Interactive effects of current velocity and light on the growth and morphology of the seagrass *Zostera noltii?*

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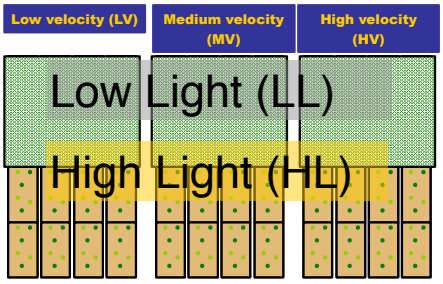
1. INTRODUCTION & OBJECTIVES

Seagrasses encounter multiples stresses due to environmental heterogeneity, which may be partly overcome through the ability of being phenotypically plastic. As hydrodynamic energy often enhances turbidity, seagrasses may be expected to frequently experience a combination of light and mechanical stress. We investigated:

1. Have the hydrodynamics and light reduction an interactive effect on morphometric and dynamic traits of seagrass *Z. noltii*?
2. What are the predominant response in the acclimatation when both stresses co-occur?

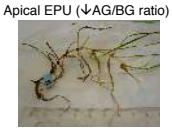
2. EXPERIMENT DESIGN

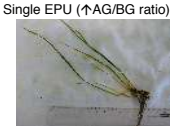
Bifactorial mesocosms experiment: velocity & light



Two types of *experimental plants units (EPU):*

- Apical EPU (↓AG/BG ratio)
- Single EPU (↑AG/BG ratio)





Light treatments:
LL: 2.5±0.6 mol $m^{-2}d^{-1}$ (40 µmol $m^{-2}s^{-1}$ at 18:6 L:D)
HL: 15.6±2.5 mol $m^{-2}d^{-1}$ (240 µmol $m^{-2}s^{-1}$ at 18:6 L:D)

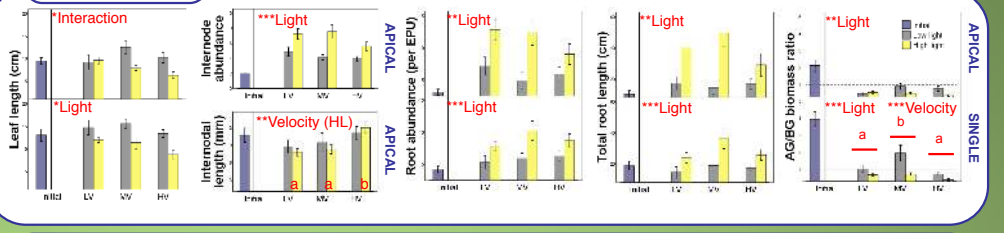
Current velocities treatments:
LV: 1 cm/s
MV: 10 cm/s
HV: 35 cm/s

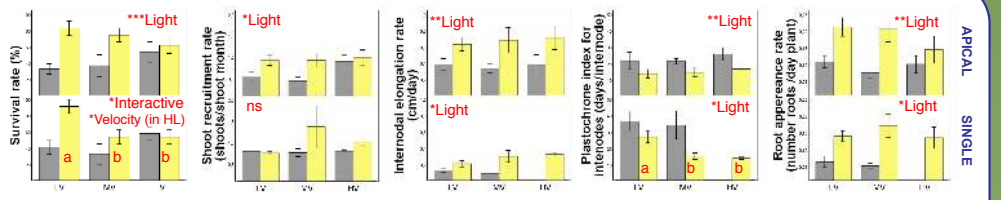
Others variables: fixed
Temperature: 19.5 ºC
Natural filtered seawater
46 days



View of the flume tanks

3. RESULTS





Two-way ANOVA results: interactive/light/velocity significant effect: *** p < 0.001; ** p < 0.01; * p < 0.05

VELOCITY EFFECTS

Effects on non-light limited plants:
- **In apical EPUs**: shorter leaves, longer internodes and shorter roots, at high velocity.
- **In single EPUs**: high proportion of BG biomass at high and low velocities, i.e., AG/BG < 1. Higher plastochrone index for internodes at low velocity.

LIGHT EFFECTS

- Light reduction effects on morphology followed the same pattern for apical and single plants: longer leaves, shorter internodes and a poorer root development. Thereafter, higher AG/BG ratio in plants under LL.
- Higher internodal elongation rates, root appereance rates and shoot recruitment rates at HL.
- Plastochrone index for internodes decreased at HL.

INTERACTIVE EFFECTS

There were not relevant interactive light-velocity effects on morphology or dynamic properties, except for survival rate: single EPUs presented lower suvival rate at low light except when hydrodynamic energy increased (MV and HV).

4. DISCUSSION

-Under concurrently stresses due to light and hydrodynamic, the seagrass *Z. noltii* responds firstly to constraining light, and only in non-limited light conditions, plants showed plasticity to hydrodynamics. Thereafter, no interactive effects of both stresses were demonstrated.
-The plasticity of seagrass modules with light reduction was consistent with previous studies (longer leaves and lower BG biomass). Additionally, the direct effect of current velocity at high light was the same as previously reported (Peralta *et al* 2006).

5. CONCLUSIONS

Light reduction is the mayor factor determining *Z. noltii* plasticity. Additionaly, this study rejects the hypothesis of a strong interactive effect of mechanical stress and light reduction on *Z. noltii* morphology and growth.