

Effects of experimental reduction of light and nutrient enrichments (N and P) on seagrasses: a review

VANINA LEONI, ALEXANDRE VELA, VANINA PASQUALINI*, CHRISTINE PERGENT-MARTINI and GÉRARD PERGENT

University of Corsica, Faculty of Sciences, Equipe 'Ecosystèmes Littoraux', Corte, France

ABSTRACT

1. Excessive nutrient discharge, linked to human activities, is one of the main causes of the decline of seagrass meadows since it modifies two essential parameters controlling their primary production: the nutrient concentrations (especially nitrogen and phosphorus) and the irradiance.

2. To investigate the behaviour of seagrass under varied conditions of light and/or nutrient concentrations, it is necessary to experimentally manipulate nutrient enrichment and light, either *in situ* or in artificial ecosystems. The available experimental information concerning the influences of light reduction and nutrient enrichments (N and P) on seagrass meadows are summarized.

3. The protocols for experimentally reducing light vary considerably but all light reduction experiments show a decrease in seagrass vitality and physiological changes (e.g. promotes an increase in chlorophyll and tissue nitrogen), depending on the species-specific tolerance (light optima).

4. A wide range of protocols for experimentally increasing nutrient levels have been applied, including varying the nutrient species quantities and ratios, as well as the sources and frequency of additions. Responses to N and/or P enrichment range from stimulation to direct or indirect inhibition, varying depending upon the species, the protocol implemented, the nutrient source (water column versus sediments), and other environmental conditions (e.g. interactions with factors such as temperature, grazing and light).

5. Both light reduction and nutrient enrichment, can cause seagrass decline, through similar internal mechanisms, promoting an imbalance of internal nutrient supply ratios. Similar physiological responses can thus be observed (e.g. increase of N, P and chlorophyll contents of leaves).

6. This study shows the close link between the physiology and morphology of seagrasses, with regard to environmental modifications. It also highlights their ability to provide information on environmental conditions by means of their responses.

Copyright © 2007 John Wiley & Sons, Ltd.

Received 28 November 2005; Revised 14 November 2006; Accepted 28 December 2006

KEY WORDS: enrichment; experimentation; light; nutrient enrichments; seagrass; shading

*Correspondence to: V. Pasqualini, University of Corsica, Faculty of Sciences, Equipe 'Ecosystèmes Littoraux', BP 52, 20250 Corte, France. E-mail: pasquali@univ-corse.fr