**Table S5:** Seasonal variation of the concentration of essential and toxic trace elements (mg/ kg DW macroalgae) in *L. hyperborea* collected during the years 2016 and 2017.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Trace metals** | **Year 2016** | | | |  | **Year 2017** | | | |
| **Winter** | **Spring** | **Summer** | **Autumn** |  | **Winter** | **Spring** | **Summer** | **Autumn** |
| **Essential elements** | | | | |  |  |  |  |  |
| Ca | 16157.31±230.72 A a | 16015.61±53.49A a | 11596.98±113.39 A c | 12565.27±120.93 B b |  | 14861.14±236.98 B a | 13081.56±153.33 B b | 11212.54±98.73 A c | 14304.60±113.64 A a |
| Co | 0.31±0.00 B a | 0.16±0.00 A c | 0.12±0.01 A d | 0.19±0.00 A b |  | 0.34±0.00 A a | 0.07±0.00 B d | 0.10±0.00 B c | 0.22±0.01 A b |
| Cr | 0.71±0.01 A a | 0.44±0.00 A b | 0.28±0.01 A d | 0.34±0.00 B c |  | 0.68±0.01 A a | 0.26±0.00 B c | 0.28±0.00 A c | 0.48±0.01 A b |
| Cu | 0.75±0.01 B a | 0.71±0.01 A b | 0.45±0.01 A c | 0.44±0.00 B c |  | 1.18±0.02 A a | 0.55±0.01 B b | 0.36±0.00 B d | 0.47±0.01 A c |
| Fe | 113.29±0.95 B b | 71.27±0.79 A c | 46.25±0.67 B d | 122.51±0.44 A a |  | 167.72±2.57 A a | 60.17±0.60 B c | 53.97±0.58 A c | 102.20±1.60 B b |
| I | 5970.45±151.97Aa | 3599.66±61.87 B c | 4423.82±45.59 A b | 3479.44±118.71 B c |  | 6163.65±137.20 A a | 4032.96±85.78 A b | 4358.96±144.29 A b | 6259.87±60.37 A a |
| Mg | 8836.68±125.98 Aa | 8607.97±25.92 A a | 6729.95±26.25 B c | 7173.58±73.45 A b |  | 8391.74±150.78 A a | 8092.77±45.04 B a | 7052.82±43.25 A b | 5774.40±59.86 B c |
| Mn | 3.10±0.03 B b | 4.07±0.03 A a | 2.09±0.03 A c | 1.77±0.02 B d |  | 3.50±0.03 A a | 3.01±0.02 B b | 1.97±0.02 A d | 2.76±0.04 A c |
| Mo | nd | nd | nd | 0.54±0.01 |  | 1.08±0.01 | 1.17±0.02 | nd | nd |
| Ni | 2.16±0.01 A a | 0.94±0.02 A b | 0.36±0.01 A d | 0.77±0.01 A c |  | 1.47±0.01 B a | 0.59±0.01 B b | 0.33±0.00 A c | 0.61±0.01 B b |
| P | 3684.97±29.31 A a | 3074.57±24.51 A b | 1545.84±10.80 B d | 2097.17±14.23 A c |  | 3012.55±14.62 B a | 2520.63±23.89 B b | 1602.12±5.28 A d | 1860.82±11.95 B c |
| Se | 0.46±0.03 A b | 0.66±0.02 A a | 0.20±0.02 A c | 0.40±0.03 A b |  | 0.500.03 A a | 0.44±0.05 B ab | 0.30±0.05 A b | 0.40±0.01 A ab |
| Zn | 78.47±0.62 A a | 55.04±0.83 A b | 30.36±0.08 B d | 39.681±0.39 A c |  | 64.49±0.666 B a | 45.78±0.46 B b | 32.901±0.35 A d | 39.73±0.43 A c |
| **Toxic metals** | | | | |  |  |  |  |  |
| As | 135.43±1.21 B b | 106.70±1.49 A c | 615.05±0.24 A a | 78.00±0.54 B d |  | 147.20±1.07 A a | 102.27±0.71 A b | 74.74±0.43 B d | 90.21±0.48 A c |
| Cd | 0.97±0.01 A b | 1.21±0.02 B a | 0.47±0.01 B d | 0.62±0.01 B c |  | 0.99±0.01 A b | 1.63±0.02 A a | 0.70±0.01 A c | 0.75±0.02 A c |
| Hg | 0.03±0.00 A a | 0.02±0.00 A b | 0.01±0.00 A b | 0.02±0.00 A b |  | 0.02±0.00 B a | 0.01±0.00 B c | 0.01±0.00 A bc | 0.02±0.00 A ab |
| Pb | 0.08±0.00 B a | 0.07±0.00 A b | 0.04±0.01 A c | 0.06±0.00 A b |  | 0.14±0.00 A a | 0.03±0.00 B c | 0.01±0.00 B d | 0.07±0.01 A b |

Results are expressed as average ± standard deviation of the mean. Abbreviations: nd (non-detected). Different letters indicate statistical differences (P < 0.05) in the proximate composition of each macroalgae between different seasons within the same year (lower case letters) or differences within the same season between the years 2016 and 2017 (upper case letters). Statistical analyses were not performed for Mo due to the large number of samples bellow the limit of detection of the method.