



Density-dependent nutritional value of the dinoflagellate *Cochlodinium polykrikoides* to the copepod *Acartia tonsa*

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ABSTRACT: The nutritional value of the dinoflagellate *Cochlodinium polykrikoides* to the copepod *Acartia tonsa* was evaluated over a range of ecologically relevant cell densities. Based on egg production rate, egg hatching success, and naupliar recruitment rate of *A. tonsa*, mixed-diet experiments indicated *C. polykrikoides* was nutritionally insufficient or had no nutritional value to *A. tonsa* at 600 $\mu\text{g C L}^{-1}$ (330 cells mL^{-1}), and was toxic at 1000 $\mu\text{g C L}^{-1}$ (550 cells mL^{-1}) when compared with the nontoxic flagellate *Rhodomonas lens*. However, the nutritional value of *C. polykrikoides* to *A. tonsa* at 100 and 200 $\mu\text{g C L}^{-1}$ (55 and 110 cells mL^{-1}) was greater than or equal to that of *R. lens*. The density-dependent nutritional value of *C. polykrikoides* to *A. tonsa* was also demonstrated in the long-term survival experiments. Survivorship of *A. tonsa* fed *C. polykrikoides* was lower than those fed *R. lens* at 900 and 1800 $\mu\text{g C L}^{-1}$. In contrast, *C. polykrikoides* supported higher survivorship of *A. tonsa* than *R. lens* at 180 and 540 $\mu\text{g C L}^{-1}$. The nutritional value of *C. polykrikoides* to *A. tonsa* decreased from beneficial to deleterious with increasing cell density. A putatively "harmful" alga is not always deleterious to grazers, and its ecological effects may be distinctly different during bloom and non-bloom periods.

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