



**Figure S1.** HPLC chromatograms of betalains and phenolic compounds from *Opuntia stricta* var. *dillenii* green extracts. The numbers associated to the peaks are according to Table S1.

**Table S1.** Characterization of the main betalains and phenolic compounds present in *Opuntia stricta* var. *dillenii* green extracts analyzed by HPLC-DAD and HPLC-MS<sup>1</sup>.

Peak	t <sub>R</sub> (min)	Compound	UV λ max (nm)	[M-H] <sup>+</sup>	[M-H] <sup>-</sup>	MS/MS (m/z)
1	8.83	Piscidic acid	272		255	193, 165, 135, 119, 107
2	10.76	Betanin	535	551		390, 389
3	15.23	Isobetanin	535	551		390, 389
4	31.34	Neobetanin	467		549	387
5	35.14	Quercetin-3-O-rhamnosyl-rutinoside (QG3)	358	757		611, 303
6	38.65	Quercetin hexosyl pentosyl rhamnoside (QG1)	255, 358	426		303, 191, 120
7	39.56	Quercetin glycoside (QG2)-Quercetin hexose pentoside	255, 353	653		303, 177
8	40.00	Isorhamnetin glucoxyl-rhamnosyl-rhamnoside (IG1)	256, 356	771		625, 317, 85
9	42.57	Isorhamnetin glucoxyl-rhamnosyl-pentoside (IG2)	254, 356	757		317, 167, 86

<sup>1</sup>Data were previously published by Gómez-López et al, 2021 [5].

**Table S2.** Composition of the digestive phases and the enzymes used for the *in vitro* gastrointestinal digestion assay by INFOGEST method.

Simulated digestive phases at 1:1 (w/w)				
Reagents	Stock	Simulated oral	Simulated gastric	Simulated intestinal
		phase	phase	phase
% (v/v)				
KCl	0.5 M	2	5.6	2.16
KH <sub>2</sub> PO <sub>4</sub>	0.5 M	4	0.18	0.32
NaHCO <sub>3</sub>	1 M	0.8	2.6	17.0
NaCl	2 M	0.2	2	3.2
MgCl <sub>2</sub> (H <sub>2</sub> O) <sub>6</sub>	0.15 M	0.2	0.4	0.44
HCl	1 M	0.8	0.6	0.2
NaOH	1 M	0.2	-	0.32
MilliQ water	-	91.8	88.62	76.36
pH		6.8	1.3	8.2
Addition of enzyme % (v/v)				
Salivary amylase	75 U/ml	5	-	-
Pepsine	2500 U/ml	-	4 - 8*	-
Lipase	25 U/ml	-	4	-
Pancreatine	100 U/ml	-	-	12
Bile salt	10 Mm	-	-	6

\* Only added when the assay was performed with lipase.

**Table S3.** Recovery of main betalains and phenolic compounds from *Opuntia stricta* var. *dillenii* green extracts (control) encapsulated by Formulation A and Formulation B after *in vitro* gastro-intestinal digestion.

Compound	In vitro phase	OPD green Extract <sup>2</sup>	Recovery (%) <sup>1</sup>			
			Formulation A <sup>3</sup>		Formulation B <sup>3</sup>	
			w/o lipase	w/ lipase	w/o lipase	w/ lipase
BETALAINS						
Betanin	Oral	91.7 ± 0.3	114.5 ± 3.4 <sup>Aa</sup>	106.5 ± 14.9 <sup>Aa</sup>	113.1 ± 1.3 <sup>Aa</sup>	90.1 ± 7.1 <sup>Ba</sup>
	Gastric	87.8 ± 2.2	108.4 ± 4.4 <sup>Aa</sup>	83.1 ± 5.9 <sup>Ba</sup>	71.1 ± 0.4 <sup>Ab</sup>	74.1 ± 13 <sup>Aa</sup>
	Intestinal	35.3 ± 0.2	93.4 ± 0.9 <sup>Aa</sup>	70.8 ± 1.8 <sup>Ba</sup>	67.1 ± 0.1 <sup>Ab</sup>	56.3 ± 0.2 <sup>Bb</sup>
Isobetanin	Oral	79.8 ± 0.2	123.5 ± 5.5 <sup>Aa</sup>	101.6 ± 1.8 <sup>Ba</sup>	104.7 ± 4.7 <sup>Ab</sup>	88.2 ± 3.3 <sup>Bb</sup>
	Gastric	68.8 ± 0.1	99.9 ± 3.9 <sup>Aa</sup>	81.7 ± 8.5 <sup>Aa</sup>	69.3 ± 6.6 <sup>Ab</sup>	68.1 ± 13.5 <sup>Aa</sup>
	Intestinal	30.1 ± 0.1	90.9 ± 0.9 <sup>Aa</sup>	68.1 ± 0.6 <sup>Ba</sup>	67.7 ± 1 <sup>Ab</sup>	55.8 ± 3.6 <sup>Bb</sup>
Neobetanin	Oral	52.6 ± 0.6	84.6 ± 1.6 <sup>Ba</sup>	93.7 ± 4.9 <sup>Aa</sup>	60 ± 7.5 <sup>Ab</sup>	38.5 ± 6.9 <sup>Bb</sup>
	Gastric	48.1 ± 4.3	69.3 ± 5.2	n.d.	53.6 ± 6.2 <sup>A</sup>	18.8 ± 1.2 <sup>B</sup>
	Intestinal	47.2 ± 0.1	52.9 ± 9.1 <sup>Aa</sup>	41.7 ± 1 <sup>Ba</sup>	44.5 ± 1.9 <sup>Ab</sup>	11.5 ± 0.7 <sup>Bb</sup>
PHENOLIC ACIDS						
Piscidic acid	Oral	96.1 ± 4.4	47.9 ± 2.1 <sup>Ab</sup>	47.5 ± 5.5 <sup>Ab</sup>	118.3 ± 0.8 <sup>Aa</sup>	77.5 ± 1.1 <sup>Ba</sup>
	Gastric	96.1 ± 3.9	79.2 ± 1.2 <sup>Ab</sup>	42.5 ± 7.2 <sup>Bb</sup>	113.2 ± 2.5 <sup>Aa</sup>	128.2 ± 1.4 <sup>Ba</sup>
	Intestinal	64.3 ± 3.3	253.1 ± 5.8 <sup>Aa</sup>	251.9 ± 4.8 <sup>Aa</sup>	226.9 ± 0.9 <sup>Ab</sup>	247.3 ± 5.4 <sup>Ba</sup>
FLAVONOIDS						
Isorhamnetin glucoxyl-rhamnosyl-pentoside (IG2)	Oral	73.9 ± 2.4	107.7 ± 3.5 <sup>Aa</sup>	87.1 ± 0.1 <sup>Ba</sup>	81.9 ± 4.4 <sup>Ab</sup>	62.58 ± 4.9 <sup>Bb</sup>
	Gastric	68.7 ± 0.6	92.1 ± 6.7 <sup>Aa</sup>	84.2 ± 2.5 <sup>Aa</sup>	65.5 ± 2.8 <sup>Ab</sup>	62.4 ± 12.6 <sup>Ab</sup>
	Intestinal	23.5 ± 0.3	91.1 ± 2.8 <sup>Aa</sup>	75.7 ± 3.8 <sup>Ba</sup>	58.7 ± 0.5 <sup>Ab</sup>	46.2 ± 5.3 <sup>Bb</sup>

<sup>1</sup>Results were expressed as mean ± standard deviation. This came from obtaining at least two independent measurements (n= 2) of each sample. Superscript capital letters indicate statistically significant differences (p ≤ 0.05) between gastro-intestinal digestion phases without or with lipase within the same formulation. Superscript lower-case letters indicate statistically differences (p ≤ 0.05) between the different formulations under the same conditions of using or not using lipase.

<sup>2</sup> OPD green Extract refers to the green extracts obtained from *Opuntia stricta* var. *dillenii*'s whole fruits. <sup>3</sup> Formulation A, based on Tween 20 and Formulation B, based on caseinate.