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journal or publication title	Journal of Integrated Field Science
volume	16
page range	12-12
year	2019-03
URL	http://hdl.handle.net/10097/00125660



Symposium mini review

Possible Use of Blue Light in *Undaria Pinnatifida* Aquaculture

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Keywords

blue LED light, growth, kelp, *Undaria*, *Eisenia*, isopod, *Cymodoce japonica*

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Abstract

Latest studies have shown that blue light promotes the growth of both gametophytes and sporophytes of laminarian kelps (Xu *et al.*, 2005; Wang *et al.*, 2010; Murase *et al.*, 2014). On the contrary, insects and some other invertebrate animals are negatively affected by the blue light emission (Hori *et al.*, 2014; Xiaolong *et al.*, 2015). Therefore, we aimed to promote the growth of cultured *Undaria pinnatifida* and also to deter the herbivorous grazing isopod *Cymodoce japonica* by the emission of blue light. *Cymodoce japonica* grazes on the young sporophytes of cultured *U. pinnatifida* and often causes great loss of its production (Yamaguchi and Nishioka, 1998; Kiriyama, 2007). Water-proof blue LED light capable of emitting in every night time for more than two months was developed and employed underwater for the growth experiment of *U. pinnatifida* in the field from January to April 2018. In the laboratory, alternative selection experiments from four conditions: red, green and blue LED lights and dark were conducted in a container for 30 individuals of *C. japonica*. The nocturnal blue light emission in the field promoted the growth of *U. pinnatifida*. In the laboratory choice experiments, *Cymodoce japonica* apparently avoided blue light. Therefore, the blue light emission to young sporophytes will largely contribute to the rise of *U. pinnatifida* production through the promotion of growth and the exclusion of grazers.

Acknowledgments

This study was supported by the Tohoku Ecosystem-Associated Marine Sciences (TEAMS) Fund of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.

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