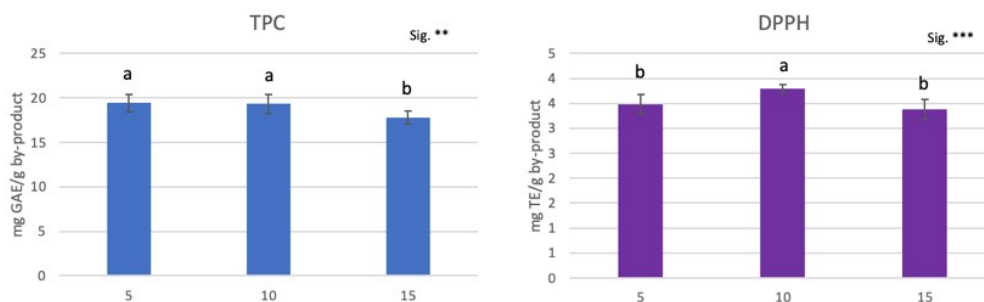


## Encapsulation of Lime Extract from By-Products in Zein–Pectin Microparticles for Gluten-Free Vegan Pancakes

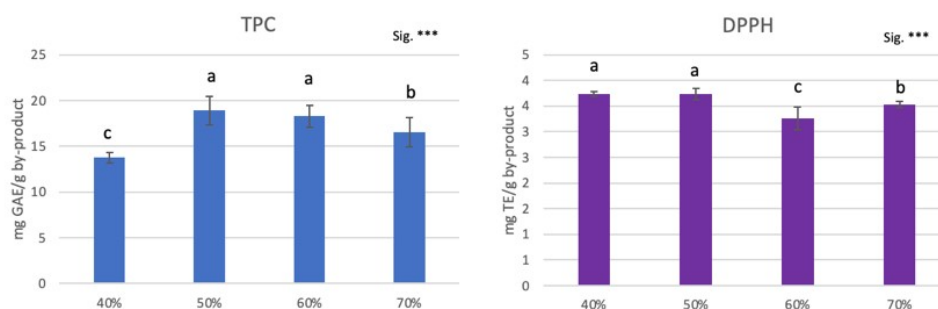
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a)



b)



Statistical significance: \*\*\*p < 0.001; \*\*p < 0.01; \*p < 0.05; and n.s. = not significant (p > 0.05). Lowercase letters indicate statistical differences.

**Figure S1.** Optimization of polyphenolic extraction from lime by-products, evaluated through the determination of total phenolic content (TPC) and antioxidant activity assessed by the DPPH radical scavenging assay. Effects of ultrasound-assisted extraction (UAE) time (a) and ethanol:water (EtOH:H<sub>2</sub>O) solvent ratio (b).

**Table S1.** Experimental conditions optimized for the drying process using nano spray drying (NSD).

Nº	Sample	Nozzle	Flow (L/min)	T <sup>inlet</sup> (°C)	T <sup>outlet</sup> (°C)	P (mbar)	Pump (%)	Spray (%)
1C	Control	Medium (5.5 µm)	170	110	42 - 49	59	80	80
1S	Lime-loaded	Medium (5.5 µm)	170	110	36 - 43	58	80	80
2C	Control	Medium (5.5 µm)	130	110	41 - 42	40	80	80
2S	Lime-loaded	Medium (5.5 µm)	130	110	36 - 42	40	80	80
3C	Control	Medium (5.5 µm)	150	110	33 - 43	51	80	80
3S	Lime-loaded	Medium (5.5 µm)	150	110	50 - 43	49	80	80
4C	Control	Medium (5.5 µm)	150	120	41 - 52	50	80	80
4S	Lime-loaded	Medium (5.5 µm)	150	120	40 - 50	51	80	80
5C	Control	Medium (5.5 µm)	150	100	36 - 46	51	80	80
5S	Lime-loaded	Medium (5.5 µm)	150	100	38 - 46	48	80	80

**Table S2.** Results obtained from the drying optimization in terms of production yield, antioxidant properties and quantification of phenolic compounds.

Nº	Production		Antioxidant capacity (DPPH)		Phenolic compounds ( $\mu\text{g/g}$ )					
	Yield (%)	mg/min	mgTE/g	Sample - control (mgTE/g)	Chlorogenic acid	Ferulic acid	Eriocitrin	Narirutin	Hesperidin	Rutin
1C	93.03	2.36	2.40							
1S	88.37	3.79	5.25	2.85	149.90	19.99	4,681.93	844.37	547,001.78	553.93
2C	82.92	3.39	2.62							
2S	92.22	3.67	5.66	3.44	179.65	35.32	5,559.68	941.78	621,413.46	660.20
3C	89.47	2.77	2.70							
3S	89.79	4.23	5.44	2.73	157.45	11.02	4,502.73	799.22	520,490.33	537.20
4C	91.09	2.36	3.03							
4S	94.27	3.36	5.40	2.37	169.44	22.97	5,223.02	902.03	579,163.11	607.23
5C	90.10	2.83	3.15							
5S	86.17	2.44	5.65	2.50	164.33	29.22	4,754.28	858.13	561,411.43	581.82

Numbers followed by a C refer to control particles, while those followed by S refer to lime-loaded samples.