

The effect of environmental history and genotype on thermal stress tolerance in *Acropora cervicornis* corals



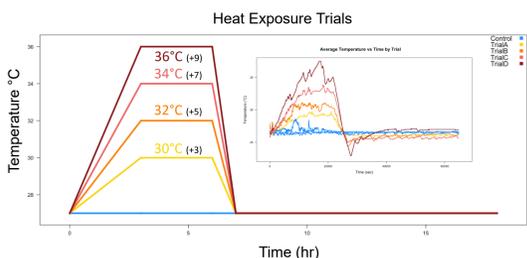
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BACKGROUND

This study examined how environmental history, the conditions in which corals are raised, influences bleaching when exposed to short term heat stress. With warming oceans, corals need to adapt to resist heat induced bleaching. The results of this study can be translated to better inform restoration efforts on how to evaluate coral stress tolerance using low-cost and accessible field equipment.

METHODS

1. Collected *Acropora cervicornis* (staghorn) corals of three genotypes (AC8, AC10, AC12) from two sites (KL & SS) on Bonaire Caribbean Netherlands.
2. Exposed fragments to short term heat trials.
3. **Color Score:** Photographed fragments and analyzed pixel averages for Red, Green, and Blue profiles compared to standards.
4. **Chlorophyll Concentration:** Isolated symbionts from coral tissue and analyzed spectrophotometrically for relative concentration based on surface area.

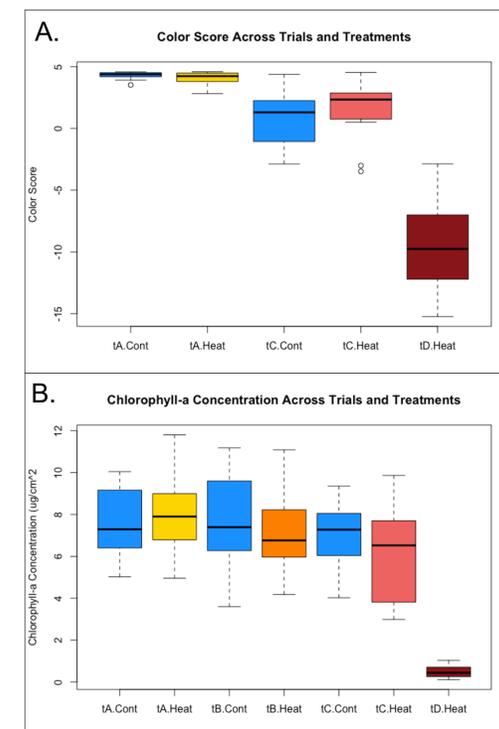
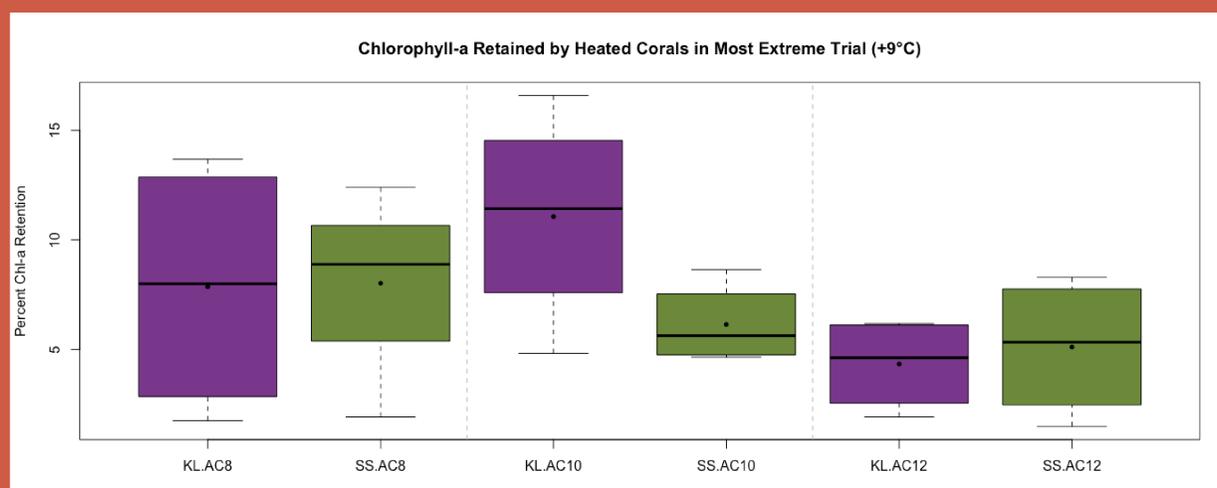
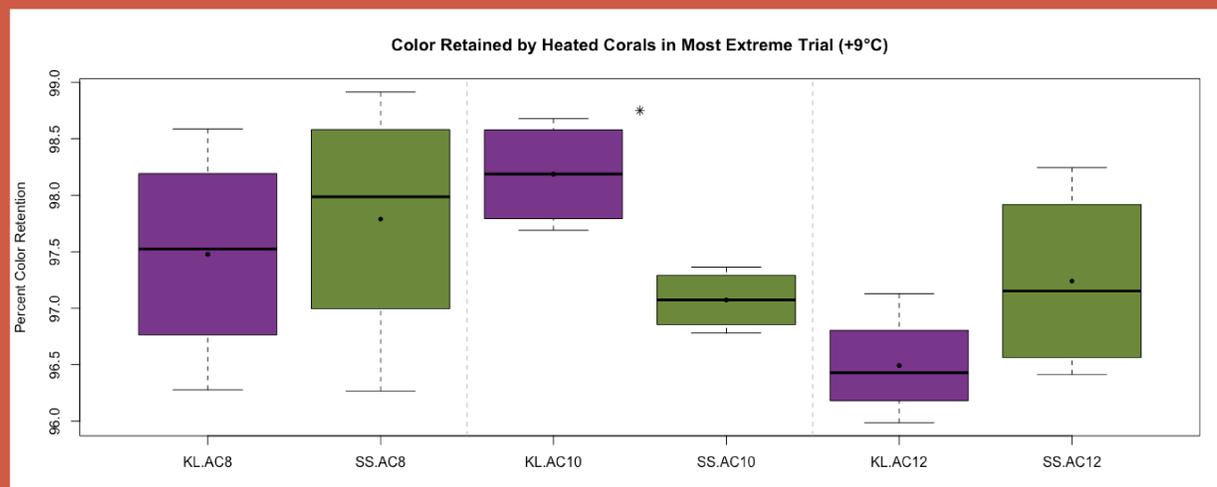


Temperature exposure profiles including Control (Blue), Warm (Yellow), Hot (Orange), Extreme (Pink), Most Extreme (Dark Red). Actual profile shown in inset.

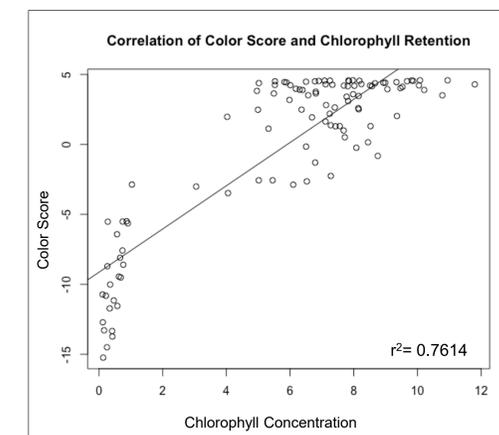


Example of photo analysis showing Control coral (Left) and Heated coral (Right)

Environmental history and genotype lead to differences in thermal stress tolerance in *Acropora cervicornis* corals.



Color scores from image analysis (A) and chlorophyll concentrations (B) of coral samples collected from each trial (A-D) and each treatment (Heated or Control). Control treatments are in blue, experimental treatments are in yellow (A: Warm), orange (B: Hot), pink (C: Extreme), and dark red (D: Most Extreme).



Correlation data comparing color score and chlorophyll concentration for heated and control corals.

RESULTS

- Environmental history influences bleaching from thermal stress.
- Genotypes differ in bleaching responses.
- Image analysis and chlorophyll retention had similar patterns as stress response metrics.



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This material is based upon work supported by the National Science Foundation under Grant No. HRD-1852123. This NSF Grant was awarded to Florida International University as part of the Research Experiences for Undergraduates (REU) Site Program. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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