Variable Nitrogen Utilization in Co-limited *Crocosphaera watsonii*

*Johann Lopez, Nathan Garcia, Katherine Mackey
University of California Irvine
johannl@uci.edu

Background

Iron limitation yields lower estimates of nitrogen fixation rates in model exercises (1) and laboratory cultures (2). Here, we investigate the consequences of iron and light co-limitation on growth and nitrogen fixation rates of the unicellular diazotroph, *Crocosphaera watsonii*, grown with and without fixed nitrogen

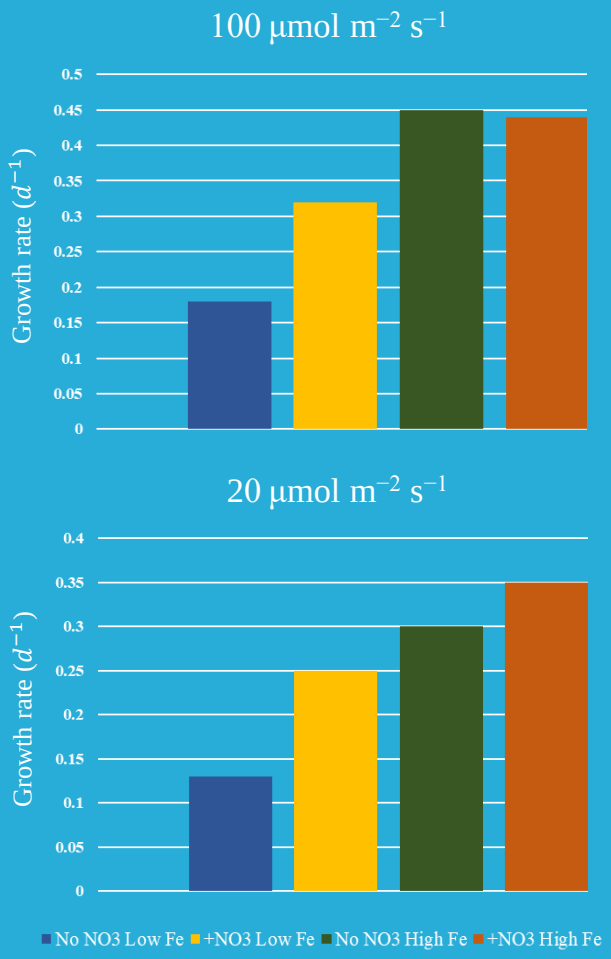
Methods

Cells were exposed to conditions shown below at high and low light intensity.

Growth rate calculated from increases in in vivo chlorophyll fluorescence measured using the Turner Designs Trilogy® laboratory fluorometer.

Nitrogen fixation rates measured via the $^{15}N_2$ assimilation technique (3)

Results



Conclusions

- NO_3^- supplementation nearly doubles growth under Fe-limitation in both high and low light conditions
- Fe-replete conditions yield higher growth rates relative to NO_3^- amended (Fe-limiting) conditions

References

(1) Voss, M., Bange, H. W., Dippner, J. W., Middelburg, J. J., Montoya, J. P., & Ward, B. (2013). The marine nitrogen cycle: recent discoveries, uncertainties and the potential relevance of climate change. *Philos T R Soc B, 368*(1621)

(2) Jacq, V., Ridame, C., L'Helguen, S., Kaczmar F., Saliot, A. (2014). Response of the Unicellular Diazotrophic Cyanobacterium *Crocosphaera watsonii* to Iron Limitation. *PLOS ONE* 9(1)

(3) Montoya, J. P., Voss, M., Kähler, P., Capone, D. G. (1996). A simple, high-precision, high-sensitivity tracer assay for N2 fixation. *Appl. Environ. Microbiol.* 62: 986–993

Acknowledgements

This research was funded through NSF GRFP grant no. DGE-1321846. Travel support provided by Turner Designs' student travel stipend award program