

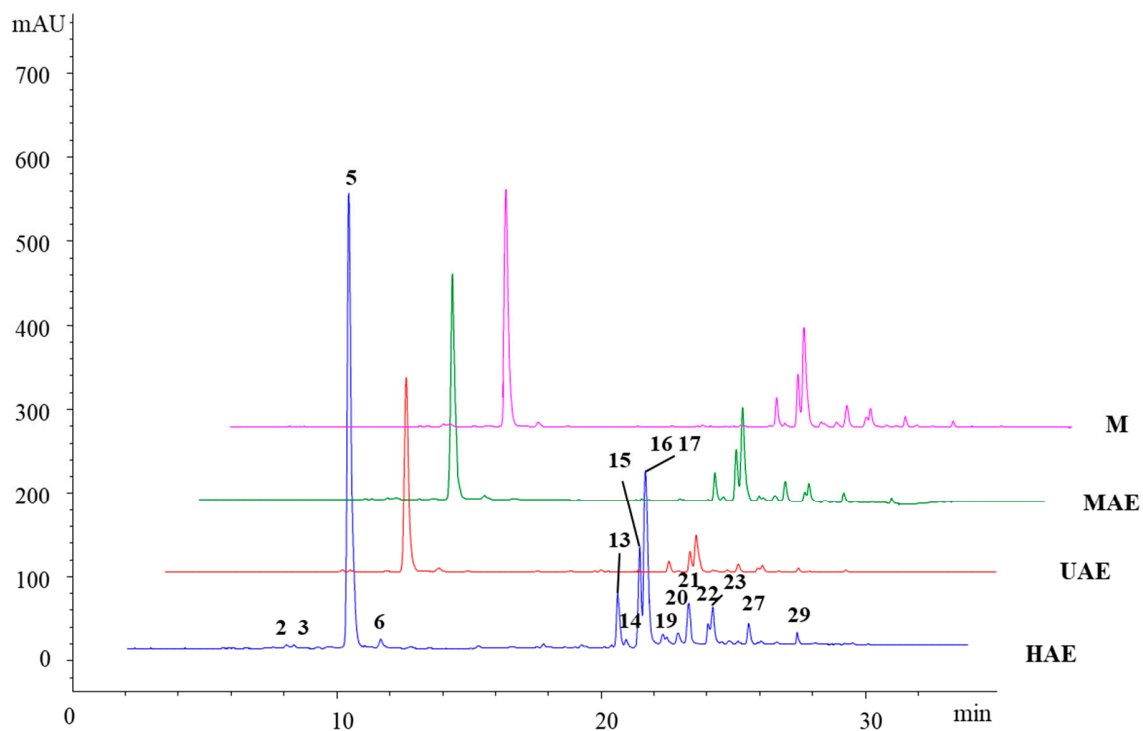
**Figure S1.** The influence of extraction procedures on total polyphenol content *Vaccinium myrtillus* leaf waste extracts from maceration, and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively); the same letter represents the absence of significant differences based on one-way analysis of variance and Duncan's *post hoc* test at  $p < 0.05$ ; TPC, total polyphenol content; GAE, gallic acid equivalent.

**Table S1.** The optimization of maceration and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively) of *Vaccinium myrtillus* by-product from leaves employing as a statistical tool a  $2^3$  experimental design.

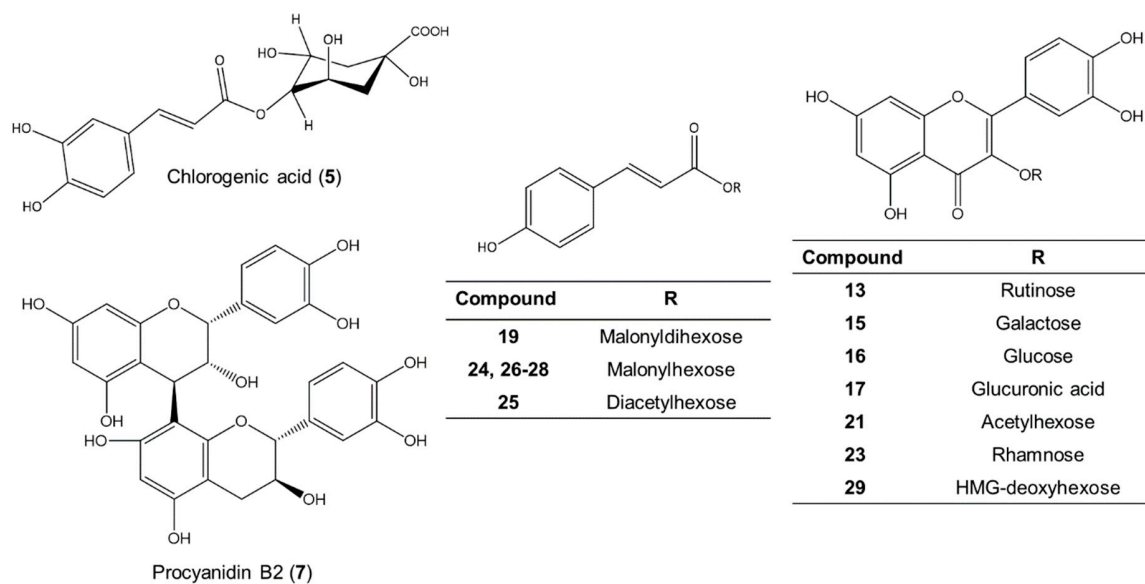
	Effect	Std. Err.	Effect Estimates	Coeff.	Std. Err. Coeff.	<i>p</i>
<b>Maceration</b>						
TPC* (mg GAE/g)						
Constant				46.947	0.117	0.000
Main factors						
Solid-to-solvent ratio (g/mL) (1)	16.235	0.235	69.032	8.117	0.117	0.000
Solvent type (2)	0.610	0.235	2.594	0.305	0.117	0.019
Time (min) (3)	1.078	0.235	4.585	0.539	0.117	0.000
Interaction of two factors						
1 by 2	0.770	0.235	3.274	0.385	0.117	0.004
1 by 3	-0.028	0.235	-0.120	-0.014	0.117	0.905
2 by 3	-0.517	0.235	-2.197	-0.258	0.117	0.042
<b>HAE</b>						
TPC (mg GAE/g)						
Constant				46.881	0.077	0.000
Main factors						
Solid-to-solvent ratio (g/mL) (1)	17.736	0.153	115.725	8.868	0.077	0.000

Solvent type (2)	0.321	0.153	2.093	0.160	0.077	0.051
Time (min) (3)	0.067	0.153	0.440	0.034	0.077	0.665
Interaction of two factors						
1 by 2	0.214	0.153	1.397	0.107	0.077	0.180
1 by 3	-0.039	0.153	-0.256	-0.019	0.077	0.801
2 by 3	0.082	0.153	0.538	0.041	0.077	0.597
<b>UAE</b>						
TPC (mg GAE/g)						
Constant				46.449	0.114	0.000
Main factors						
Solid-to-solvent ratio (g/mL) (1)	17.320	0.229	75.647	8.660	0.114	0.000
Solvent type (2)	0.535	0.229	2.337	0.267	0.114	0.032
Time (min) (3)	1.807	0.229	7.891	0.903	0.114	0.000
Interaction of two factors						
1 by 2	0.180	0.229	0.786	0.090	0.114	0.443
1 by 3	0.528	0.229	2.307	0.264	0.114	0.034
2 by 3	0.193	0.229	0.844	0.097	0.114	0.410
<b>MAE</b>						
TPC (mg GAE/g)						
Constant				46.590	0.151	0.000
Main factors						
Solid-to-solvent ratio (g/mL) (1)	14.844	0.303	49.024	7.422	0.151	0.000
Solvent type (2)	-2.619	0.303	-8.650	-1.310	0.151	0.000
Time (min) (3)	10.237	0.303	33.810	5.119	0.151	0.000
Interaction of two factors						
1 by 2	0.616	0.303	2.034	0.308	0.151	0.058
1 by 3	2.736	0.303	9.035	1.368	0.151	0.000
2 by 3	-1.011	0.303	-3.338	-0.505	0.151	0.004

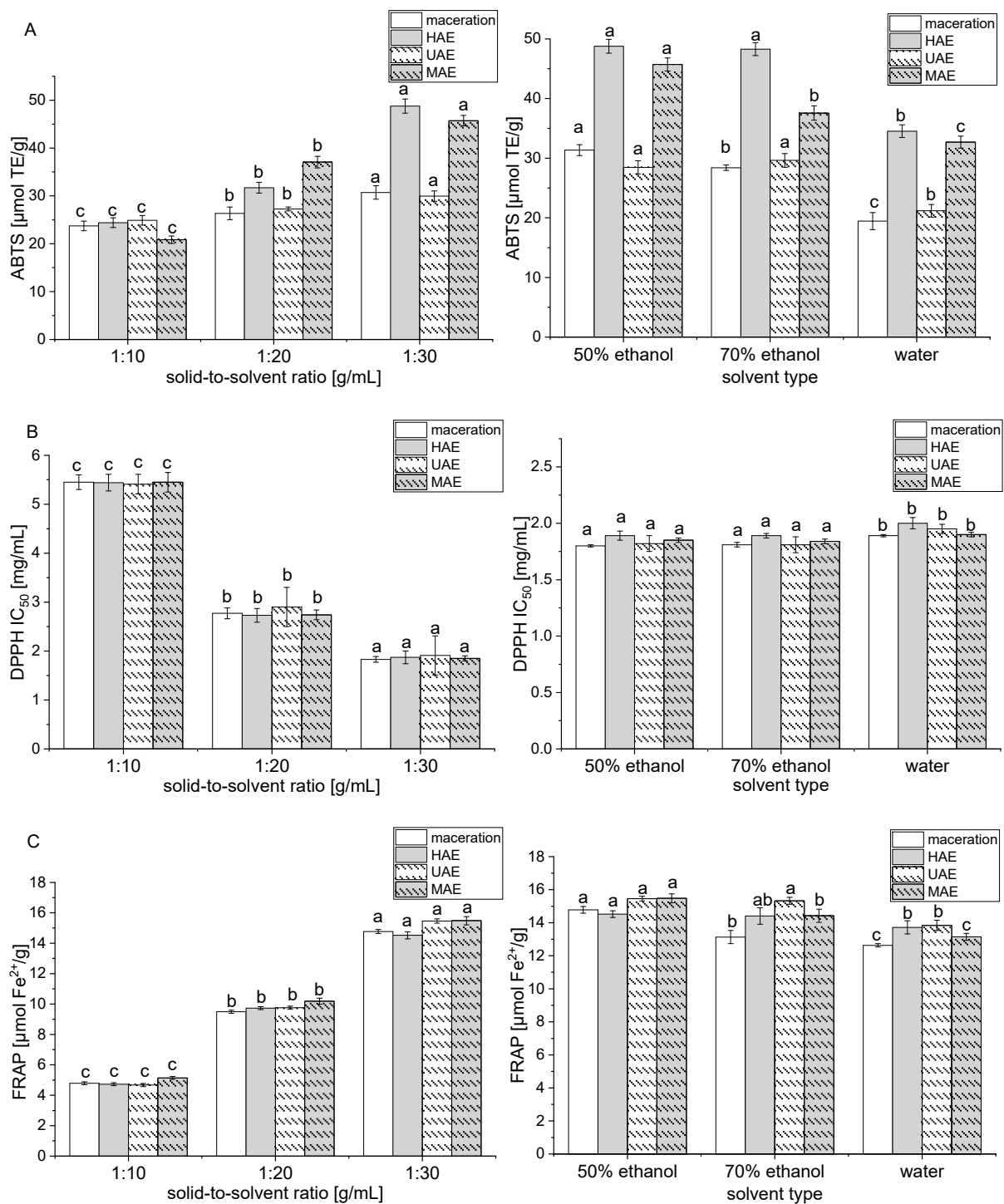
\*TPC, total polyphenol content; GAE, gallic acid equivalent; the difference was statistically significant at  $p < 0.05$ .

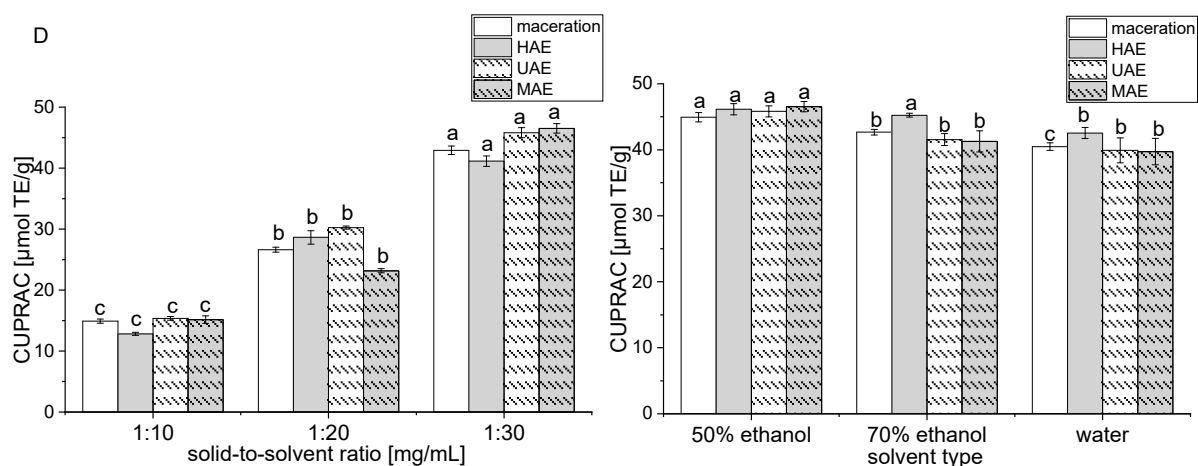


**Figure S2.** Chromatograms of four *Vaccinium myrtillus* extracts obtained from leaf dust by maceration, and heat, ultrasound, and microwave extractions (M, HAE, UAE, and MAE, respectively); numbers of compounds are given in Table 4.



**Figure S3.** Structures of the components identified in four *Vaccinium myrtillus* extracts from leaf dust using the LC-MS method; numbers of compounds are presented in Table 4.



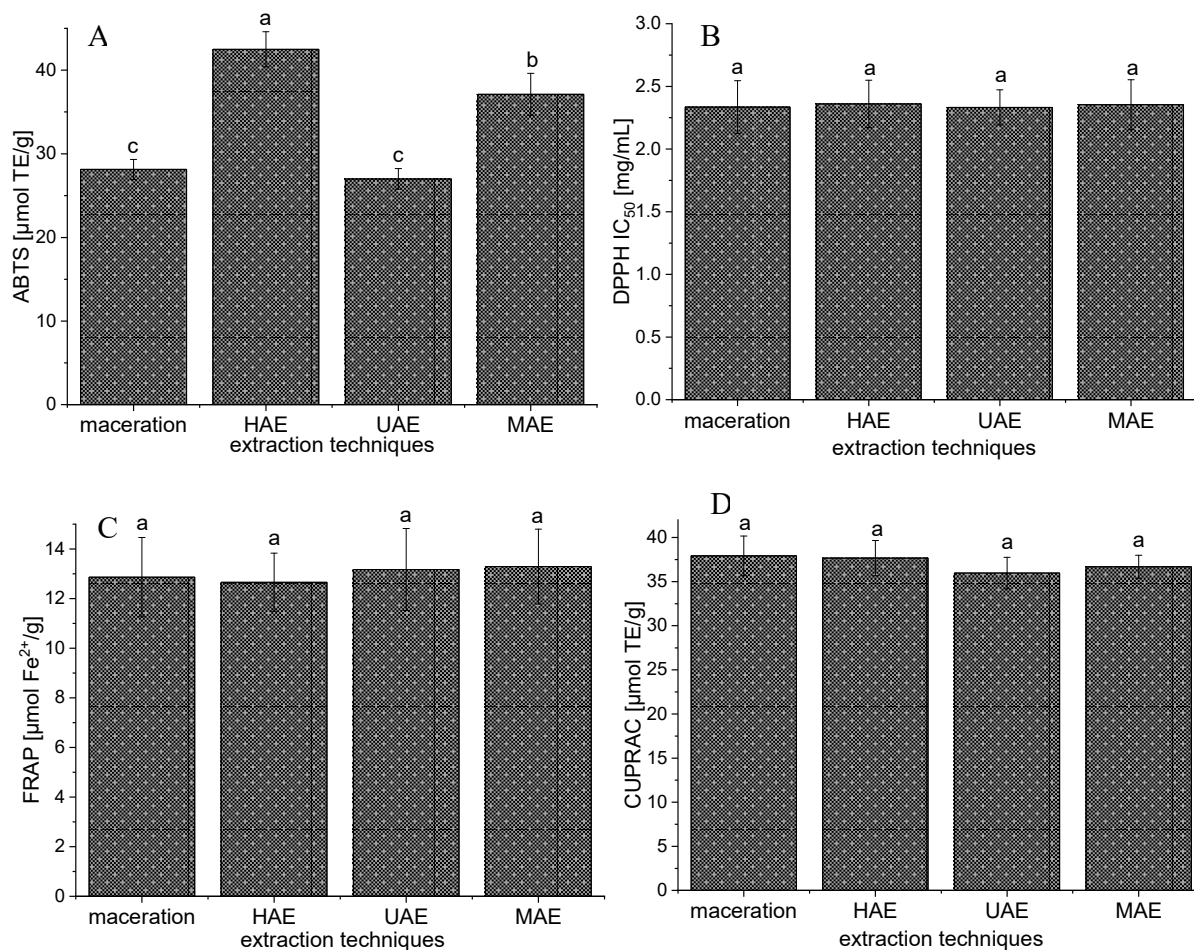


**Figure S4.** The effect of solid-to-solvent ratio and solvent type on (A) ABTS and (B) DPPH neutralization, (C) ferric ion-reducing potential, *i.e.*, FRAP, and (D) cupric ion-reducing activity, *i.e.*, CUPRAC of *Vaccinium myrtillus* extracts from waste of the leaves prepared using maceration, and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively); different letters represent statistically significant difference between the parallels from the same extraction procedures based on one-way analysis of variance and Duncan's *post hoc* test ( $n=3$ ;  $p<0.05$ ); TE, Trolox equivalent.

**Table S2.** The effect of exposure period on ABTS and DPPH radical scavenging properties, ferric ion-reducing potential, *i.e.*, FRAP, and cupric ion-reducing activity, *i.e.*, CUPRAC of *Vaccinium myrtillus* extracts from maceration, and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively).

Extraction techniques	Period (min)	antioxidant capacity			
		ABTS ( $\mu\text{mol TE/g}$ )	DPPH IC <sub>50</sub> (mg/mL)	FRAP ( $\mu\text{mol Fe}^{2+}/\text{g}$ )	CUPRAC ( $\mu\text{mol TE/g}$ )
Maceration	30	30.80±1.10 <sup>a*</sup>	1.90±0.16 <sup>a</sup>	15.48±0.13 <sup>a</sup>	42.15±1.31 <sup>b</sup>
	45	31.36±1.18 <sup>a</sup>	1.80±0.13 <sup>a</sup>	15.33±0.41 <sup>a</sup>	42.93±0.70 <sup>b</sup>
	60	30.96±1.15 <sup>a</sup>	1.81±0.11 <sup>a</sup>	15.36±0.25 <sup>a</sup>	45.65±0.43 <sup>a</sup>
HAE	15	49.17±1.00 <sup>a</sup>	1.82±0.10 <sup>a</sup>	13.75±0.45 <sup>b</sup>	40.50±0.51 <sup>a</sup>
	30	49.81±1.13 <sup>a</sup>	1.84±0.15 <sup>a</sup>	14.98±0.47 <sup>a</sup>	41.15±0.85 <sup>a</sup>
	45	48.01±1.02 <sup>a</sup>	1.86±0.09 <sup>a</sup>	13.60±0.10 <sup>b</sup>	40.47±1.08 <sup>a</sup>
UAE	5	19.13±1.01 <sup>b</sup>	1.84±0.11 <sup>a</sup>	14.32±0.23 <sup>b</sup>	34.58±0.57 <sup>c</sup>
	15	29.96±1.11 <sup>a</sup>	1.80±0.07 <sup>a</sup>	15.14±0.45 <sup>a</sup>	41.27±0.32 <sup>a</sup>
	30	29.12±1.29 <sup>a</sup>	1.81±0.14 <sup>a</sup>	14.56±0.23 <sup>b</sup>	39.82±0.48 <sup>b</sup>
MAE	1	29.04±1.00 <sup>c</sup>	1.89±0.03 <sup>a</sup>	14.87±0.46 <sup>a</sup>	43.35±1.20 <sup>b</sup>
	2	45.72±1.08 <sup>a</sup>	1.85±0.02 <sup>a</sup>	15.48±0.11 <sup>a</sup>	46.53±0.78 <sup>a</sup>
	3	39.63±1.25 <sup>b</sup>	1.85±0.04 <sup>a</sup>	15.42±0.42 <sup>a</sup>	40.20±0.85 <sup>c</sup>

\*Values with the same letter in each column showed no statistically significant difference ( $p>0.05$ ;  $n=3$ ; analysis of variance, Duncan's *post hoc* test); TE, Trolox equivalents; IC<sub>50</sub>, the concentration of extract required to neutralize 50% of DPPH radicals.



**Figure S5.** The impact of extraction methods on (A) ABTS and (B) DPPH neutralization, (C) ferric ion-reducing antioxidant power (FRAP), and (D) cupric ion-reducing activity (CUPRAC) of all obtained *Vaccinium myrtillus* extracts from maceration, and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively); various letters mean different population groups based on one-way analysis of variance and Duncan's *post hoc* test ( $n=3$ ;  $p<0.05$ ); TE, Trolox equivalents;  $\text{IC}_{50}$ , the concentration of extract required to neutralize 50% of DPPH radicals.

**Table S3.** The antibacterial and antifungal potential of four *Vaccinium myrtillus* extracts obtained using leaf by-product and maceration, and heat, ultrasound, and microwave extractions (HAE, UAE, and MAE, respectively) investigated in the disk diffusion assay.

Microorganism	maceration	HAE	UAE	MAE	antibiotics/fluconazole
zone of inhibition (cm)					
<i>Staphylococcus aureus</i>	1.9*	1.8	1.9	1.8	S
<i>Enterococcus faecalis</i>	1.0	1.5	1.3	1.0	S
<i>Escherichia coli</i>	R	R	R	R	R/I/S
<i>Pseudomonas aeruginosa</i>	R	R	R	R	S/I
<i>Klebsiella</i> spp.	R	R	R	R	S/I
<i>Proteus</i> spp.	R	R	R	R	S/I
<i>Candida albicans</i>	R	R	R	R	S

\*The analysis was performed in triplicate and the lowest obtained value of the inhibition zone was taken as the result ("stricter criteria").

**Table S4.** The data of *Vaccinium myrtillus* leaf dust extracts' extraction yield (EY), electrolytic conductivity (G), density ( $\rho$ ), surface tension ( $\gamma$ ), and viscosity ( $\eta$ ).

extraction	EY (%)	G (mS/g)	$\rho$ (g/mL)	$\gamma$ (mN/m)	$\eta$ (mPa·s)
maceration	1.58±0.14 <sup>ab*</sup>	0.28±0.02 <sup>b</sup>	0.961±0.008 <sup>a</sup>	27.4±1.3 <sup>ab</sup>	3.12±0.13 <sup>a</sup>
HAE	1.14±0.20 <sup>c</sup>	0.20±0.02 <sup>c</sup>	0.919±0.006 <sup>c</sup>	26.2±0.1 <sup>b</sup>	2.99±0.13 <sup>a</sup>
UAE	1.31±0.29 <sup>bc</sup>	0.18±0.02 <sup>c</sup>	0.968±0.019 <sup>a</sup>	28.5±0.4 <sup>a</sup>	3.19±0.14 <sup>a</sup>
MAE	1.94±0.27 <sup>a</sup>	0.35±0.03 <sup>a</sup>	0.930±0.009 <sup>b</sup>	26.1±1.0 <sup>b</sup>	2.96±0.20 <sup>a</sup>

\*Values with the same letter in each column showed no statistically significant difference ( $p>0.05$ ; n=3; analysis of variance, Duncan's *post hoc* test); heat-, ultrasound- and microwave-assisted extractions (HAE, UAE, and MAE, respectively).