



Nitrogen fixation and release of fixed nitrogen by *Trichodesmium* spp. in the Gulf of Mexico

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ABSTRACT: During a 3-yr study in the Gulf of Mexico, we measured dinitrogen (N_2) fixation and nitrogen (N) release by *Trichodesmium* and compared these rates with water column N demand and the estimated N necessary to support blooms of *Karenia brevis*, a toxic dinoflagellate that severely affects the West Florida shelf. Net and gross N_2 fixation rates were compared in simultaneous incubations using $\delta^{15}N_2$ uptake and acetylene reduction, respectively. The difference between net and gross N_2 fixation is assumed to be an approximation of the rate of N release. Results demonstrate that *Trichodesmium* in the Gulf of Mexico are fixing N_2 at high rates and that an average of 52% of this recently fixed N_2 is rapidly released. Calculations suggest that observed densities of *Trichodesmium* can provide enough N to support moderately sized *K. brevis* blooms. Based on other studies where $\delta^{15}N_2$ and acetylene reduction were compared directly, it appears that N release from *Trichodesmium* is common but varies in magnitude among environments. In addition, carbon (C) and N-based doubling times for *Trichodesmium* vary among studies and environments. Comparing gross N_2 fixation and C fixation directly, C-based doubling times exceeded N-based doubling times, which suggests an imbalance in elemental turnover or a failure to fully quantify *Trichodesmium* N use.

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