**Supplementary Material**

**Table S1|** Median, first quartile (25%) and third quartile (75%) of measured zooxanthellae cellular parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **HN/unfed** | **HN/fed** | **LN/unfed** | **LN/fed** |
| **Cell size (µm2)** | Median  25%  75% | 59.44  51.99  66.02 | 54.32  48.10  65.84 | 89.65  75.164  101.99 | 100.83  79.9  121.10 |
| **Chloroplasts (µm2)** | Median  25%  75% | 24.26  20.11  28.77 | 23.42  17.73  31.46 | 24.42  20.15  29.20 | 20.02  18.31  25.95 |
| **Lipid bodies (%)** | Median  25%  75% | 1.78  0.30  7.05 | 1.93  0.44  5.33 | 33.65  21.80  48.73 | 45.21  35.22  51.74 |
| **Pyrenoid starch sheath (µm2)** | Median  25%  75% | 1.72  1.03  2.18 | 1.66  1.08  2.34 | 1.56  0.90  2.77 | 1.91  0.62  2.90 |
| **Pyrenoid starch core (µm2)** | Median  25%  75% | 2.08  1.65  2.70 | 2.07  1.54  2.63 | 2.37  1.80  3.12 | 3.35  2.05  3.77 |
| **Accumulation body (µm2)** | Median  25%  75% | 6.92  3.40  11.46 | 6.80  3.76  10.56 | 7.50  3.47  11.60 | 6.62  3.08  11.79 |

**Table S2|** Mean and SD of measured polyp parameters.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **HN/unfed** | **HN/fed** | **LN/unfed** | **LN/fed** |
| Wet weight (g polyp-1) | 7.32 ± 1.40 | 8.81 ± 2.03 | 0.81 ± 0.24 | 1.83 ± 0.49 |
| Total protein (mg polyp-1) | 17.01 ± 5.78 | 19.07 ± 6.12 | 2.37 ± 1.31 | 9.07 ± 1.59 |
| Polyps feeding (% day-1) | - | 67.54 ± 10.83 | - | 98.30 ± 2.25 |
| Zooxanthellae density (cells mm-2) | 252.89 ± 20.71 | 261.58 ± 29.39 | 39.72 ± 8.36 | 34.46 ± 13.03 |
| Starch granules (% of cells containing >5) | 3.18 ± 2.75 | 8.34 ± 2.58 | 24.35 ± 7.19 | 28.42 ± 13.47 |
| AB integrity (% of AB containing >3 break) | 2.78 ± 4.81 | 2.73 ± 2.64 | 47.12 ± 8.55 | 47.26 ± 15.98 |

**Table S3|** Results of the two-way ANOVA with the two factors: dissolved inorganic nutrient (DIN) availability and heterotrophic feeding. Asterisk indicates use of the non-parametric Scheirer-Ray-Hare test.

|  |  |  |  |
| --- | --- | --- | --- |
| **Factor** | **df** | ***F* value** | ***p* value** |
| **Polyp weight** |  |  |  |
| DIN | 1 | 132.587 | **<0.001** |
| Heterotrophy | 1 | 4.599 | 0.05 |
| DIN x heterotrophy | 1 | 0.163 | 0.692 |
| Total | 17 |  |  |
| **Total protein** |  |  |  |
| DIN | 1 | 36.126 | **<0.001** |
| Heterotrophy | 1 | 4.57 | 0.051 |
| DIN x heterotrophy | 1 | 1.281 | 0.277 |
| Total | 17 |  |  |
| **Polyp volume** |  |  |  |
| DIN | 1 | 52.053 | **<0.001** |
| Heterotrophy | 1 | 124.409 | **<0.001** |
| DIN x heterotrophy | 1 | 79.937 | **<0.001** |
| Total | 55 |  |  |
| **Density** |  |  |  |
| DIN | 1 | 379.548 | **<0.001** |
| Heterotrophy | 1 | 0.023 | 0.883 |
| DIN x heterotrophy | 1 | 0.381 | 0.554 |
| Total | 11 |  |  |
| **Cell size** |  |  |  |
| DIN | 1 | 502.457 | **<0.001** |
| Heterotrophy | 1 | 2.480 | 0.116 |
| DIN x heterotrophy | 1 | 15.096 | **<0.001** |
| Total | 399 |  |  |
| **Chloroplasts** |  |  |  |
| DIN | 1 | 0.642 | 0.426 |
| Heterotrophy | 1 | 0.753 | 0.388 |
| DIN x heterotrophy | 1 | 0.774 | 0.382 |
| Total | 79 |  |  |
| **Lipid bodies** |  |  |  |
| DIN | 1 | 1084.119 | **<0.001** |
| Heterotrophy | 1 | 10.155 | **0.002** |
| DIN x heterotrophy | 1 | 8.153 | **0.005** |
| Total | 399 |  |  |
| **Starch granules** |  |  |  |
| DIN | 1 | 20.636 | **0.002** |
| Heterotrophy | 1 | 1.033 | 0.339 |
| DIN x heterotrophy | 1 | 0.014 | 0.908 |
| Total | 11 |  |  |
| **Factor** | **df** | ***F* value** | ***p* value** |
| **Pyrenoid starch** |  |  |  |
| DIN | 1 | 0.148 | 0.701 |
| Heterotrophy | 1 | 0.147 | 0.702 |
| DIN x heterotrophy | 1 | 0.384 | 0.537 |
| Total | 108 |  |  |
| **Pyrenoid core** |  |  |  |
| DIN | 1 | 11.618 | **<0.001** |
| Heterotrophy | 1 | 0.640 | 0.425 |
| DIN x heterotrophy | 1 | 1.354 | 0.247 |
| Total | 108 |  |  |
| **Accumulation body size**\* |  |  |  |
| DIN | 1 | 0.015 | 0.903 |
| Heterotrophy | 1 | 0.268 | 0.605 |
| DIN x heterotrophy | 1 | 0.001 | 0.970 |
| Total | 240 |  |  |
| **Accumulation body integrity** |  |  |  |
| DIN | 1 | 121.945 | **<0.001** |
| Heterotrophy | 1 | 0.883 | 0.375 |
| DIN x heterotrophy | 1 | 2.831 | 0.131 |
| Total | 11 |  |  |

**Table S4|** Results of Tukey’s post hoc test of pairwise comparison for all measured parameters. No post hoc examination could be conducted following the use of non-parametric analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **DIN within unfed** | **DIN within fed** | **Feeding within HN** | **Feeding within LN** |
| **Wet weight (g polyp-1)** | Diff of means  q  P | 6.508  11.111  **<0.001** | 6.981  11.918  **<0.001** | 1.492  2.548  0.093 | 1.019  1.741  0.239 |
| **Total protein (mg polyp-1)** | Diff of means  q  P | 14.644  7.142  **<0.001** | 10.003  4.879  **0.004** | 2.063  1.006  0.489 | 6.704  3.270  **0.037** |
| **Polyp volume (ml polyp-1)** | Diff of means  q  P | 0.958  15.669  **<0.001** | 0.102  1.783  0.213 | 0.131  2.041  0.155 | 1.191  22.130  **<0.001** |
| **Zooxanthellae density (cells mm-2)** | Diff of means  q  P | 213.169  13.339  **<0.001** | 227.126  14.213  **<0.001** | 8.693  0.544  0.601 | 5.265  0.329  0.750 |
| **Cell size (µm2)** | Diff of means  q  P | 0.180  18.530  **<0.001** | 0.256  26.301  **<0.001** | 0.0225  2.311  0.102 | 0.0532  5.460  **<0.001** |
| **Chloroplasts (µm2)** | Diff of means  q  P | 0.113  0.0786  0.956 | 2.424  1.681  0.238 | 0.0170  0.0118  0.993 | 2.521  1.748  0.220 |
| **Lipid bodies (%)** | Diff of means  q  P | 4.079  30.071  **<0.001** | 4.854  35.781  **<0.001** | 0.0449  0.331  0.815 | 0.82  6.042  **<0.001** |
| **Starch granules (% of cells with >5)** | Diff of means  q  P | 21.170  4.662  **0.011** | 20.084  4.423  **0.014** | 5.159  1.136  0.445 | 4.072  0.897  0.544 |
| **Pyrenoid starch sheath (µm2)** | Diff of means  q  P | 0.0182  0.247  0.862 | 0.0779  0.958  0.500 | 0.0183  0.275  0.846 | 0.0778  0.892  0.530 |
| **Pyrenoid core (µm2)** | Diff of means  q  P | 0.431  2.367  0.097 | 0.879  4.358  **0.003** | 0.0699  0.424  0.765 | 0.377  1.745  0.220 |
| **Accumulation body size (µm2)** | Diff of means  q  P | - | - | - | - |
| **Accumulation body integrity (% of AB with >3 break)** | Diff of means  q  P | 60.929  12.726  **<0.001** | 44.816  9.360  **<0.001** | 3.558  0.743  0.614 | 12.555  2.622  0.101 |

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**Figure S1|** A) zooxanthellae of the LN/fed treatment containing a high number of starch granules. B) zooxanthellae of the LN/fed treatment containing a very large amount of lipid bodies. C) zooxanthellae of the LN/unfed treatment containing a very large amount of lipid bodies. D) pyrenoid in a zooxanthellae of the HN treatment. E) pyrenoid in a zooxanthellae of the LN treatment. F) accumulation body in a zooxanthellae of the HN treatment. G) accumulation body in a zooxanthellae of the LN treatment.