SUPPLEMENTARY MATERIAL

Table S1. ANOVA result of the antioxidant capacity first order model

Source	Coefficient value	*p*-Value
Model		0.0671
Intercept	83.6808	0.0274
X_1	-0.519083	0.0878
X_2	-34.6633	0.1349
X_1X_2	0.233333	0.2166

Note: X_1 = Inlet temperature (°C); X_2 = Maltodextrin:Habanero pepper extract ratio (w/w)

Table S2. ANOVA result of the antioxidant capacity second order model

Source	Coefficient value	*p*-Value
Model		0.0000
Intercept	301.59	0.0000
X_1	−3.17846	0.0001
X_2	−133.013	0.0000
X_1^2	0.0118935	0.0001
X_2^2	32.3595	0.0000
X_1X_2	0.23025	0.0960

Note: X_1 = Inlet temperature (°C); X_2 = Maltodextrin:Habanero pepper extract ratio (w/w)

Table S3. Results of the microencapsulated capsaicinoids of the complete experimental design for the optimization of the spray-drying conditions of a habanero pepper extract

Exp	Factors				Variable response		
	Coded Values		Real values				
	X_1	X_2	IT (°C)	M:E (w/w)	CP*	DC*	TC*
1	−1	−1	100	1:1	0.39 ± 0.000	0.035 ± 0.000	0.43 ± 0.000
2	1	−1	140	1:1	0.27 ± 0.000	0.025 ± 0.000	0.30 ± 0.000
3	−1	1	100	2:1	0.27 ± 0.004	0.027 ± 0.004	0.30 ± 0.000
4	1	1	140	2:1	0.19 ± 0.007	0.022 ± 0.003	0.21 ± 0.003
5	0	0	120	1.5:1	0.30 ± 0.004	0.030 ± 0.000	0.33 ± 0.004
6	0	0	120	1.5:1	0.32 ± 0.000	0.030 ± 0.000	0.35 ± 0.000
7	0	0	120	1.5:1	0.32 ± 0.007	0.030 ± 0.004	0.35 ± 0.004
8	0	0	120	1.5:1	0.35 ± 0.000	0.030 ± 0.000	0.38 ± 0.000
9	−1.414	0	92	1.5:1	0.17 ± 0.000	0.060 ± 0.004	0.23 ± 0.004
10	1.414	0	148	1.5:1	0.16 ± 0.004	0.050 ± 0.000	0.22 ± 0.004
11	0	−1.414	120	0.8:1	0.28 ± 0.000	0.080 ± 0.004	0.36 ± 0.004
12	0	1.414	120	2.2:1	0.12 ± 0.003	0.040 ± 0.003	0.16 ± 0.007

Note: Exp = Experiment; IT = Inlet Temperature; M:E = Ratio of maltodextrin gram per 1 gram of habanero pepper extract; w/w = Weight/weight ratio; CP = Capsaicinoid; DC = Dihydrocapsaicin; TC = Total capsaicinoids; *mg/g Powder; Values are means ± SD (n = 3)

Table S4. Model for capsaicin and total capsaicinoids as a function input variables and analysis of variance

Source	CP	TC	CP (*p*-value)	TC (*p*-value)
Model			0.0000	0.0000
Intercept	-1.43601	-1.15088		
X_1	0.0292452	0.0265272	0.0108	0.0019
X_2	0.219263	0.119397	0.0000	0.0000
X_1^2	-0.000132814	-0.000122189	0.0001	0.0000
X_2^2	-0.142499	-0.117499	0.0038	0.0037
X_1X_2	0.142499	0.000916667	0.5662	0.4441

Note: X_1 = Inlet temperature (°C); X_2 = Maltodextrin:Habanero pepper extract ratio (w/w); CP = Capsaicin; TC = Total capsaicinoids

Table S5. Results of the validation experiment for the microencapsulated polyphenol profile and their comparison with the predicted values of the mathematical model

Metabolite	Spray drying conditions		Optimal response (mg/100g PW)	Experimental Value (mg/100g PW)	Error (%)
	IT (°C)	M:E (w/w)			
TPC	0.8	148	8.42*	6.56 ± 0.12*	22.09
Protocatechuic acid	0.8	148	19.46	0 ± 0.00	100
Coumaric acid	0.8	148	2.09	2.27 ± 0.10	8.61
Rutin	0.8	148	7.08	4.1 ± 0.02	42.09
Diosmetin	0.8	148	1.74	0.65 ± 0.01	62.64
Naringenin	0.8	148	0.98	0.40 ± 0.00	59.18

Note: TPC = Total polyphenol content; IT = Inlet temperature; M:E = Maltodextrin ratio per gram of extract; w/w = Weight/Weight; PW = Powder; *mg Gallic acid equivalent/100g powder; Values are means ± SD (n = 3)

Table S6. Results of the validation experiment for capsaicin and total capsaicinoids content and their comparison with the predicted values of the mathematical model

Response variable	Experimental*	Predicted*	Error rate (%)
CP	0.12 ± 0.00 mg /g PW	0.17 mg /g PW	29.41
TC	0.16 ± 0.00 mg /g PW	0.23 mg /g PW	30.43

Note: CP = Capsaicin; TC = Total Capsaicinoids; PW = Powder; Values are means ± SD (n = 3); *Microencapsulation condition 148°C inlet temperature and 0.8:1 w/w ratio (Maltodextrin:Habanero pepper extract)

Table S7. Polyphenol profile of the habanero pepper (*Capsicum chinense* Jacq.) extract and microencapsulated by spray drying

	Spray drying conditions		Metabolites (mg/100g Powder)						
Exp	**IT (°C)**	**M:E (w/w)**	**Gallic acid**	**Protocatechuic acid**	**Catechin**	**Chlorogenic acid**	**Coumaric acid**	**Cinnamic acid**	**Rutin**
1	100	1	3.60 ± 0.05	17.34 ± 0.18^{f}	5.96 ± 0.17^{c}	5.99 ± 0.15^{abc}	1.78 ± 0.03^{e}	1.20 ± 0.01^{cd}	10.77 ± 0.42^{h}
2	140	1	3.78 ± 0.05^{abc}	10.26 ± 0.48^{de}	3.42 ± 0.75^{b}	1.46 ± 0.51^{a}	1.13 ± 0.19^{cd}	0.98 ± 0.14^{ab}	2.85 ± 0.23^{bcde}
3	100	2	3.47 ± 0.43^{ab}	11.05 ± 0.36^{e}	4.19 ± 0.04^{b}	0.90 ± 0.01^{a}	1.33 ± 0.01^{d}	0.90 ± 0.00^{a}	3.03 ± 0.09^{cde}
4	140	2	2.43 ± 0.18^{a}	6.81 ± 0.33^{bc}	1.96 ± 0.54^{a}	1.38 ± 0.51^{a}	1.00 ± 0.09^{bc}	1.06 ± 0.09^{abc}	1.71 ± 0.19^{ab}
5	120	1.5	0.00	8.63 ± 0.00^{cd}	7.09 ± 0.08^{d}	4.27 ± 0.01^{ab}	0.83 ± 0.00^{ab}	1.23 ± 0.01^{cd}	1.62 ± 0.02^{ab}
6	120	1.5	2.33 ± 0.01^{a}	8.87 ± 0.01^{cde}	7.24 ± 0.15^{d}	4.06 ± 0.06^{ab}	0.74 ± 0.11^{a}	1.16 ± 0.13^{bcd}	1.25 ± 0.24^{a}
7	120	1.5	2.10 ± 0.00^{a}	8.14 ± 0.26^{cd}	6.70 ± 0.01^{cd}	3.77 ± 0.09^{ab}	0.76 ± 0.01^{a}	1.16 ± 0.01^{bcd}	1.90 ± 0.66^{abc}
8	120	1.5	2.52 ± 0.02^{a}	8.82 ± 0.03^{cde}	7.42 ± 0.17^{d}	4.14 ± 0.17^{ab}	0.86 ± 0.02^{ab}	1.83 ± 0.02^{f}	2.78 ± 1.01^{bcd}
9	92	1.5	5.03 ± 2.13^{bc}	4.61 ± 2.39^{b}	3.40 ± 0.07^{b}	13.24 ± 0.16^{c}	1.30 ± 0.04^{d}	1.68 ± 0.10^{e}	7.15 ± 0.38^{g}
10	148	1.5	8.28 ± 0.80^{d}	4.91 ± 0.50^{b}	13.60 ± 0.35^{f}	13.79 ± 0.21^{c}	1.23 ± 0.03^{d}	1.32 ± 0.05^{e}	4.94 ± 0.44^{f}
11	120	0.8	10.39 ± 0.01^{e}	31.65 ± 0.03^{g}	7.42 ± 0.09^{d}	24.38 ± 0.42^{d}	2.24 ± 0.00^{f}	2.50 ± 0.01^{d}	10.61 ± 0.46^{h}
12	120	2.2	5.57 ± 0.04^{c}	2.29 ± 0.38^{a}	9.83 ± 0.13^{e}	10.32 ± 0.10^{bc}	0.92 ± 0.01^{abc}	1.04 ± 0.01^{abc}	3.99 ± 0.18^{def}
13*	148	0.8	0.00	0.00	9.11 ± 0.40^{e}	42.67 ± 9.63^{e}	2.27 ± 0.10^{f}	2.61 ± 0.01^{f}	4.1 ± 0.02^{ef}
Extract**	-	-	47.15 ± 0.21	102.67 ± 0.27	113.30 ± 0.08	186.71 ± 1.75	7.81 ± 0.10	25.25 ± 0.41	53.01 ± 0.27

Note: Exp = Experiment; IT = Inlet Temperature; M:E = Ratio of maltodextrin per gram of habanero pepper extract; w/w = Weight/weight ratio; * Validation experiment; **mg/100g dry matter; Different letters in the same column refer to a statistically significant difference (LSD, $p<0.05$)

Table S7. Polyphenol profile of the habanero pepper (*Capsicum chinense* Jacq.) extract and microencapsulated by spray drying (Continue)

	Metabolites (mg/100g powder)								
Exp	**Quercetin + Luteolin**	**Kaempferol**	**Vanillin**	**Naringenin**	**Apigenin**	**Diosmetin**	**Vanillic acid**	**Ferulic acid**	**Ellagic acid**
1	0.33 ± 0.003^{ab}	1.67 ± 0.18^{g}	1.93 ± 0.004^{f}	0.00	1.06 ± 0.004^{c}	0.88 ± 0.27^{e}	0.29 ± 0.01^{a}	0.32 ± 0.00^{b}	1.78 ± 0.09^{e}
2	0.58 ± 0.003^{cd}	0.77 ± 0.03^{abcd}	0.31 ± 0.0^{b}	0.47 ± 0.00^{f}	1.08 ± 0.00^{d}	0.98 ± 0.11^{de}	0.27 ± 0.004^{a}	0.33 ± 0.13^{b}	1.04 ± 0.20^{cd}
3	0.56 ± 0.001^{cd}	1.42 ± 0.29^{fg}	0.30 ± 0.02^{b}	0.42 ± 0.002^{c}	0.32 ± 0.007^{a}	0.82 ± 0.14^{cde}	0.22 ± 0.004^{a}	0.31 ± 0.002^{b}	1.20 ± 0.20^{d}
4	0.42 ± 0.000^{abc}	1.14 ± 0.00^{ef}	0.21 ± 0.00^{a}	0.41 ± 0.03^{b}	0.00	0.00	0.38 ± 0.00^{a}	0.33 ± 0.002^{b}	0.87 ± 0.02^{cd}
5	0.66 ± 0.050^{d}	1.08 ± 0.16^{de}	0.33 ± 0.02^{b}	0.00	0.00	0.00	3.71 ± 0.42^{d}	0.47 ± 0.13^{c}	0.82 ± 0.05^{c}
6	0.51 ± 0.040^{bcd}	0.85 ± 0.01^{cde}	0.33 ± 0.00^{b}	0.00	0.00	0.00	3.89 ± 0.51^{d}	0.35 ± 0.001^{b}	0.46 ± 0.03^{b}
7	0.58 ± 0.004^{cd}	0.93 ± 0.02^{cde}	0.30 ± 0.03^{b}	0.00	0.00	0.00	3.56 ± 0.38^{d}	0.05 ± 0.009	0.27 ± 0.02^{ab}
8	0.52 ± 0.030^{bcd}	3.14 ± 0.11^{abc}	0.34 ± 0.00^{b}	0.00	0.00	0.00	3.58 ± 0.02^{d}	0.14 ± 0.002^{a}	0.33 ± 0.14^{b}
9	0.69 ± 0.080^{d}	0.48 ± 0.01^{a}	0.41 ± 0.04^{c}	0.00	0.00	0.54 ± 0.002^{a}	1.58 ± 0.01^{b}	0.00	0.00
10	0.25 ± 0.120^{a}	0.49 ± 0.01^{ab}	0.43 ± 0.00^{c}	0.40 ± 0.001^{a}	0.00	0.56 ± 0.00^{ab}	3.94 ± 0.06^{d}	0.12 ± 0.16^{a}	0.16 ± 0.01^{ab}
11	0.72 ± 0.004^{d}	0.70 ± 0.05^{abc}	0.70 ± 0.03^{d}	0.43 ± 0.002^{d}	0.00	0.69 ± 0.01^{bcd}	1.30 ± 0.27^{b}	0.90 ± 0.60^{d}	1.02 ± 0.11^{cd}
12	0.29 ± 0.190^{a}	0.49 ± 0.005^{a}	0.34 ± 0.02^{b}	0.00	0.41 ± 0.004^{b}	0.52 ± 0.004^{a}	2.61 ± 0.03^{c}	0.00	0.00
13*	1.56 ± 0.010^{e}	0.81 ± 0.01^{bcd}	1.24 ± 0.03^{e}	0.40 ± 0.00^{a}	0.00	0.65 ± 0.01^{bcd}	0.00	0.00	2.49 ± 0.02^{e}
Extract**	14.59 ± 0.00	13.99 ± 0.73	25.25 ± 0.41	8.06 ± 0.03	4.23 ± 0.05	12.56 ± 0.31	61.93 ± 0.42	6.62 ± 0.21	11.19 ± 0.26

Note: Exp = Experiment; *Validation experiment; **mg/100g dry matter; Different letters in the same column refer to a statistically significant difference (LSD, $p<0.05$)

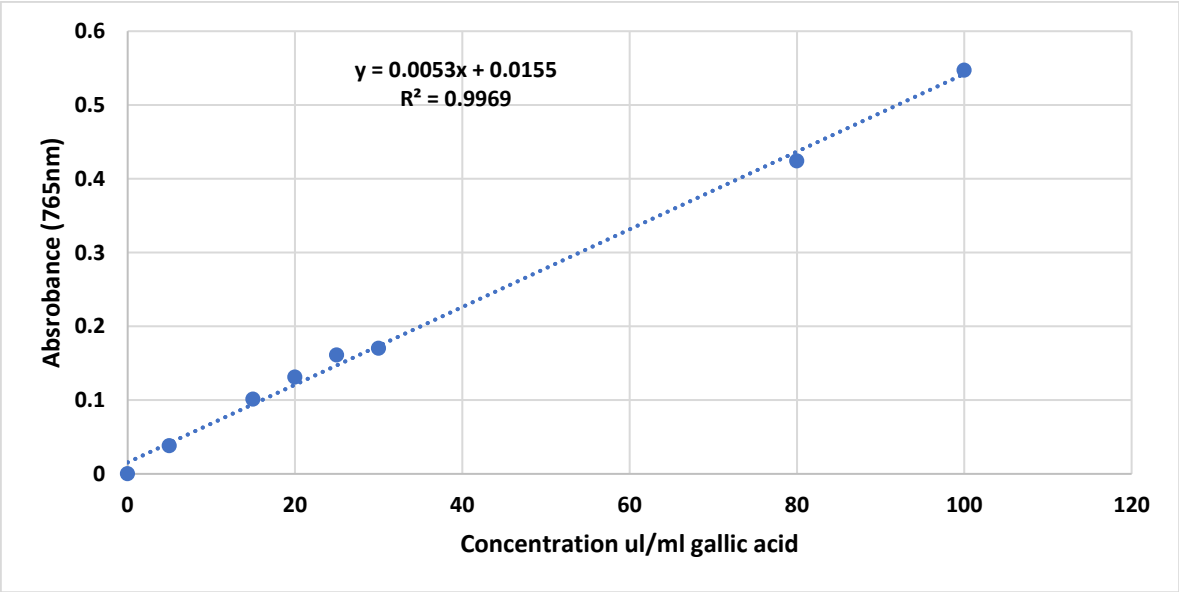
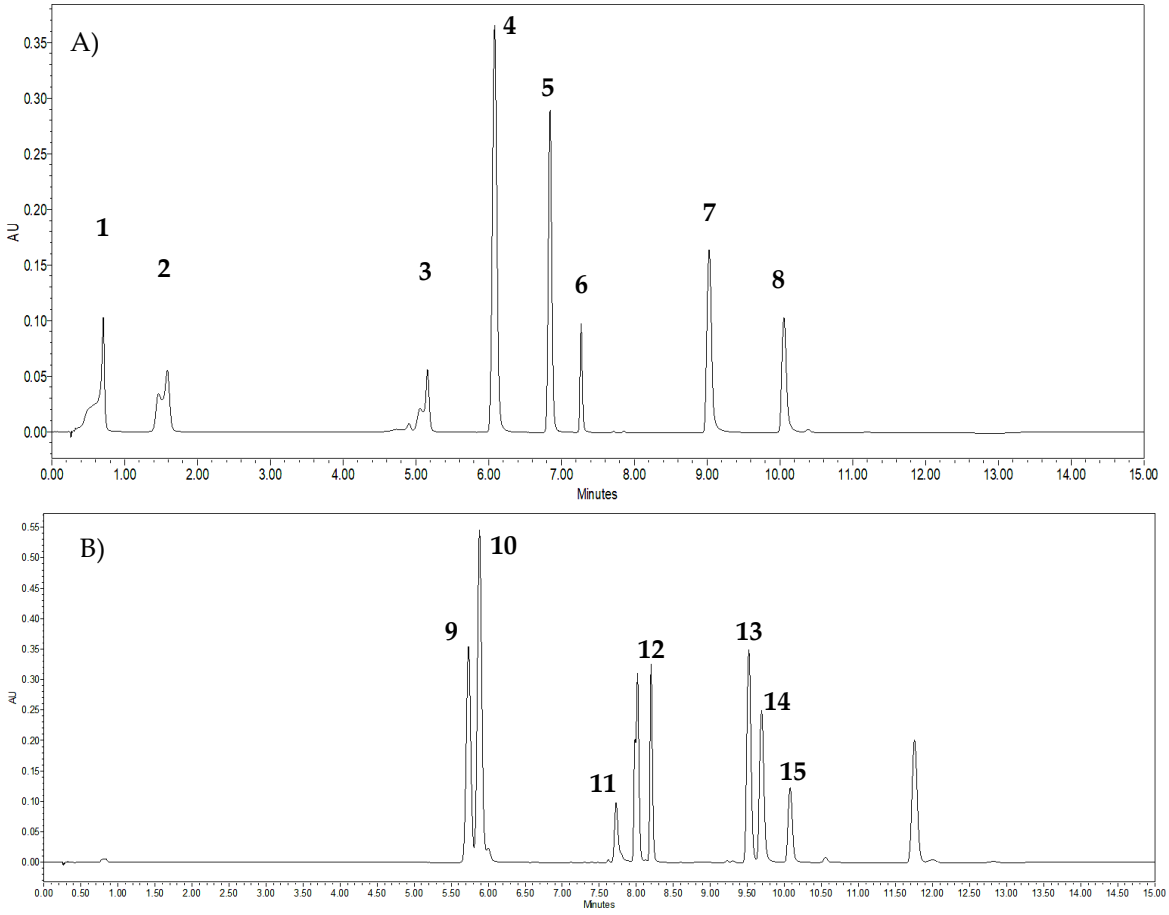


Figure S1. Calibration curve for the determination of the total polyphenol content by the Folin-Ciocalteu methodology



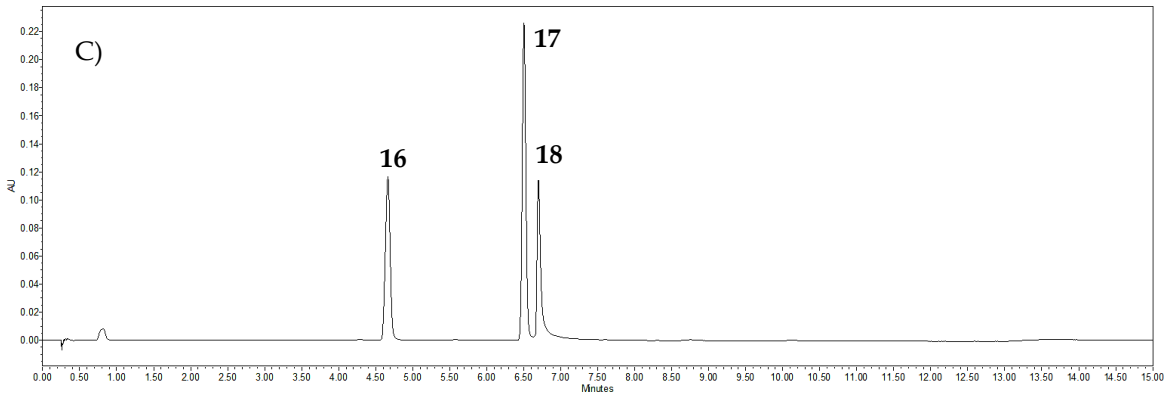


Figure S2. Chromatograms of the polyphenol profile obtained by ultra-high pressure liquid chromatography (UPLC); A) 1. Gallic acid, 2. Protocatechuic acid, 3. Catechin, 4. Chlorogenic acid, 5. Cinnamic acid, 6. Rutin, 7. Quercetin + luteolin, 8. Kaempferol; B) 9. Vanillin, 10. Coumaric acid, 11. Ferulic acid, 12. Ellagic acid, 13. Naringenin, 14. Apigenin, 15. Diosmetin; C) 16. Vanillic Acid, 17. Diosmin + hesperidin, 18. Neohesperidin

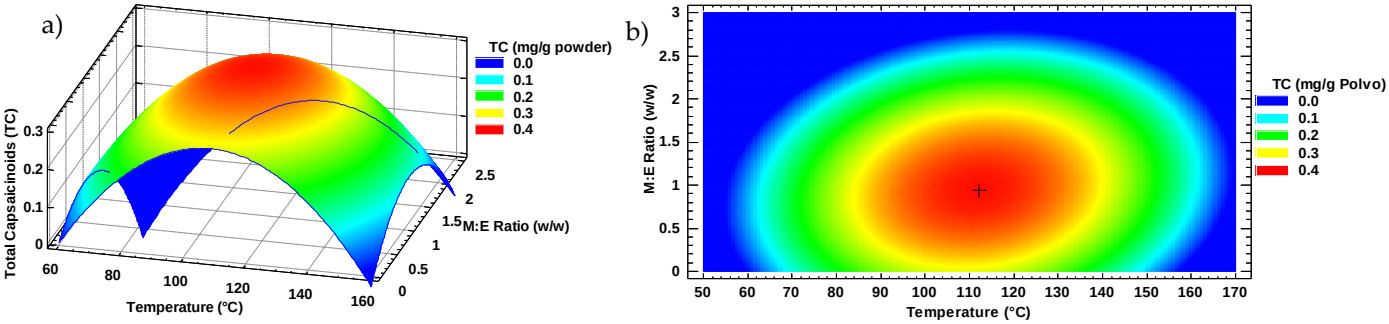


Figure S3. Total capsaicinoids content response surface (a) and contour plot (b) by factors of input inlet temperature and maltodextrin ratio