

**Table 3.** Micro- and macro-elements concentration in ultrasound treated and fermented with LUHS210 strain by-products.

By-products	Macro-elements, mg/g d.m. (dry mass)							
	Na	Mg	K	Ca				
OPC	80.6 ± 7.3 <sup>a</sup>	1959.1 ± 85.9 <sup>b</sup>	1910.8 ± 83.6 <sup>b</sup>	1511.6 ± 93.8 <sup>b</sup>				
OPC <sub>cus</sub>	89.3 ± 8.1 <sup>a</sup>	2093.6 ± 95.6 <sup>b</sup>	1959.4 ± 75.1 <sup>b</sup>	1557.1 ± 89.6 <sup>b</sup>				
OPC <sub>LUHS210</sub>	481.0 ± 21.3 <sup>b</sup>	1435.8 ± 43.8 <sup>a</sup>	1766.1 ± 59.7 <sup>a</sup>	1332.0 ± 65.8 <sup>a</sup>				
RPC	15.0 ± 1.2 <sup>a</sup>	273.7 ± 24.1 <sup>b</sup>	149.8 ± 9.6 <sup>a</sup>	349.5 ± 25.7 <sup>a</sup>				
RPC <sub>cus</sub>	17.8 ± 1.4 <sup>a</sup>	267.5 ± 16.8 <sup>b</sup>	145.8 ± 10.8 <sup>a</sup>	305.3 ± 25.8 <sup>a</sup>				
RPC <sub>LUHS210</sub>	402.6 ± 25.6 <sup>b</sup>	210.6 ± 18.9 <sup>a</sup>	484.7 ± 27.5 <sup>b</sup>	808.7 ± 46.0 <sup>b</sup>				
APC	64.6 ± 4.8 <sup>a</sup>	1801.2 ± 53.6 <sup>b</sup>	2719.1 ± 82.9 <sup>b</sup>	3135.9 ± 69.3 <sup>b</sup>				
APC <sub>cus</sub>	68.0 ± 5.7 <sup>a</sup>	1923.1 ± 74.5 <sup>b</sup>	2868.8 ± 73.4 <sup>b</sup>	3241.8 ± 45.2 <sup>b</sup>				
APC <sub>LUHS210</sub>	455.6 ± 3.9 <sup>b</sup>	1481.9 ± 48.1 <sup>a</sup>	2543.8 ± 61.9 <sup>a</sup>	2302.3 ± 80.7 <sup>a</sup>				
CPC	38.9 ± 2.8 <sup>a</sup>	560.9 ± 43.2 <sup>b</sup>	1939.9 ± 82.7 <sup>a</sup>	293.6 ± 19.5 <sup>a</sup>				
CPC <sub>cus</sub>	42.6 ± 3.6 <sup>a</sup>	599.8 ± 41.5 <sup>b</sup>	1980.8 ± 63.9 <sup>a</sup>	291.8 ± 19.0 <sup>a</sup>				
CPC <sub>LUHS210</sub>	435.3 ± 3.9 <sup>b</sup>	431.8 ± 33.8 <sup>a</sup>	1820.9 ± 59.7 <sup>a</sup>	316.6 ± 27.5 <sup>a</sup>				
SPC	172.9 ± 14.3 <sup>a</sup>	332.1 ± 25.4 <sup>b</sup>	2427.7 ± 69.8 <sup>a</sup>	1301.7 ± 81.6 <sup>b</sup>				
SPC <sub>cus</sub>	194.1 ± 16.3 <sup>a</sup>	347.5 ± 25.7 <sup>b</sup>	2532.9 ± 96.3 <sup>a</sup>	1405.9 ± 93.5 <sup>b</sup>				
SPC <sub>LUHS210</sub>	548.4 ± 32.6 <sup>b</sup>	264.5 ± 21.3 <sup>a</sup>	2238.8 ± 83.2 <sup>a</sup>	1111.8 ± 75.3 <sup>a</sup>				
Essential micro-elements, µg/g d.m. (dry mass)								
	Cr	Mn	Fe	Co	Ni	Cu	Zn	Se
OPC	0.043 ± 0.001 <sup>b</sup>	70.8 ± 6.1 <sup>b</sup>	62.8 ± 5.7 <sup>a</sup>	0.002 ± 0.001 <sup>a</sup>	0.230 ± 0.017 <sup>b</sup>	3.50 ± 0.27 <sup>b</sup>	58.3 ± 4.9 <sup>b</sup>	nd
OPC <sub>cus</sub>	0.044 ± 0.003 <sup>b</sup>	74.7 ± 6.8 <sup>b</sup>	65.0 ± 6.1 <sup>a</sup>	0.002 ± 0.001 <sup>a</sup>	0.243 ± 0.010 <sup>b</sup>	3.63 ± 0.24 <sup>b</sup>	58.1 ± 5.1 <sup>b</sup>	nd
OPC <sub>LUHS210</sub>	0.002 ± 0.001 <sup>a</sup>	56.0 ± 4.9 <sup>a</sup>	55.4 ± 4.3 <sup>a</sup>	0.002 ± 0.001 <sup>a</sup>	0.103 ± 0.012 <sup>a</sup>	2.62 ± 0.18 <sup>a</sup>	40.0 ± 3.6 <sup>a</sup>	nd
RPC	0.412 ± 0.037 <sup>a</sup>	20.8 ± 1.8 <sup>a</sup>	34.7 ± 2.8 <sup>a</sup>	0.035 ± 0.003 <sup>a</sup>	0.325 ± 0.018 <sup>b</sup>	4.86 ± 0.32 <sup>b</sup>	26.0 ± 1.9 <sup>b</sup>	0.063 ± 0.004 <sup>b</sup>
RPC <sub>cus</sub>	0.442 ± 0.032 <sup>a</sup>	20.8 ± 1.4 <sup>a</sup>	38.8 ± 3.2 <sup>a</sup>	0.035 ± 0.003 <sup>a</sup>	0.348 ± 0.017 <sup>b</sup>	4.82 ± 0.39 <sup>b</sup>	24.1 ± 1.7 <sup>b</sup>	0.069 ± 0.005 <sup>b</sup>
RPC <sub>LUHS210</sub>	0.395 ± 0.031 <sup>a</sup>	19.3 ± 1.6 <sup>a</sup>	29.3 ± 2.1 <sup>a</sup>	0.032 ± 0.003 <sup>a</sup>	0.178 ± 0.014 <sup>a</sup>	3.70 ± 0.21 <sup>a</sup>	18.2 ± 1.3 <sup>a</sup>	0.034 ± 0.002 <sup>a</sup>
APC	0.015 ± 0.002 <sup>a</sup>	9.61 ± 0.82 <sup>a</sup>	22.3 ± 2.5 <sup>b</sup>	0.007 ± 0.001 <sup>a</sup>	0.111 ± 0.009 <sup>a</sup>	1.51 ± 0.13 <sup>b</sup>	28.9 ± 2.1 <sup>b</sup>	nd
APC <sub>cus</sub>	0.018 ± 0.005 <sup>a</sup>	9.30 ± 0.9 <sup>a</sup>	23.3 ± 1.9 <sup>b</sup>	0.007 ± 0.001 <sup>a</sup>	0.128 ± 0.012 <sup>b</sup>	1.63 ± 0.11 <sup>b</sup>	30.9 ± 2.7 <sup>b</sup>	nd
APC <sub>LUHS210</sub>	0.022 ± 0.003 <sup>a</sup>	12.2 ± 0.8 <sup>b</sup>	16.9 ± 1.3 <sup>a</sup>	0.009 ± 0.001 <sup>a</sup>	0.103 ± 0.016 <sup>a</sup>	1.18 ± 0.10 <sup>a</sup>	20.3 ± 1.8 <sup>a</sup>	nd
CPC	0.013 ± 0.001 <sup>a</sup>	21.6 ± 1.7 <sup>a</sup>	42.3 ± 3.7 <sup>b</sup>	0.010 ± 0.001 <sup>a</sup>	0.549 ± 0.043 <sup>b</sup>	5.85 ± 0.41 <sup>b</sup>	17.1 ± 1.5 <sup>a</sup>	0.010 ± 0.004 <sup>a</sup>
CPC <sub>cus</sub>	0.012 ± 0.001 <sup>a</sup>	23.2 ± 2.6 <sup>a</sup>	39.4 ± 3.2 <sup>b</sup>	0.012 ± 0.001 <sup>a</sup>	0.523 ± 0.051 <sup>b</sup>	6.19 ± 0.53 <sup>b</sup>	18.1 ± 1.2 <sup>a</sup>	0.012 ± 0.002 <sup>a</sup>
CPC <sub>LUHS210</sub>	0.010 ± 0.001 <sup>a</sup>	20.4 ± 1.5 <sup>a</sup>	27.4 ± 1.9 <sup>a</sup>	0.027 ± 0.003 <sup>b</sup>	0.347 ± 0.029 <sup>a</sup>	4.28 ± 0.32 <sup>a</sup>	16.0 ± 1.1 <sup>a</sup>	0.043 ± 0.003 <sup>b</sup>
SPC	nd	8.50 ± 0.74 <sup>a</sup>	9.70 ± 0.43 <sup>b</sup>	0.010 ± 0.001 <sup>a</sup>	0.350 ± 0.031 <sup>b</sup>	1.29 ± 0.09 <sup>b</sup>	7.86 ± 0.38 <sup>b</sup>	nd

**Table 3.** Micro and macro elements concentration in ultrasound treated and fermented with LUHS210 strain by-products (continued).

By-products	Essential micro-elements, $\mu\text{g/g d.m. (dry mass)}$														
	Cr	Mn	Fe	Co	Ni	Cu	Zn								
SPC <sub>Cus</sub>	nd	8.96 ± 0.79 <sup>a</sup>	10.00 ± 1.0 <sup>b</sup>	0.011 ± 0.001 <sup>a</sup>	0.334 ± 0.020 <sup>b</sup>	1.31 ± 0.06 <sup>b</sup>	8.65 ± 0.72 <sup>b</sup>								
SPC <sub>LUHS210</sub>	nd	11.0 ± 1.3 <sup>a</sup>	6.49 ± 0.62 <sup>a</sup>	0.006 ± 0.001 <sup>a</sup>	0.137 ± 0.012 <sup>a</sup>	1.03 ± 0.08 <sup>a</sup>	5.53 ± 0.43 <sup>a</sup>								
	Non-essential micro-elements, $\mu\text{g/g d.m. (dry mass)}$														
	Ga	As	V	Rb	Sr	Mo	Ag	Cd	Sn	Sb	Cs	Ba	Hg	Tl	Pb
OPC	nd	nd	0.015 ±0.001 <sup>a</sup>	2.92 ±0.18 <sup>b</sup>	7.51 ±0.63 <sup>b</sup>	0.888 ±0.073 <sup>b</sup>	nd	0.054 ±0.003 <sup>b</sup>	nd	nd	nd	3.30 ±0.19 <sup>b</sup>	nd	nd	nd
OPC <sub>Cus</sub>	nd	nd	0.018 ±0.002 <sup>a</sup>	2.98 ±0.16 <sup>b</sup>	7.81 ±0.61 <sup>b</sup>	0.897 ±0.082 <sup>b</sup>	nd	0.051 ±0.004 <sup>b</sup>	nd	nd	nd	3.38 ±0.25 <sup>b</sup>	nd	nd	nd
OPC <sub>LUHS210</sub>	nd	nd	0.015 ±0.001 <sup>a</sup>	2.16 ±0.18 <sup>a</sup>	5.51 ±0.40 <sup>a</sup>	0.639 ±0.051 <sup>a</sup>	nd	0.037 ±0.002 <sup>a</sup>	nd	nd	nd	2.46 ±0.14 <sup>a</sup>	nd	nd	nd
RPC	0.006 ±0.001 <sup>a</sup>	0.035 ±0.002 <sup>a</sup>	0.051 ±0.003 <sup>a</sup>	1.08 ±0.09 <sup>b</sup>	1.32 ±0.12 <sup>ab</sup>	0.846 ±0.071 <sup>b</sup>	nd	0.086 ±0.007 <sup>b</sup>	nd	nd	0.003 ±0.001 <sup>a</sup>	1.39 ±0.09 <sup>b</sup>	nd	nd	0.009 ±0.001 <sup>a</sup>
RPC <sub>Cus</sub>	0.007 ±0.001 <sup>a</sup>	0.038 ±0.003 <sup>a</sup>	0.057 ±0.004 <sup>a</sup>	1.05 ±0.07 <sup>b</sup>	1.31 ±0.09 <sup>b</sup>	0.845 ±0.069 <sup>b</sup>	nd	0.085 ±0.006 <sup>b</sup>	nd	nd	0.003 ±0.001 <sup>a</sup>	1.42 ±0.11 <sup>b</sup>	nd	nd	0.009 ±0.001 <sup>a</sup>
RPC <sub>LUHS210</sub>	0.008 ±0.001 <sup>a</sup>	0.034 ±0.002 <sup>a</sup>	0.056 ±0.004 <sup>a</sup>	0.893 ±0.072 <sup>a</sup>	1.08 ±0.11 <sup>a</sup>	0.643 ±0.053 <sup>a</sup>	nd	0.066 ±0.003 <sup>a</sup>	nd	nd	0.003 ±0.001 <sup>a</sup>	1.12 ±0.08 <sup>a</sup>	nd	nd	0.010 ±0.001 <sup>a</sup>
APC	nd	nd	nd	1.96 ±0.11 <sup>b</sup>	29.4 ±2.3 <sup>b</sup>	0.061 ±0.004 <sup>b</sup>	nd	nd	nd	nd	0.008 ±0.001 <sup>a</sup>	2.51 ±0.19 <sup>b</sup>	nd	nd	nd
APC <sub>Cus</sub>	nd	nd	nd	2.05 ±0.16 <sup>b</sup>	31.6 ±2.7 <sup>b</sup>	0.068 ±0.003 <sup>b</sup>	nd	nd	nd	nd	0.007 ±0.001 <sup>a</sup>	2.57 ±0.21 <sup>b</sup>	nd	nd	nd
APC <sub>LUHS210</sub>	nd	nd	nd	1.57 ±0.12 <sup>a</sup>	21.8 ±1.9 <sup>a</sup>	0.050 ±0.002 <sup>a</sup>	nd	nd	nd	nd	0.006 ±0.001 <sup>a</sup>	1.91 ±0.17 <sup>a</sup>	nd	nd	nd
CPC	nd	nd	0.012 ±0.001 <sup>a</sup>	5.43 ±0.46 <sup>b</sup>	0.908 ±0.074 <sup>b</sup>	0.031 ±0.002 <sup>b</sup>	nd	0.023 ±0.001 <sup>b</sup>	nd	nd	0.019 ±0.002 <sup>a</sup>	0.290 ±0.03 <sup>b</sup>	nd	0.003 ±0.001 <sup>a</sup>	nd
CPC <sub>Cus</sub>	nd	nd	0.012 ±0.001 <sup>a</sup>	5.61 ±0.37 <sup>b</sup>	0.998 ±0.102 <sup>b</sup>	0.036 ±0.002 <sup>c</sup>	nd	0.026 ±0.003 <sup>b</sup>	nd	nd	0.020 ±0.002 <sup>a</sup>	0.288 ±0.013 <sup>b</sup>	nd	0.003 ±0.001 <sup>a</sup>	nd
CPC <sub>LUHS210</sub>	nd	nd	0.013 ±0.001 <sup>a</sup>	4.14 ±0.32 <sup>a</sup>	0.729 ±0.059 <sup>a</sup>	0.023 ±0.001 <sup>a</sup>	nd	0.017 ±0.002 <sup>a</sup>	nd	nd	0.016 ± 0.002 <sup>a</sup>	0.174 ±0.012 <sup>a</sup>	nd	0.003 ±0.001 <sup>a</sup>	nd
SPC	nd	nd	nd	3.22 ±0.24 <sup>b</sup>	13.3 ±1.1 <sup>b</sup>	0.415 ±0.034 <sup>a</sup>	nd	nd	nd	nd	0.002 ±0.001 <sup>a</sup>	8.52 ±0.71 <sup>b</sup>	nd	nd	nd
SPC <sub>Cus</sub>	nd	nd	nd	3.36 ±0.25 <sup>b</sup>	14.4 ±1.2 <sup>b</sup>	0.447 ±0.035 <sup>a</sup>	nd	nd	nd	nd	0.002 ±0.001 <sup>a</sup>	9.01 ±0.63 <sup>b</sup>	nd	nd	nd

**Table 3.** Micro- and macro-elements concentration in ultrasound treated and fermented with LUHS210 strain by-products (continued).

By-products	Non-essential micro-elements, $\mu\text{g/g d.m. (dry mass)}$														
	Ga	As	V	Rb	Sr	Mo	Ag	Cd	Sn	Sb	Cs	Ba	Hg	Tl	Pb
SPC <sub>LUHS210</sub>	nd	nd	nd	2.53 $\pm 0.19^a$	10.4 $\pm 0.9^a$	nd	nd	nd	nd	nd	nd	6.52 $\pm 0.48^a$	nd	nd	nd

Data are represented as means ( $n = 3$ )  $\pm$  SD. <sup>a-c</sup> Means with different letters in the same column for each by-product are significantly different ( $p < 0.05$ ). RPC - Rice press cake; SPC - Soy press cake; APC - Almond press cake; CPC - Coconut press cake; OPC - Oat press cake; US – treated with 37 kHz ultrasound; LUHS210 – fermented with LUHS210 strain for 24 h.