

**Table S1.** Available extraction protocols for obtaining carotenoids from TPW with corresponding yields. Values in italics are obtained by spectrophotometry, otherwise HPLC. All the parameters significant for extraction procedure were noted (Type of TPW, extraction solvent, extraction conditions specific for the type of extraction method). If available, the reference extraction method yields were also noted.

Extraction method	Type of TPW	Extraction solvent	Extraction conditions	Yield (mg/100g)**	Reference extraction method Yield (mg/100g)	Reference
	Peel and seeds	carbon dioxide	80 °C, 50 MPa, peel/seeds (70/30)	<i>LY: 0.13</i>	-	[81]
SFE	Peel	carbon dioxide	105 min, 10 g, 300 µm, 80 °C, 400 bar, 4 g CO <sub>2</sub> /min, SSR 1:2.5	<i>LY: 72.9</i>	CSE (hexane) LY: 60.9 (ethyl acetate) LY: 32.0 (EtOH) LY: 28.5	[82]
	Pomace	carbon dioxide	450 bar, 70 °C, 11 kg/h	<i>LY: 1017 (in extract)</i> <i>BC: 154.9 (in extract)</i>	-	[83]
	Peel	water	100 MPa, 10 passes	LY: 1930 (on a dry basis)	high shear mixing (5 min at 20000 rpm in an ice bath)	[84]
HPE	Pomace	ethyl lactate	700 MPa, 10 min, initial temp. 25 °C, final temp. 34 °C	LY: 8.4 TC: 16.5	CSE (ethyl lactate, 25 °C, 30 min) LY: 8.2; TC: 16.5	[85]
	Pomace	hexane:EtOH:acetone (60:20:20 v/v/v)	450 MPa, 10 min, 20 °C	LY: 2.0	-	[86]
	Pomace	hexane:MetOH:acetone (2:1:1 v/v/v) with 0.05% (w/v) BHT	30 min, 90 W, SSR (1:35 w:v)	<i>LY: 9.0</i>	CSE (hexane:MetOH:acetone (2:1:1 v/v/v) with 0.05% (w/v) BHT) <i>LY: 9.4</i>	[87]
UAE	Pomace	EtOH	20 min, solvent/solid (72 mL/g), 65 °C, amplitude (65%), pulser duration on (33 s), volume (90 mL)	LY: 153.6	-	[88]
	Pomace	hexane:acetone:MetOH:toluene (10:7:6:7 v/v/v/v)	45 min, 50 Hz	LY: 4.6	CSE (hexane:acetone:MetOH:toluene (10:7:6:7 v/v/v/v)) LY: 2.7	[89]

	Pomace	ethyl lactate:ethyl acetate (70:30)	20 min, 100 W, 40 kHz, 63.4 °C, solvent/solid (100 mL/g)	LY: 133.5	CSE (ethyl lactate:ethyl acetate (70:30)) LY: 121.0	[90]
	Pomace	hydrophobic eutectic mixture DL-MetOH:lactic acid (8:1)	10 min, 100 W, 40 kHz, 70 °C, solvent/sample (120 mL/g)	LY: 144.7	-	[91]
MAE	Peel	ethyl acetate	1 min, 400 W (24 kJ equivalent)	<i>all trans</i> LY: 13.6	CSE <b>(hexane(BHT)/ethyl acetate, 1 min)</b> LY: <i>ca.</i> 9.7 <b>(hexane(BHT)/ethyl acetate, 30 min)</b> LY: <i>ca.</i> 2.1	[92]
	Pomace	EtOH 95%	1 min, 300 W, SSR 0.05 g/mL	LY: 5.7 BC: 4.8	-	[93]
	Pomace	enzyme extract produced by solid state fermentation of <i>Fusarium solani pisi</i>	pH 8, 50 °C, solid:enzyme (1:30 w/v), particle size 0.8–1.25 mm	LY: 2.7	CSE <b>(EtOH)</b> LY: <i>ca.</i> 2.1 <b>(pectinase)</b> LY: <i>ca.</i> 2.2 <b>(cellulase)</b> LY: <i>ca.</i> 2.1	[94]
EAE	Pomace	cellulolytic and pectinolytic enzymes (1:1) followed by ethyl acetate extraction	enzymatic reaction (5 h, 40 °C, enzyme/substrate (0.2 mL/g)); extraction (1 h, solvent/substrate (5 mL/g))	LY: 1150 (in concentrated oleoresin)	CSE <b>(acetone; ethyl acetate; EtOH; and their 1:1 combination)</b> LY: n.d. <b>(EtOH: water (1:1))</b> LY: n.d.	[95]
	Peel	cellulase (100 U/g) and endo-xylanase (400 U/g) followed by acetone extraction	enzymatic reaction (4 h, 50 °C); extraction (130 min, 20 °C, SSR 1:30)	LY: 15.4 BC: 35.9 TC: 55.2	CSE (acetone) LY: 1.5 times decrease BC: 1.4 times decrease TC: 1.4 times decrease	[96]
	Pomace	pectinase (70 U/g) followed by ethyl lactate extraction	enzymatic reaction (180 min, 45 °C); extraction (30 min, 25 °C, SSR 1:10 (g/mL))	LY: 8.9 TC: 12.7	CSE (ethyl acetate) LY: 10 times decrease TC: 6 times decrease	[85]

				TC: 0.69–3.62 BC: 0.07–0.60 Z isomers LY: 0.06–0.20 all E LY: 1.0–3.1; TC: 0.53–3.88		
	Peel	surfactant-based extraction	1 g, 11.9 mL SDS 0.3%, homogenization (13,500 rpm, 2 min); ultrasound; agitation (8.2 h); ultracentrifugation		-	[97]
Other					CSE (hexane) TC: 5.0 (ethyl acetate) TC: 7.1 (acetone) TC: 5.8	
	Pomace	deep eutectic solvent extraction (menthol:fatty hexanoic acid (2:1))	SSR 1:25, 90 min, 50 °C	TC: 9.5		[98]

Green extraction techniques (SFE-supercritical fluid extraction, HPE-high pressure extraction, UAE-ultrasound assisted extraction, MAE-microwave assisted extraction, EAE-enzyme assisted extraction, CSE-conventional solvent extraction), BHT- butylated hydroxytoluene, SSR-solid to solvent ratio, EtOH-ethanol, MetOH-methanol, SDS-sodium dodecyl sulfate, LY-lycopene, BC-beta carotene, TC-total carotenoid, \*\* obtained under optimal extraction conditions