Supplementary Material

# Supplementary Figures and Tables

## Supplementary Figures



**Figure S1** Gametophyte survival of *Laminaria digitata* along a temperature gradient in experiment 1. Survival of *L. digitata* gametophytes from **(A)** Tromsø (n=5; day 28, n=4), **(B)** Bodø (n=5), **(C)** Helgoland (n=4), **(D)** Roscoff (n=5; day 21-28, n=3) and **(E)** Quiberon (n=5; day 21-28, n=4) between 15-25°C over time. Day 0-14 represent the priming period and day 14-28 the recovery period at 15°C. Numbers state percentage survival of the 24°C treatment on day 14 and 28. Values are expressed as the mean ± SD.

## Supplementary Tables

**Table S1** Replicate (R) composition of *Laminaria digitata* gametophyte genetic lineages used in experiment 1. Each replicate consists of randomly selected progeny from three parental sporophytes. The numbers correspond to individual sporophyte parents (in total 30-35 sporophytes were sampled), from which gametophyte progeny were derived. Thus, each replicate consisted of three different genetic lineages with overall 15 different genetic lineages per location. These genetic lineages formed the basis for isolation of clonal cultures for experiment 2 (see Table S3). For information on Helgoland material see Liesner et al. (2020a).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Population |  | |  | |  | |
| Replicate | Tromsø | | Bodø | | Roscoff | | Quiberon |
| R1 | TRM-13  TRM-23  TRM-25 | | BOD-8  BOD-14  BOD-28 | | ROS-3  ROS-30  ROS-27 | | QUI-9  QUI-15  QUI-25 |
| R2 | TRM-2  TRM-18  TRM-27 | | BOD-11  BOD-21  BOD-23 | | ROS-14  ROS-21  ROS-24 | | QUI-2  QUI-13  QUI-14 |
| R3 | TRM-28  TRM-29  TRM-30 | | BOD-9  BOD-1  BOD-13 | | ROS-26  ROS-20  ROS-8 | | QUI-5  QUI-6  QUI-12 |
| R4 | TRM-9  TRM-10  TRM-21 | | BOD-2  BOD-22  BOD-26 | | ROS-18  ROS-19  ROS-23 | | QUI-3  QUI-7  QUI-8 |
| R5 | TRM-4  TRM-5  TRM-7 | | BOD-15  BOD-27  BOD-17 | | ROS-6  ROS-17  - | | QUI-1  QUI-4  QUI-27 |

**Table S2** Replicate (R) composition of male and female clonal gametophyte isolates of *Laminaria digitata* used in experiment 2. Cultures are kept under these stock culture numbers at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany. Numbers in brackets of the Tromsø and Quiberon population refer to the genetic lineages indicated in Table S1. Numbers in brackets of the Spitsbergen material also indicate different sporophyte parents (P) but had been sampled earlier (in 2015) than the Tromsø and Quiberon material (in 2018).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Population |  |  |
| Sex | Spitsbergen  R1-R5 | Tromsø  R1-R5 | Quiberon  R1-R5 |
| ♂ | 3463 (P1)  3473 (P21)  3469 (P18)  3467 (P9)  3465 (P2) | 3562 (TRM-28)  3558 (TRM-26)  3566 (TRM-30)  3560 (TRM-27)  3554 (TRM-21) | 3532 (QUI-2)  3538 (QUI-18)  3540 (QUI-21)  3534 (QUI-14)  3530 (QUI-1) |
| ♀ | 3464 (P1)  3474 (P21)  3470 (P18)  3468 (P9)  3466 (P2) | 3563 (TRM-28)  3559 (TRM-26)  3567 (TRM-30)  3561 (TRM-27)  3555 (TRM-21) | 3533 (QUI-2)  3539 (QUI-18)  3541 (QUI-21)  3535 (QUI-14)  3531 (QUI-1) |

**Table S3** Initial gametophyte density of *Laminaria digitata* populations on day 0 during experiment 1 and 2 (mean ± SD).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Population |  |  |  |  |  |
|  | Spitsbergen  (n=5) | Tromsø  (n=5) | Bodø  (n=5) | Helgoland  (n=4) | Roscoff  (n=5) | Quiberon  (n=5) |
| Experiment 1 | nd | 620 ± 106 | 694 ± 200 | 4239 ± 1682 | 697 ± 153 | 647 ± 79 |
| Experiment 2 | 463 ± 54.8 | 509 ± 75.1 | nd | nd | nd | 572 ± 44.7 |
| NB: Gametophytes from Helgoland were mostly unicellular, while vegetative gametophytes from Tromsø, Bodø, Roscoff and Quiberon consisted of six to eight cells per gametophyte, so the absolute number of gametophyte cells was similar. Nd - no data. | | | | | | |