



# Settlement success of *Favia fragum* planulae exposed to different sediment types and doses

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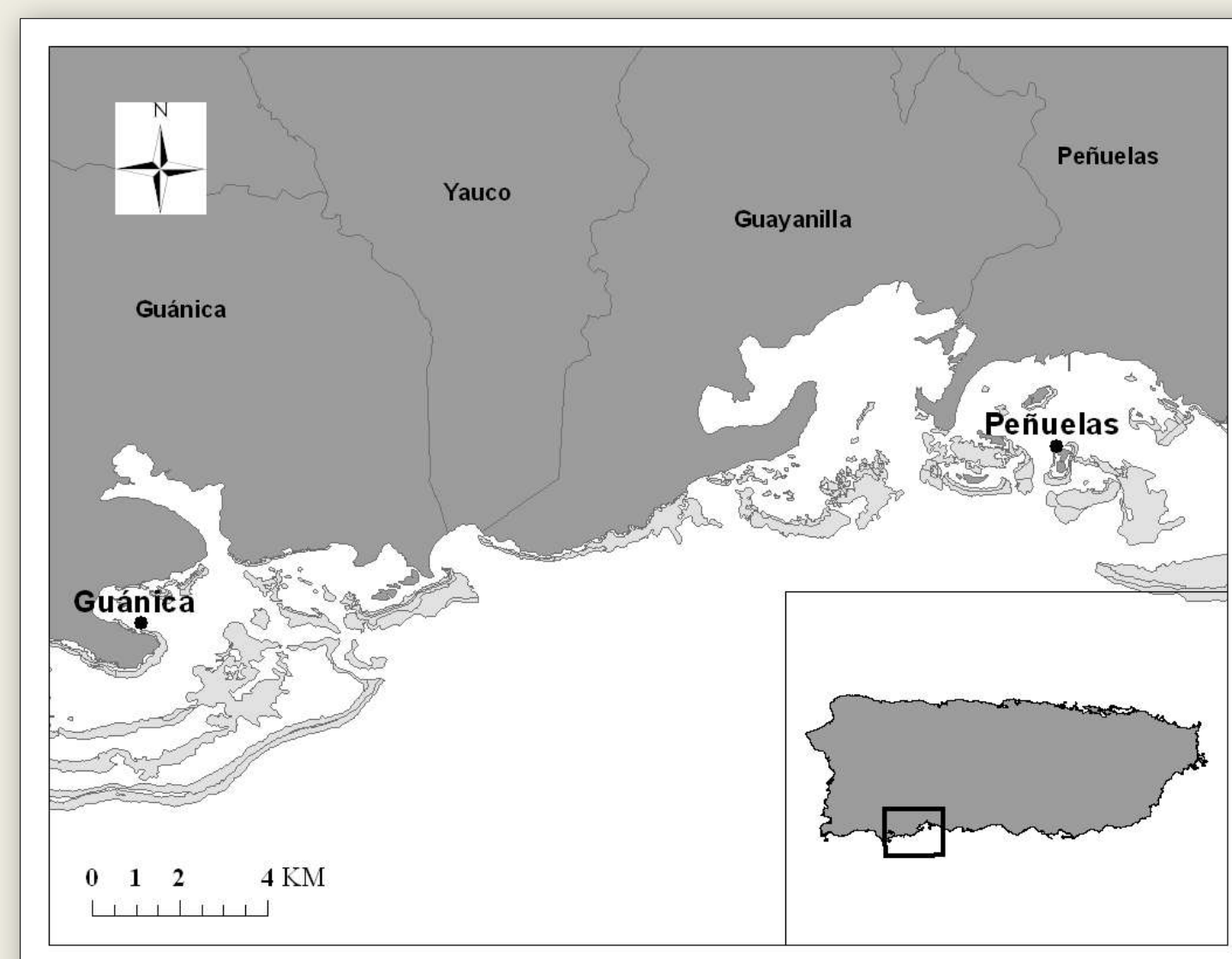


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Protection Agency  
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## Introduction

- Sedimentation has been reported to adversely affect coral ecosystems [1], but sediment source effects on coral larval settlement and metamorphosis are not well understood
- Successful settlement is considered to be one of the most important life history processes for reef sustainability and recovery [2]
- We investigated sediment effects on larval settlement when exposed to whole Guánica or Peñuelas, Puerto Rico marine sediment or to Peñuelas sediment grain size fractions

Figure 1. Locations of marine sediment collected from Guánica and Peñuelas, Puerto Rico



## Methods

- Planulae collected from cultured *Favia fragum* colonies\*
- Planulae exposed to marine sediment collected from Guánica and Peñuelas, Puerto Rico (Fig. 1) in doses of 20-640 mg/cm<sup>2</sup> or to Peñuelas sediment grain size fractions <32-500 µm in 250 mL beakers (Fig. 2)
- Total organic carbon determined for each sediment source
- After 48 hours planulae quantified as settled (and morphed) (Fig. 3), not settled (Fig. 4a & b), or dead
- ANOVA with Tukey's HSD post-hoc multiple comparison tests performed

## Results

Figure 5. Mean settlement for planulae exposed to Guánica sediment

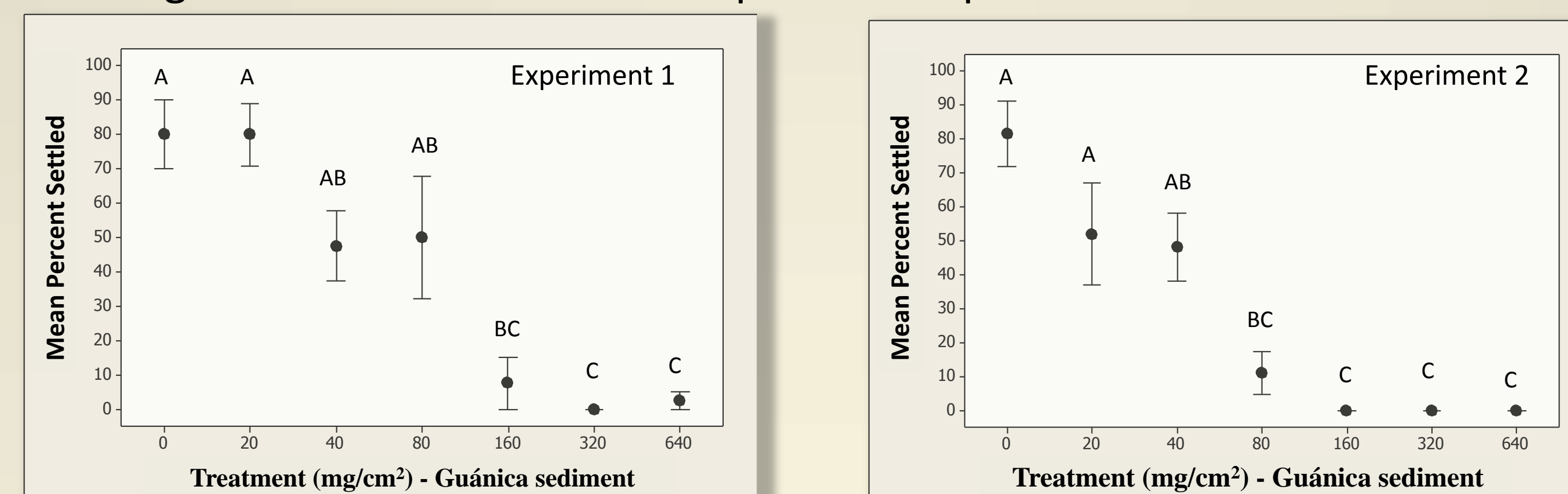


Figure 6. Mean settlement for planulae exposed to Peñuelas sediment

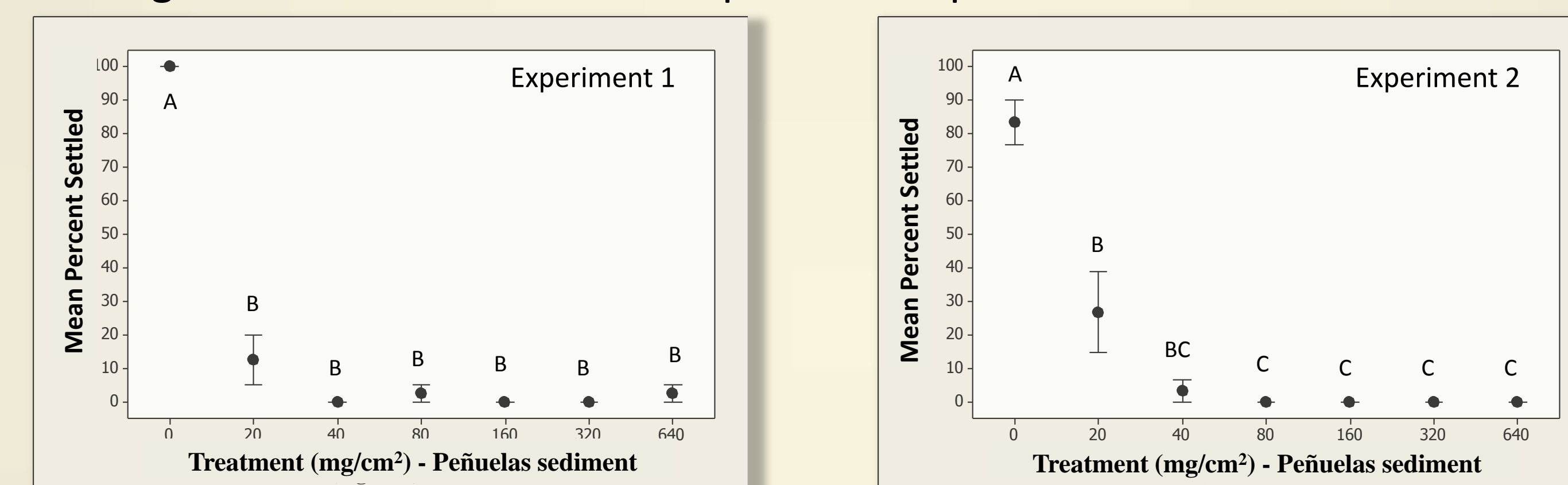
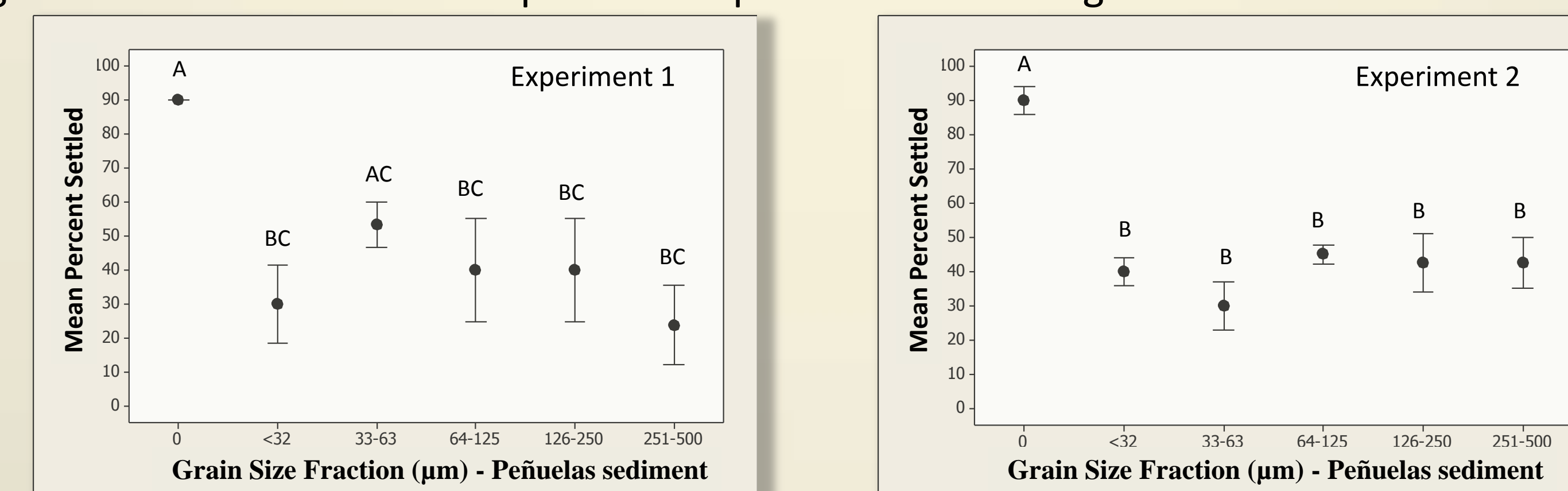


Figure 7. Mean settlement for planulae exposed to Peñuelas grain size fractions at 20 mg/cm<sup>2</sup>



- Guánica sediment: significant decrease in settlement compared to control beginning at 80 and 160 mg/cm<sup>2</sup> (Fig. 5)
- Peñuelas sediment: significant decrease in settlement compared to control beginning at 20 mg/cm<sup>2</sup> (Fig. 6)
- Grain size fractions – Peñuelas sediment: significant decrease in settlement compared to control beginning at <32 and 33-63 µm fractions (Fig. 7)
- EC50: Guánica sediment = 31.80 mg/cm<sup>2</sup> (r<sup>2</sup>=0.87), Peñuelas sediment = 1.25 mg/cm<sup>2</sup> (r<sup>2</sup>=0.54)
- TOC: Guánica sediment = 2.8%, Peñuelas sediment = 6.0%

## Conclusions

- Peñuelas grain size fractions (<32-500 µm) at 20 mg/cm<sup>2</sup> do not have variable effects on *F. fragum* settlement
- Coral larval settlement may be source dependent with factors other than grain size influencing rate of settlement
- TOC may inhibit successful settlement
- Future studies should highlight organic carbon

Figure 2. Set-up of experiments



Figure 3. Settled (and morphed) *F. fragum* planulae

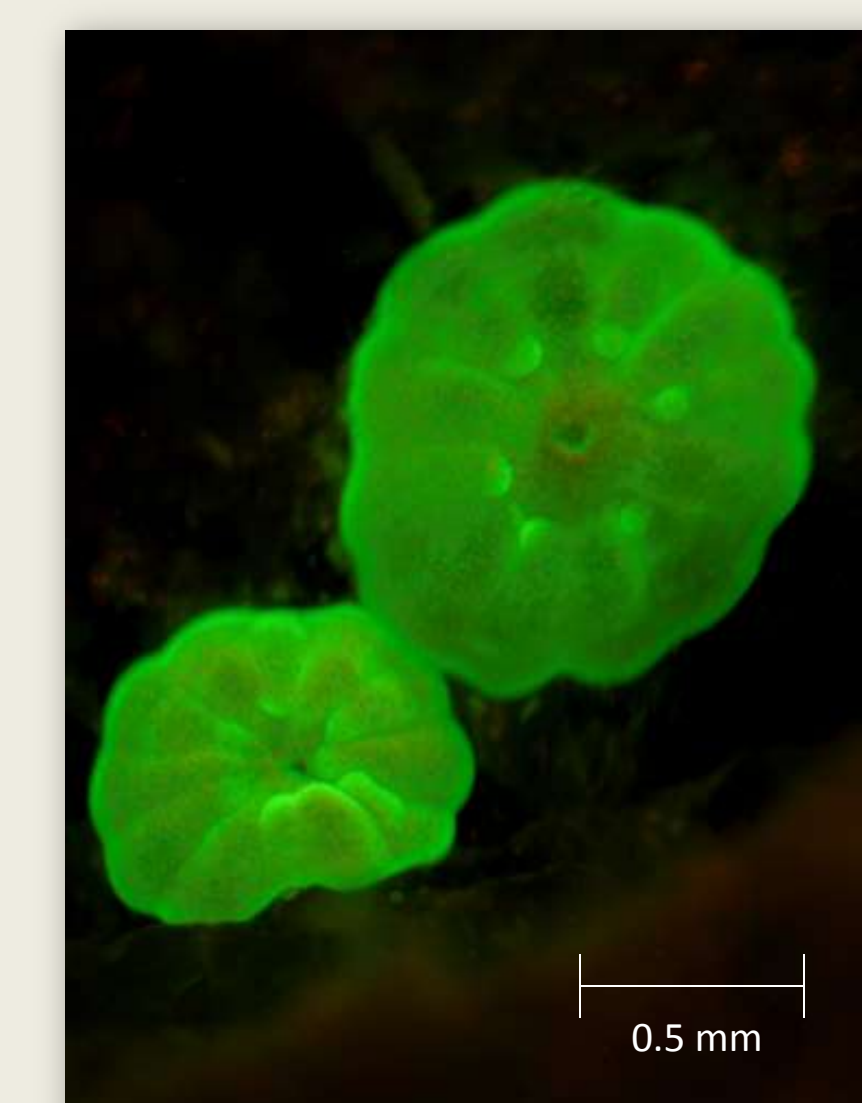
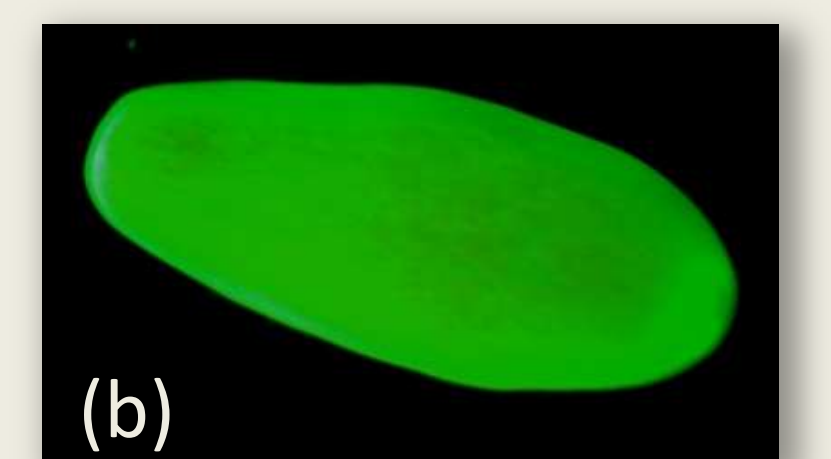
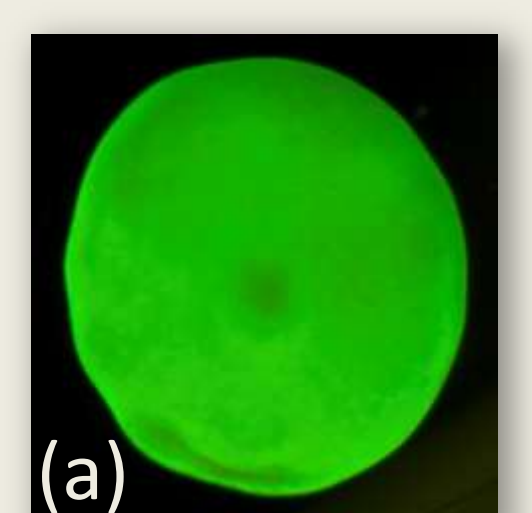


Figure 4. (a) Settled but not morphed planulae (b) Unsettled planulae



## References

- [1] Ryan et al. (2008) A record of recent change in terrestrial sedimentation in a coral-reef environment, La Parguera, Puerto Rico: A response to coastal development? Mar Poll Bull 56:1177-1183
- [2] Hughes & Tanner (2000) Recruitment failure, life histories, and long-term decline of Caribbean corals. Ecology 81(8): 2250-2263



\*Corals maintained under permit number FKNMS-2001-036