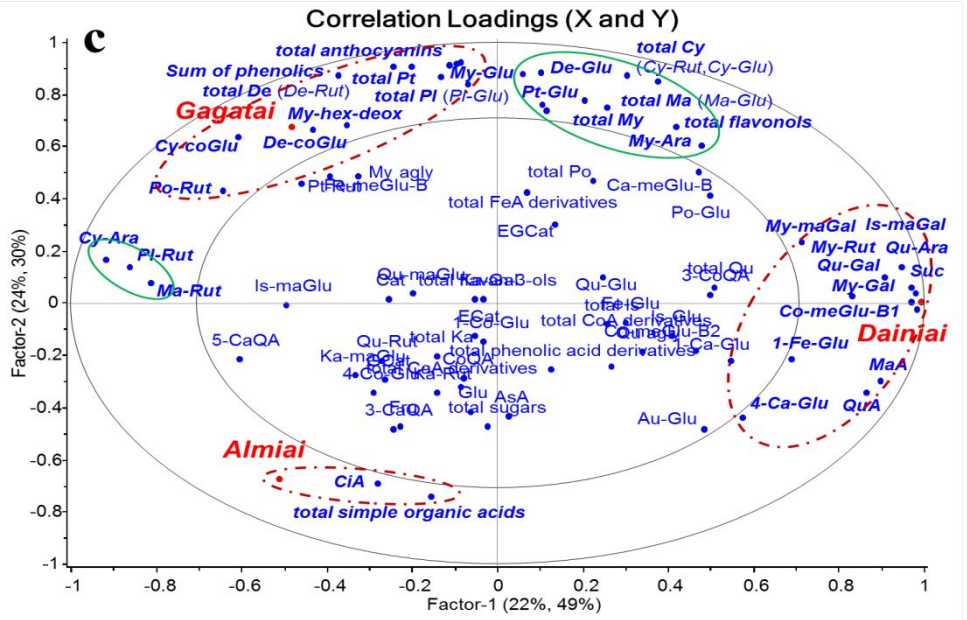
Supplemental Figure 1 Chromatographs of sugars, simple organic acids and phenolic compounds in cultivars of blackcurrant: a. LC chromatograph of phenolics in black-fruited cultivars; b. LC

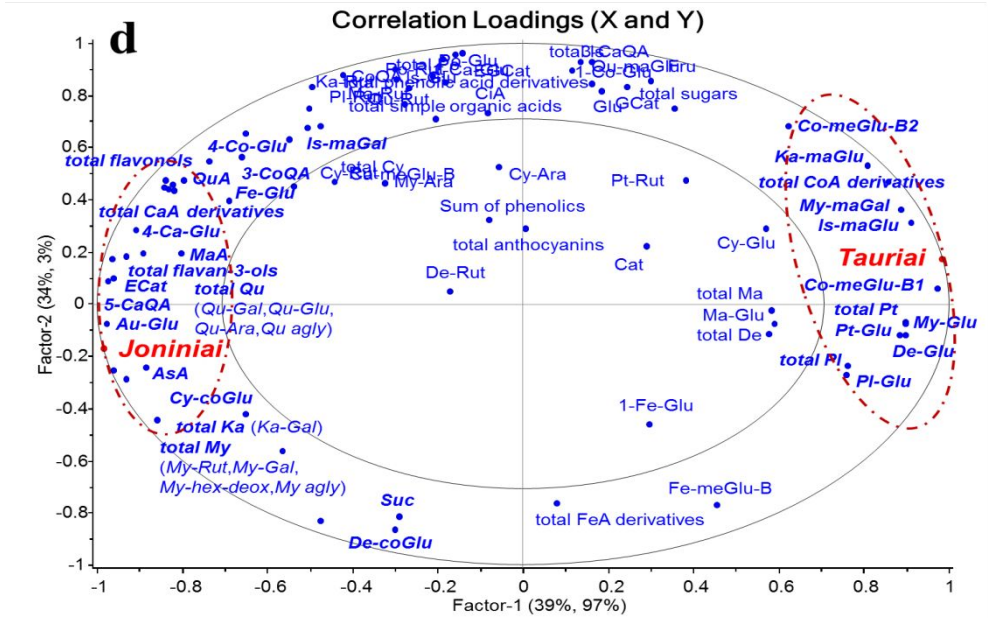
chromatograph of phenolics in green-fruited cultivars; c. GC chromatograph of sugars, simple organic acids in all cultivars. The information of each peak was referred in **Table 1**.


a
Scores
Gagatai 2014
Gagatai 2015
Almiai 2014
Almiai 2015
Tauriai 2015
Tauriai 2014
Group B
Group A
Joniniai 2014
Joniniai 2015
Dainiai 2014
Dainiai 2015
Factor-2 (16%, 23%)
Factor-1 (32%, 23%)


Correlation Loadings (X and Y)
Almiai
Tauriai
Gagatai
Joniniai
Dainiai
Factor-2 (16%, 23%)
Factor-1 (32%, 23%)


b
Correlation Loadings (X and Y)
Group B
Group A
Factor-2 (8%, 12%)
Factor-1 (32%, 83%)


c
Correlation Loadings (X and Y)
Gagatai
Almiai
Dainiai
Factor-2 (24%, 30%)
Factor-1 (22%, 49%)



Supplemental Figure 2 Comparison of Lithuanian cultivars with PLS regression models: a. all Lithuanian cultivars; b. the comparison between groups A and B; c. the comparison within group A; d. the comparison within group B.