

Table S6. Gene expression profiles of *NyHSP70-1* and *NyHSP70-2* in three generations of *Neopyropia yezoensis* under heat stress normalized using *eIF4A* as the reference gene

| Gene | Generation | Temperature | Duration (h) | | | | | | | |
|------------------|------------|-------------|---------------------|---------------------------|---------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | | | 0 | 0.5 | 1 | 2 | 4 | 6 | 8 | 12 |
| <i>NyHSP70-1</i> | G | 5°C | 1 ± 0 ^a | 0.66 ± 0.08 ^a | 0.59 ± 0.38 ^a | 0.63 ± 0.44 ^a | 0.72 ± 0.33 ^a | 0.62 ± 0.19 ^a | 0.75 ± 0.35 ^a | 0.65 ± 0.52 ^a |
| | | 15°C | 1 ± 0 ^a | 0.61 ± 0.2 ^a | 0.95 ± 0.57 ^a | 0.55 ± 0.15 ^a | 0.61 ± 0.16 ^a | 0.68 ± 0.25 ^a | 0.93 ± 0.41 ^a | 0.86 ± 0.57 ^a |
| | | 25°C | 1 ± 0 ^a | 3.71 ± 1.55 ^{bc} | 4.22 ± 0.79 ^c | 13.45 ± 1.99 ^c | 6.35 ± 0.93 ^d | 2.89 ± 1.38 ^b | 2.59 ± 0.52 ^b | 2.73 ± 0.61 ^b |
| | S | 5°C | 1 ± 0 ^{ab} | 0.73 ± 0.11 ^{ab} | 0.82 ± 0.2 ^{ab} | 0.66 ± 0.29 ^{ab} | 0.49 ± 0.17 ^a | 0.6 ± 0.32 ^{ab} | 0.34 ± 0.12 ^a | 0.5 ± 0.25 ^a |
| | | 15°C | 1 ± 0 ^{ab} | 0.69 ± 0.28 ^{ab} | 0.64 ± 0.28 ^{ab} | 0.73 ± 0.15 ^{ab} | 0.7 ± 0.24 ^{ab} | 0.64 ± 0.2 ^{ab} | 0.65 ± 0.21 ^{ab} | 1.06 ± 0.34 ^{ab} |
| | | 25°C | 1 ± 0 ^{ab} | 2.08 ± 0.28 ^{bc} | 4.71 ± 0.33 ^d | 6.27 ± 1.26 ^c | 2.39 ± 0.31 ^c | 2.3 ± 0.31 ^c | 1.52 ± 0.4 ^b | 1.03 ± 0.34 ^{ab} |
| | CS | 5°C | 1 ± 0 ^b | 0.85 ± 0.12 ^{ab} | 1.12 ± 0.13 ^b | 0.67 ± 0.11 ^{ab} | 0.7 ± 0.35 ^{ab} | 0.48 ± 0.18 ^a | 0.55 ± 0.36 ^{ab} | 0.35 ± 0.27 ^a |
| | | 15°C | 1 ± 0 ^b | 1.07 ± 0.16 ^b | 0.95 ± 0.11 ^b | 1.14 ± 0.2 ^b | 1.15 ± 0.1 ^b | 1.16 ± 0.07 ^b | 1.15 ± 0.15 ^b | 1.12 ± 0.1 ^b |
| | | 25°C | 1 ± 0 ^b | 3.67 ± 0.35 ^d | 6.8 ± 0.56 ^c | 3.62 ± 0.44 ^d | 3.34 ± 0.2 ^d | 3.29 ± 0.16 ^d | 1.99 ± 0.08 ^c | 1.79 ± 0.24 ^{bc} |
| <i>NyHSP70-2</i> | G | 5°C | 1 ± 0 ^a | 0.45 ± 0.08 ^a | 0.44 ± 0.09 ^a | 0.45 ± 0.23 ^a | 0.16 ± 0.07 ^a | 0.35 ± 0.44 ^a | 0.4 ± 0.49 ^a | 0.34 ± 0.24 ^a |
| | | 15°C | 1 ± 0 ^a | 1.73 ± 1.36 ^a | 1.36 ± 0.68 ^a | 1.3 ± 0.91 ^a | 1.37 ± 0.89 ^a | 1.33 ± 0.87 ^a | 1.34 ± 0.93 ^a | 1 ± 0.34 ^a |
| | | 25°C | 1 ± 0 ^a | 13.9 ± 1.85 ^c | 50.2 ± 4.32 ^{ef} | 126.33 ± 12.02 ^g | 44.73 ± 4.05 ^c | 21.79 ± 2.9 ^d | 53.24 ± 4.7 ^f | 5.52 ± 2.43 ^b |
| | S | 5°C | 1 ± 0 ^{ab} | 0.92 ± 0.14 ^{ab} | 1.14 ± 0.24 ^b | 0.82 ± 0.31 ^{ab} | 0.7 ± 0.32 ^a | 0.54 ± 0.38 ^a | 0.59 ± 0.36 ^a | 0.67 ± 0.35 ^a |
| | | 15°C | 1 ± 0 ^{ab} | 1.23 ± 0.18 ^b | 1.27 ± 0.19 ^b | 1.16 ± 0.12 ^b | 1.34 ± 0.32 ^b | 1.28 ± 0.34 ^b | 1.02 ± 0.06 ^{ab} | 0.63 ± 0.25 ^a |
| | | 25°C | 1 ± 0 ^{ab} | 7.27 ± 0.67 ^c | 21.91 ± 1.67 ^c | 28.51 ± 2.04 ^f | 10.12 ± 0.79 ^d | 11.52 ± 0.88 ^d | 18.39 ± 1.83 ^c | 1.88 ± 0.5 ^b |
| | CS | 5°C | 1 ± 0 ^b | 0.84 ± 0.12 ^b | 0.6 ± 0.14 ^{ab} | 0.51 ± 0.46 ^{ab} | 0.14 ± 0.09 ^a | 0.44 ± 0.38 ^{ab} | 0.17 ± 0.08 ^a | 0.32 ± 0.23 ^a |
| | | 15°C | 1 ± 0 ^b | 0.36 ± 0.09 ^a | 0.4 ± 0.16 ^a | 0.27 ± 0.13 ^a | 0.42 ± 0.18 ^{ab} | 0.39 ± 0.15 ^a | 0.34 ± 0.26 ^a | 0.58 ± 0.16 ^{ab} |
| | | 25°C | 1 ± 0 ^b | 3.96 ± 0.35 ^c | 14.58 ± 1.15 ^c | 7.66 ± 0.51 ^d | 3.6 ± 0.41 ^c | 1.8 ± 0.28 ^b | 8.8 ± 0.74 ^d | 1.49 ± 0.43 ^b |

Mean values ± SD were calculated from triplicate experiments, and letters denote statistically significant differences ($p < 0.05$) determined by two-way ANOVA. G, gametophyte; S, sporophyte; CS, conchosporophyte.