

Supplementary material - Nutritional and Functional Advantages of the Use of Fermented Black Chickpea Flour for Semolina-Pasta Fortification.

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Table 1. Drying cycle used for making pasta.

Cycle	Ventilation			Recovery		
	Temperature (°C)	U.R. %	Time (min)	Temperature (°C)	U.R. %	Time (min)
1	55	85	3	55	85	2
2	55	85	3	55	85	2
3	55	70	3	55	70	4
4	55	70	3	40	65	8
5	55	70	3	40	60	10
6	55	70	3	40	60	10
7	55	70	3	40	55	10
8	55	70	3	40	55	12
9	55	70	3	40	55	12
10	55	70	3	40	55	12
11	55	70	3	40	55	12
12	55	70	3	40	55	14
13	55	70	3	40	50	14
14	55	70	3	40	50	16
15	55	70	3	40	50	16
16	55	70	3	40	50	16
17	55	65	3	40	50	16
18	55	65	3	40	50	18
19	55	65	3	40	50	18
20	55	65	3	40	45	18
21	55	65	3	40	45	18
22	55	60	3	35	45	18
23	55	60	3	35	45	18
24	50	55	3	35	45	18
25	45	55	3	35	15	18
26	40	40	3	15	15	10
27	15	10	20	15	10	20
28	15	10	20	15	10	20

Table 2. List and definition of the attributes used for the sensory analysis made on pasta samples.

Attribute	Abbreviation	Definition
		<i>Visual</i>
Color heterogeneity	Ht	Heterogeneity of the pasta color evaluated after cooking
Texture	Te	Uniformity of the pasta texture at visual inspection
Stacking	St	The degree of piece to piece adhesion
		<i>Odor</i>
Intensity	OI	Overall odor intensity of pasta
Pungent	OP	Pungency of pasta smell
		<i>Flavour</i>
Pungent	P	Pungency of pasta flavour
Delicate	D	Soft and delicate flavor perception
Legume	L	Typical flavor of lentils, beans, chickpeas, etc.
Whole	W	Flavor of whole-wheat flour, buckwheat
Toasted	To	Grilled and toasty flavor
Sapidity	Sp	Sapidity taste
		<i>Texture</i>
Chewability	Ch	The mouthfeel sensation of labored mastication due to sustained, elastic resistance from the sample.
<i>General acceptability</i>	GA	Overall appreciation

Table 3. Polar compounds identified in free and bound extracts of black chickpea doughs by UPLC-PDA-ESI-QTOF.

No.	Polar compound	RT (min)	Molecular Formula	m/z expected	m/z calculated	Error (ppm)	Score (%)	Fragments (MS ²)
<i>Free phenolic compounds</i>								
1	Protocatechuic acid	1.125	C ₇ H ₆ O ₄	153.0198	153.0188	6.5	100	
2	Dihydroxybenzoic acid hexoside	2.652	C ₁₃ H ₁₆ O ₉	315.0719	315.0716	1	96.95	217.0164, 152.0088, 108.0225
3	Dihydrocaffeic acid	2.921	C ₉ H ₁₀ O ₄	181.0512	181.0501	6.1	92.63	
4	Indole-3-acrylic acid	3.376	C ₁₁ H ₉ N ₁ O ₂	186.0568	186.0555	7	89.47	142.0665
5	Hydroxybenzoic acid hexoside-pentoside	3.521	C ₁₈ H ₂₄ O ₁₂	431.1194	431.119	0.9	99.95	137.0245
6	Dihydroxybenzoic acid hexoside-pentoside I	4.030	C ₁₈ H ₂₄ O ₁₃	447.1144	447.1139	1.1	96.67	131.0708
7	Dihydroxybenzoic acid hexoside-pentoside II	4.336	C ₁₈ H ₂₄ O ₁₃	447.1144	447.1139	1.1	96.67	131.0708
8	Dihydrophaseic acid	4.518	C ₁₅ H ₂₂ O ₅	281.1394	281.1389	1.8	96.55	217.004
9	Phloretic acid	5.54	C ₉ H ₁₀ O ₃	165.0564	165.0552	7.3	62.13	
10	Dihydrophaseic acid isomer	6.165	C ₁₅ H ₂₂ O ₅	281.1394	281.1389	1.8	96.55	217.0029
11	Hydroxybenzoic acid hexoside-pentoside dehydrodimer	6.634	C ₃₆ H ₄₆ O ₂₃	845.2342	845.2352	-1.2	99.99	431.1199, 137.0250
12	Hydroxybenzoic acid hexoside-pentoside trimer	7.753	C ₅₄ H ₆₈ O ₃₄	1259.3509	1259.3514	-0.3	77.69	845.2329, 431.1147, 137.0228
13	Hydroxibenzoic acid derivative	8.390	C ₂₅ H ₂₈ O ₁₄	551.1398	551.1401	-0.5	99.01	413.1053, 137.0256

14	Myricetin derivative	9.154	C ₃₂ H ₃₈ O ₂₁	757.1796	757.1827	-4.1	43.77	316.0228
15	Quercetin-3-7-O-di-glucopyranoside	9.342	C ₂₇ H ₃₀ O ₁₇	625.1426	625.1405	3.4	95.9	
16	Quercetin-3-O-β-D-xylopyranosyl-(1/2)-rutinoside	10.018	C ₃₂ H ₃₈ O ₂₀	741.1866	741.1855	-1.6	92.81	300.0274
17	Myricetin-O-methyl ether hexoside deoxy-hexoside pentoside	10.064	C ₃₃ H ₄₀ O ₂₁	771.1972	771.1984	-1.6	99.98	315.015
18	Kaempferol 3-O-lathyroside-7-O-α-L-rhamnopyranoside	10.699	C ₃₂ H ₃₈ O ₁₉	725.1915	725.1929	-1.9	99.97	284.0333
19	Quercetin-3-O-rutinoside-7-O-α-L-rhamnopyranoside	10.823	C ₃₃ H ₄₀ O ₂₀	755.2009	755.2035	-3.4	99.56	299.0200, 300.0274
20	Lablab saponin	16.771	C ₅₄ H ₈₂ O ₂₂	1081.5216	1081.5219	-0.3	99.93	
21	Soyasaponin Bd	17.206	C ₄₈ H ₇₇ O ₁₈	941.5102	941.511	-0.8	96.95	
<i>Bound phenolic compounds</i>								
1	Gallic acid	1.275	C ₇ H ₆ O ₅	169.0147	169.0137	1	99.28	125.0243
2	Protocatechuic acid	1.685	C ₇ H ₆ O ₄	153.0198	153.0188	6.5	100	
3	Dihydroxybenzoic acid hexoside	2.131	C ₁₃ H ₁₆ O ₉	315.0721	315.0716	1.6	99.56	217.0038, 152.0105, 108.0221
4	Hydroxybenzoic acid hexoside-pentoside	3.463	C ₁₈ H ₂₄ O ₁₂	431.1195	431.119	1.2	82.5	
5	Morin	3.956	C ₁₅ H ₁₀ O ₇	301.0362	301.0402	-13.3	99.08	
6	Dihydroxybenzoic acid hexoside-pentoside I	4.001	C ₁₈ H ₂₄ O ₁₃	447.1125	447.1139	-3.1	78.66	
7	Dihydrophaseic acid	6.120	C ₁₅ H ₂₂ O ₅	281.1384	281.1389	-1.8	95.61	217.0029

8	Ferulic acid	7.642	C ₁₀ H ₁₀ O ₄	193.0494	193.0501	-3.6	62.23	
9	Isoferulic acid	8.291	C ₁₀ H ₁₀ O ₄	193.0504	193.0501	1.6	84.77	
10	Myricetin-O-methyl ether hexoside deoxy- hexoside-pentoside	10.028	C ₃₃ H ₄₀ O ₂₁	771.1976	771.1984	-1	59.56	315.015
11	Kaempferol 3-O- lathyroside-7-O- α -L- rhamnopyranoside	10.645	C ₃₂ H ₃₈ O ₁₉	725.1946	725.1929	2.3	99.31	284.0333
12	Soyasaponin Ba	16.031	C ₄₈ H ₇₆ O ₁₉	955.4886	955.4903	-1.8	49.05	
13	Soyasaponin Bd	17.190	C ₄₈ H ₇₈ O ₁₈	941.5096	941.5110	-1.5	90.4	
