

Iron Sufficiency of Nitrogen-Fixing *Trichodesmium* in the South China Sea

Houng-Yung Chen

Institute of Marine Biology, National Sun Yat-sen University, Kaohsiung

Abstract

The quantitative requirement for iron of nitrogen-fixation biochemical process in phytoplankton is generally believed to surpass that of photosynthesis. Detection of iron limitation on nitrogen fixation is thus a sensitive tool to evaluate iron sufficiency of biological systems in the ocean. A protein *idiA* (iron deficiency inducing protein A) expresses on phytoplankton including nitrogen-fixing blue-green alga *Trichodesmium* spp. when iron supply becomes limited. The present study uses the presence of *idiA* on *Trichodesmium* as a marker to investigate the iron status of primary producers in the South China Sea where iron sufficiency in phytoplankton is being debated. *Trichodesmium* colonies were collected by a clean method that used metal-free or Teflon-coated sampling gears and trawled in subsurface water at least 3 meter from the shipboard. Monoclonal antibody probe of *idiA* was used to immunostain the colonies. *Trichodesmium* cells with or without *idiA* expression were counted under a fluorescence microscope. Preliminary results from the ORI 821 SEATS cruise showed that *Trichodesmium* collected in mid-January, 2007 at station KK1 in the basin of the South China Sea differs among colonies in *idiA* expression. Puff colonies tended to be composed of fewer cells that expressed *idiA* than tuft colonies. In average, 20% of *Trichodesmium* cells in each colony express *idiA*, indicating a certain degree of iron limiting in the basin of the South China Sea during mid-January. While 5% of *Trichodesmium* cells in the puff colonies express *idiA*; about 36% of those in the tuft colonies were *idiA* positive. It is likely that *Trichodesmium* colonies of different shapes responded variably to iron limitation, or colonies of different shapes possessed varied capacities in extracting iron from surrounding environment. Investigations on spatial or temporal differences in *idiA* expression are still progressing. Further results will enable us to evaluate possible deficiency of bio-available iron in the South China Sea, its seasonality and spatial distribution.