Growth response of the seagrass *Cymodocea nodosa* to *in situ* real burial and erosion

Observatorio Ambiental Granadilla

SIMPOSIO INTERNACIONAL DE CIENCIAS DEL MAR

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Figure 1. R/V Avatar

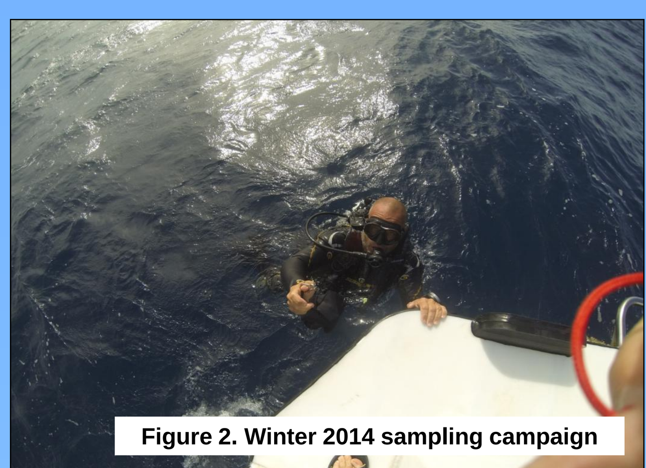
Figure 2. Winter 2014 sampling campaign

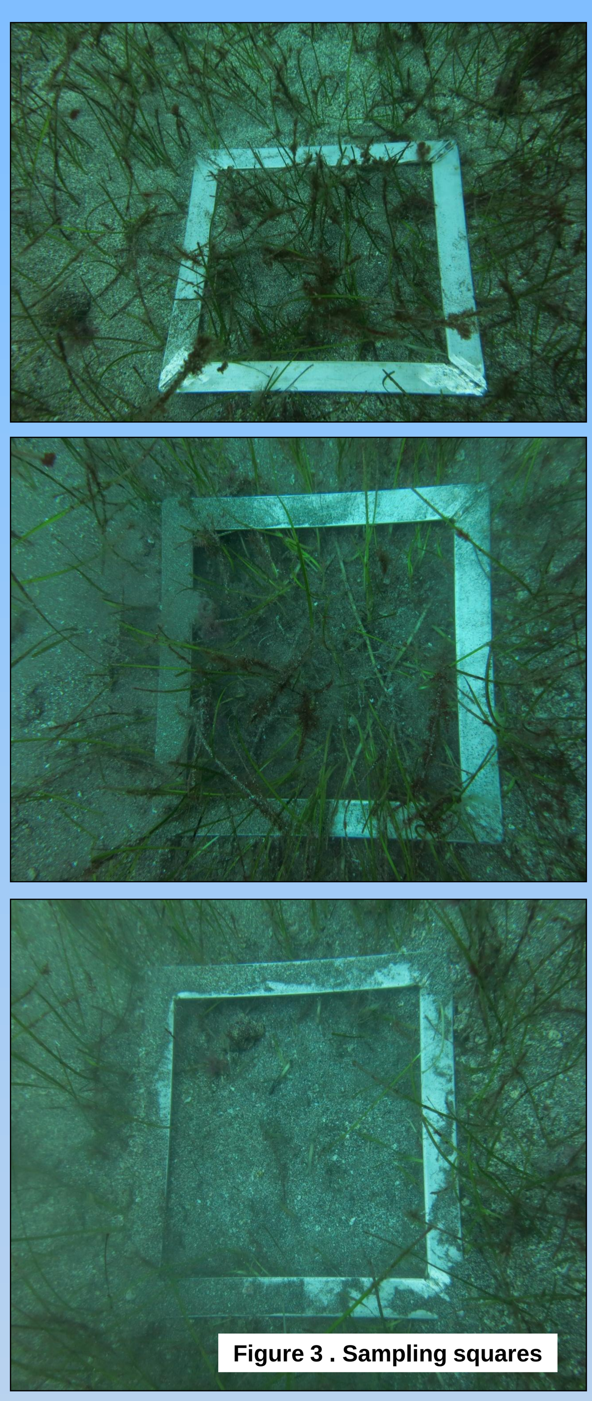
Figure 3 . Sampling squares

ABSTRACT

The construction of a large port infrastructure such as the Port of Granadilla (Tenerife Island) carries an environmental monitoring. The growth and response to the new environmental conditions of the seagrass is part of this environmental monitoring.

Environmental impact studies, especially the environmental monitoring plans of large infrastructures, are poorly studied in the Canary Islands, so we contributed to them.

The response of *Cymodocea nodosa* (Ucria) Ascherson, 1870, seedlings to *in situ* burial and erosion was examined to test the extent coupling between sediment depth and composition fluctuations and seagrass growth, due to the construction of a large port infrastructure.

Key words: *Cymodocea nodosa, seagrass growth, sand burial, sand erosion, Canary Islands.*

INTRODUCTION

Seagrass meadows of *Cymodocea nodosa* (Ucria) Ascherson occur throughout the Mediterranean and northern coast of Africa. It is the most abundance marine phanerogam in the Canary Archipelago (Afonso Carrillo & Gil Rodríguez, 1980, Reyes 1993, Reyes *et al*. 1995, Barberá *et al*. 2005), occupying sedimentary bottoms between 2 and 30 m depth, mainly to the south and southeast of the islands (Tuya, 2006).

The Port implemented an Environmental Vigilance Plan for controlling and monitoring a range of activities with a potentially negative environmental impact. As part of the EVP, the cite "Sebadales del Sur de Tenerife" ES7020116 and support areas, must be controlling and monitoring.

We report here the response of seagrass *Cymodocea nodosa* to fluctuations in sediment depth based on real situation.

MATERIAL & METHODS

The experimental design included 9 burial, erosion and seagrass control stations. Stations TGr22 and TGr04 work as control. During each sampling campaign (two per year since 2011; winter and summer), three samples were randomly collected from Cymodocea meadow, using a metal square, plastic bags and Scuba gear. With these measurements it was possible to estimate four meadow descriptors: shoot density, dry weight biomass, leaf length and leaf area.

RESULTS

The survivorship declined with erosion and with increasing burial depth, relative to the controls (stations distantly of port), but only between specifically ranges. In fact, under certain conditions the opposite occurs, increasing the growth and vitality of the seagrass. Seagrass growth response described by changes in leaf sheath length, the rate of appearance of new leaves, and others environmental monitoring data response to fluctuations in environmental factors.

The results show that *C. Nodosa* tolerates large burials and that burial stimulates the growth of surviving seedlings. Probably, the increased leaf sheath length is a response to this burial. Survival was significantly reduced when shoots were exposed to erosion (station TGr08, before port infrastructure). In general, there were no changes about the survival when the sediment level was not altered (stations TGR22 and TGr04). Nevertheless, all meadow descriptors increased significantly as burial depth increased between 5 to 10 cm. The surviving shoots decreased 100 % with burial >15 cm. The descriptors increased in response to burial <10 cm allowed them to relocate their apical meristems to the sediment surface and increased their photosynthetic area. This response and survivorship was lower in winter. During winter 2014, an important thickness growth was observed in roots. It will be analyzed after summer sampling campaign.

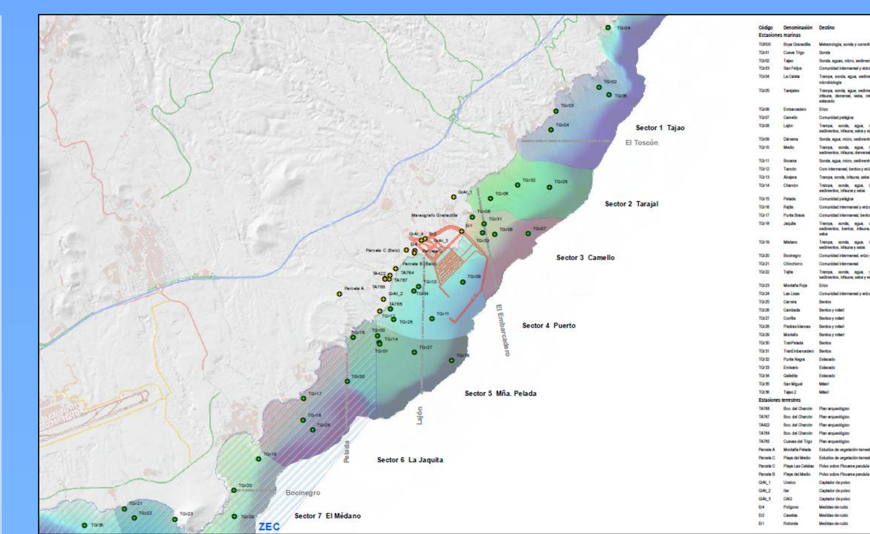
Figure 4. Study area


Figure 5. Decimetric poles


Figure 6. Scuba diver sampling sediment tramps

Figure 7 . Shoots density, leaf length, biomass and leaf area graphics at most representative stations.

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