

The effects of temperature, irradiance, natural sunlight shock and nutrient conditions on the growth, acclimation and gestation of juvenile sporophytes in *Saccharina latissima*.



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Abstract

Transplanting juvenile sporophytes from the laboratory onto lines and planting them into the open ocean can cause several sudden environmental changes, such as a direct exposure to sunlight during transport of the lines in boats or planting the lines later in the season when ocean temperatures are lower. Four experiments were conducted to investigate the effects of sudden changes in irradiance, temperature and nutrient concentrations on the growth and gestation of *Saccharina latissima*. For irradiance, one experiment examined the effects of a 1 hour shock exposure to different irradiance levels in different culture dilutions on sporophyte growth and another investigated direct sunlight exposure effects on sporophyte mortality rate. For temperature, the effects of a sudden exposure and an acclimation strategy to new growth temperatures after induction on long term growth was tested. Additionally an experiment was performed to assess the influence of current laboratory practices in terms of irradiance levels and medium refreshment timetables on the induction of new sporophytes. Results indicate that while sporophytes can cope with shock upwards to $280 \mu\text{mol photons m}^{-2} \text{s}^{-1}$ in regular densities with no reduction in growth, lower densities do show a reduction, indicative of a self-shading progress. Direct exposure to sunlight increased mortality rate exponentially within minutes, thus extreme caution should be applied in exposing the lines to the sun during planting season. No significant differences in growth rate were found for temperatures in the 4-16°C range, but lower temperatures do encourage mostly elongated growth, decreasing total biomass. The acclimation strategy seems to increase growth slightly yet also increases irregularities in morphology; an experiment with gradual acclimation is advised. Increasing irradiance levels did not significantly negatively affect sporophyte gestation compared to regular light levels. Bi-daily refreshing of the entire medium increased the total amount of sporophyte gestation as well as inhibited female gametophyte branching compared to the subjects that were only given a new medium at the start of the induction.

Notification

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