Downloaded from orbit.dtu.dk on: Apr 23, 2024

DTU Library

New hatchery methods for cultivation of the Atlantic rhodophyte Palmaria palmata - lessons learned from 4 years

Schmedes, P. S.; Nielsen, M. M.; Reitan, K. I.; Andersen, K. L.; Petersen, J. K.

Publication date:
2021

Document Version
Peer reviewed version

Link back to DTU Orbit

Citation (APA):
Schmedes, P. S., Nielsen, M. M., Reitan, K. I., Andersen, K. L., & Petersen, J. K. (2021). *New hatchery methods for cultivation of the Atlantic rhodophyte Palmaria palmata - lessons learned from 4 years*. Abstract from 7th Conference of the International Society for Applied Phycology
, Tsukuba, Ibaraki, Japan.

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

New hatchery methods for cultivation of the Atlantic rhodophyte *Palmaria palmata* - lessons learned from 4 years

P. S. Schmedes[1], M. M. Nielsen[1], K. I. Reitan[2], K. L. Andersen [1], J. K. Petersen[1],
1 Danish Shellfish Centre, National Institute of Aquatic Resources, Technical University of Denmark, Nykøbing Mors, Denmark
2 Norwegian University of Science and Technology, Department of Biology, 7491 Trondheim, Norway
peson@aqua.dtu.dk

Keywords : Dulse; spore seeding; spore use efficiency; propagules; re-attachment

In Western countries, human consumption of the red seaweed dulse (*Palmaria palmata*) as a snack and dried seaweed has a long tradition [1]. Today, in Europe, the interest of land-based and sea-based cultivation of dulse is increasing due to its health-related properties, high commercial value and push towards sustainable food production. Despite two decades of research, the hatchery method is still inadequate for large-scale cultivation [1,2]. Finalizing a 4-year PhD project in collaboration with Danish and Norwegian research institutes, we present innovative findings regarding most cultivation steps including i) induction of spore-containing tissue sori (tetrasporogenesis), ii) spore-use efficiency, iii) spore and seedling growth, and iiii) different long-line cultivation configurations to optimize harvest yield in Danish waters.

In the project, we found a relative higher content of some polyamines in ripe fertile plants compared to non-fertile plants, indicating the involvement of biogenetic amines in sporogenesis of the species. In attempt to improve the spore dispersal and seeding quality, we investigated different ways to optimize the use of sori while targeting sufficient seeding density. As a new seeding method for *P. palmata*, we set up vertical seeding tanks and applied hemispherical water agitation and flow-through conditions testing different amounts of sori. The result demonstrated a sufficient seedling density on net substrates (9 seedlings cm^{-1}) after 32 days nursery, even by the use of the lowest amount of sori, (5 g FW sori to seed 126 m substrate). The result showed improved spore use efficiency, i.e., a lower requirement of sori per seeded substrate, compared to conventionally applied hatchery protocols. Furthermore, the spore use efficiency improved by applying a secondary propagule seeding method using unattached spores after a pre-treatment. First, the unattached spores germinated into female and male gametophytes, then activated and dislodged by maceration before dispersed in the inoculation tank by use of high agitation. Both female and male gametophytes showed the ability of re-attachment to rope pieces up to 39 days after spore release. Using an extended nursery phase, the spore-seeded nets contained larger seedlings at deployment, which showed to benefit harvest yield and quality when cultivating dulse in eutrophied waters. For the first time in decades, P. palmata hatchery and cultivation methods was optimized for large-scale cultivation. Overall, the present project provides several new ways to optimize an efficient large-scale cultivation of dulse in European waters.

[1] Mouritsen OG, Dawczynski C, Duelund L, Jahreis G, Vetter W, Schr€oder M (2013) On the human consumption of the red seaweed dulse (Palmaria palmata (L.) Weber & Mohr. Journal of Applied Phycology 25: 1777–1791.

[2] Werner, A. and Dring, M., 2011. Aquaculture explained: Cultivating Palmaria palmata. Irish Sea Fisheries Board, Report no.27 - Project PBA/SW/07/001.

[3] Corey P, Kim JK, Duston J, Garbary DJ (2014) Growth and nutrient uptake by Palmaria palmata (Palmariales, Rhodo- phyta) integrated with Atlantic halibut recirculating aquaculture. Algae 29:35–45.