

OPTIMISATION OF *THALASSIOSIRA WEISSFLOGII* CULTURE REGIMES WITH REFERENCE TO NITROGEN INPUTS

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Abstract: This work deals with the response of *Thalassiosira* to the influence of low nitrate and high availability and understanding the results from a quantitative viewpoint. Cell stress responses to nitrogen limitation were observed. The culture kept at lower temp absorb more nutrients and the cell size appeared large than the regular cells. High nitrogen induction was inhibitory in growth performance that 100 and 200 ppm N showed fairly better cell growth responses.

Keywords: Nitrogen, Cell, Phosphorus, Macronutrients

INTRODUCTION

Live feed continues to be the principal nutritional basis for culture of larvae (Richmond, 2004). Shrimp prefer diatoms than other microalgae (Ju, Forster & Dominy 2009). *Thalassiosira* got into the limelight with the Vannamei farming bloom in India. For Indian conditions and seawaters, the metal profile and bacterial complexes determine the size, shape and biochemical content of the strain in particular. The culture of Vannamei introduced in Indian waters needs elaborate studies for standardisation and refinement of nutrient amounts and applications. The objective of this study is to culture *Thalassiosira* and observe the cell count with varying nitrogen concentrations.

MATERIAL AND METHOD

The *Thalassiosira* culture was cultured with three different nitrogen concentrations – 300 ppm, 200 ppm and 100 ppm but the rest of the nutrients remaining the same as f2 media. The experiments were conducted with 10 ml test tubes. Culture conditions were 18 degrees temperature and 30-32 ppt salinity.

RESULT

Nitrogen variability effects on *Thalassiosira* cell numbers and dry cell weight

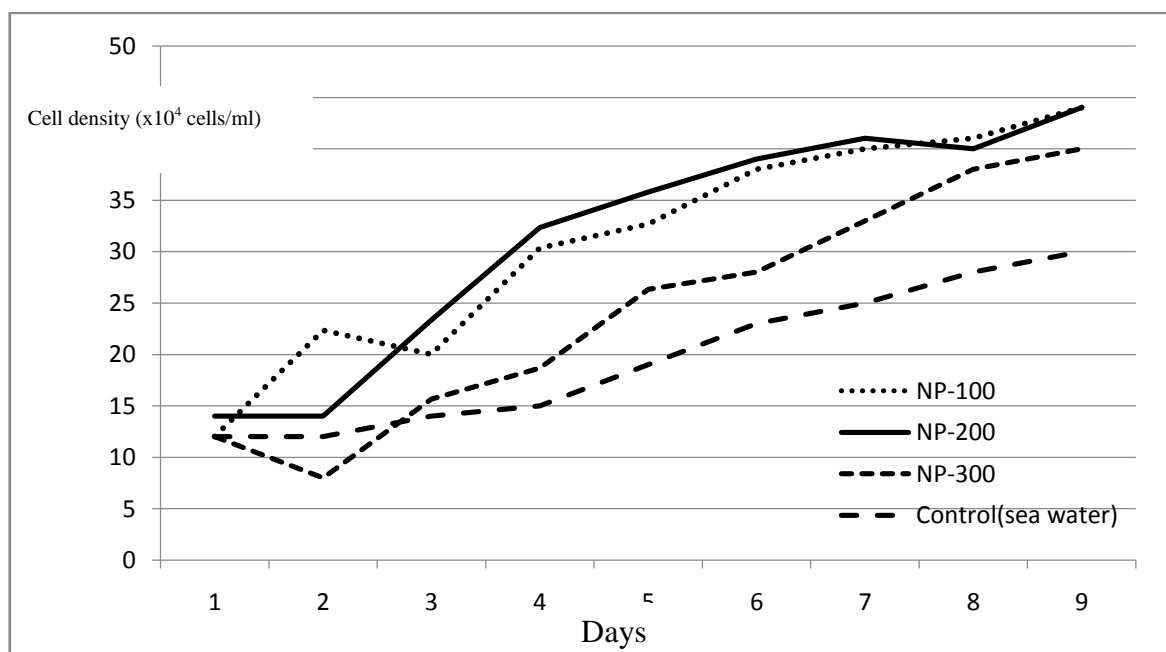


Fig. 1. Cell density ($\times 10^4$ cells/ml) of *Thalassiosira* in response to varying nitrogen concentrations with time (days)

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Fig.1. Shows that Nitrogen concentration at 100 ppm and 200 ppm reached the same cell density within the same residence time. 300 ppm was inhibitory on *Thalassiosira*. However, a progressive rise was visible for 100 ppm rather than 200 ppm levels.

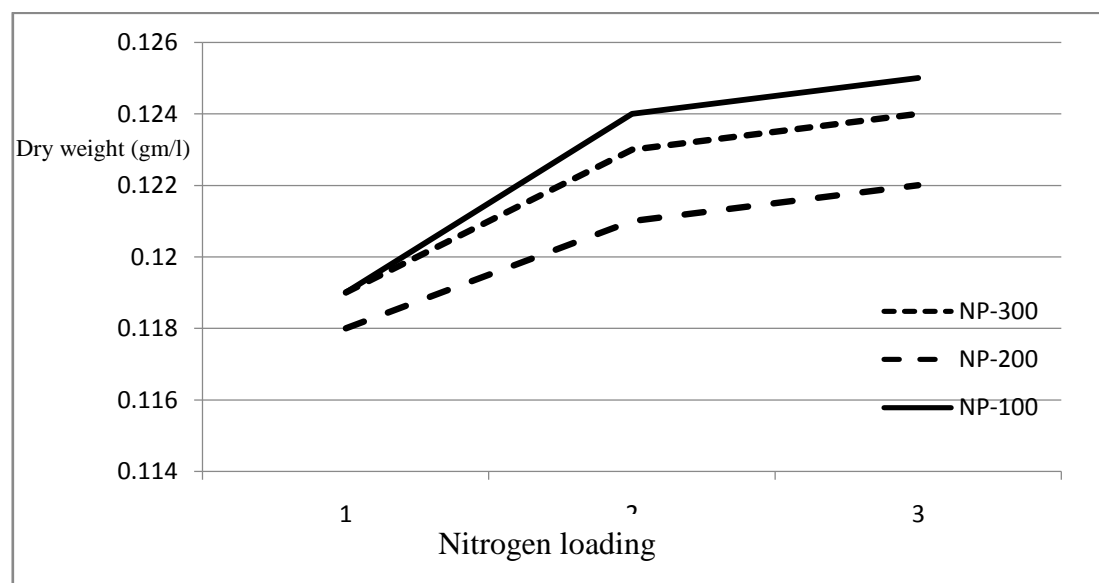


Fig. 2. Dry weight (gms per litre) of *Thalassiosira* in response to Nitrogen loading

Regarding the dry weight of *Thalassiosira* cell, 100 ppm nitrogen concentration registered better cellular protoplast and biomass than rest of the treatments as seen in Fig. 2.

DISCUSSION

Macronutrients such as nitrogen and phosphorus are believed to limit phytoplankton production in many marine and freshwater communities; consequently the uptake kinetics of these nutrients have long been of interest to physiologists and ecologists (McCarthy, 1981; Cembella *et al.*, 1984).

Diatom blooms commonly occur in regions where nitrogen (N) source is variable and they possess a suite of N-related transporters and enzymes (Allen 2005; Armbrust *et al.*, 2004; Hildebrand, 2005; Hildebrand and Dahlin, 2000) and utilize a variety of inorganic (e.g., nitrate, NO_3^- ; ammonium, NH_4^+) and organic (e.g., urea; amino acids) N sources for growth. Diatoms exhibit their fastest growth rates on reduced forms of N such as NH_4^+ or urea (Dortch, 1990; Dortch *et al.*, 1991; Peers *et al.*, 2000; Syrett 1981), in part due to the low energetic costs associated with assimilation of these forms (Hildebrand, 2005).

When cells experience high daily irradiance, N is partitioned between the plastid during the day and the mitochondria at night with variations based on a particular N source (Bender *et al.*, 2012). The impact of N source on differential transcript accumulation was most apparent under the highest light intensity in *Thalassiosira pseudonana* (Bender *et al.*, 2012). The present study clearly indicates insufficient studies on nitrogen effects on *Thalassiosira* from the dearth of

related literature. Silicate appears to be a key factor for growth acceleration and cell multiplication.

Conclusions drawn from the study are – 100 ppm nitrogen concentration are sufficient for *Thalassiosira* growth and multiplication and dry matter per cell accrual under controlled conditions.

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