Does Silica Depletion Affect the Growth and Production of Domoic Acid in Pseudo-nitzschia australis?

Paghasian, Christopher

Since 1991 the Monterey Bay has experienced eight algal blooms, one of the largest occurring during the summer of 2015. Many of the phytoplankton in these blooms produce domoic acid, which greatly deteriorates the neurological pathways of many marine predators and humans. During the latter half of an algal bloom, phytoplankton will have exhausted the majority of silica in its environment. This project investigates how silica depletion affects the growth and domoic acid production of Pseudo-nitzschia australis. Nine flasks were prepared, with sets of three undergoing different conditions: control (autoclaved seawater), all nutrients (Guillard's F/2), and silica depletion (Guillard's F/2 without silica). Each sample underwent two tests: a cDA test, which calculated the amount of domoic acid in the sample's total biomass, and a tDA test, which calculated the amount of domoic acid in one mL of the culture. An ELISA test allowed for the amount of domoic acid per cell to be calculated through a spectrophotometer. The results showed that in Pseudo-nitzschia australis, domoic acid production increases under silica depletion but cell growth significantly decreases. Therefore, even when silica has been exhausted from the environment, Pseudo-nitzschia australis can still pose a threat to marine predators and humans. Further research might investigate how many different environmental factors (copper exposure, the addition of phosphorus and nitrogen, temperature changes, or fluctuations of pH) affect the growth and domoic acid production of Pseudo-nitzschia australis.

Awards Won: