

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

REFERENCES

- Allen, A.E.** (2005). Beyond sequence homology: Redundant ammonium transporters in a marine diatom are not functionally equivalent. *J Phycol.*,41:4-6.
- Armbrust, E.V.; Berges, J.A.; Bowler, C.; Green, B.R.; Martinez, D.; Putnam, N.; Zhou, S.; Allen, A.E.; Apt, K.E.; Bechner, M.; Brzezinski, M.; Chaal, B.; Chiovitti, A.; Davis, A.; Demarest, M.; Detter, J.C.; Glavina, T.; Goodstein, D.; Hadi, M.Z.; Hellsten, U.; Hildebrand, M.; Jenkins, B.D.; Jurka, J.; Kapitonov, V.; Kröger, N.; Lau, W.; Lane, T.W.; Larimer, F.; Lippmeier, J.C.; Lucas, S.; Medina, M.; Montsant, A.; Obornik, M.; Parker, M.S.; Palenik, B.; Pazour, G.J.; Richardson, P.; Rynearson, T.A.; Saito, M.A.; Schwartz, D.; Thamtrakoln, K.; Valentin, K.; Vardi, A.; Wilkerson, F. and Rokhsar, D.S.** (2004). The genome of the diatom *Thalassiosira pseudonana*: Ecology, evolution, and metabolism. *Science*,306:79-86.
- Bender, S.J.; Parker, M.S. and Armbrust, E.V.** (2012). Coupled effects of light and nitrogen source on the urea cycle and nitrogen metabolism over a diel cycle in the marine diatom, *Thalassiosira pseudonana*, *Protist*, 163: 232-251.
- Berges, J.A. and Harnson, P.J.** (1995) Relationships between nitrate reductase activity and rates of growth and nitrate incorporation under steady-state light or nitrate limitation in the marine diatom *Thalassiosira pseudonana* (Bacillariophyceae). *J Phycol.*,131: 85-95.
- Cembella, A.D.; Antia, N.J. and Harrison, P.J.** (1984). The utilization of inorganic and organic phosphorus compounds as nutrients by eukaryotic microalgae: a multidisciplinary perspective: Part 1. *Cleveland Rubber Co. crit. Rev. Microbial*, 10: 317-391.
- Dortch, Q.** (1990). The interaction between ammonium and nitrate uptake in phytoplankton. *Mar Ecol Prog Ser.*,61:183-201.
- Dortch, Q.; Thompson, P.A. and Harrison, P.J.** (1991). Short-term interaction between nitrate and ammonium uptake in *Thalassiosira pseudonana*: Effect of preconditioning, nitrogen source and growth rate. *Mar Biol.*,110:183-193.
- Hildebrand, M.** (2005). Cloning and functional characterization of ammonium transporters from the marine diatom *Cylindrotheca fusiformis* (Bacillariophyceae). *J Phycol.*,41:105-113.
- Hildebrand, M. and Dahlin, K.** (2000). Nitrate transporter genes from the diatom *Cylindrotheca fusiformis* (Bacillariophyceae): mRNA levels controlled by nitrogen source and by the cell cycle. *J Phycol.*,36:702-713.
- Ishida, Y.; Hiragushi, N.; Kitaguchi, H.; Mitsutani, A.; Nagai, S. and Yoshimura, M.** (2000). A highly CO₂ –tolerant diatom, *Thalassiosira weissflogii* H1, enriched from coastal sea and its fatty acid composition. *Fish. Sci.*, 66 (4): 655-659.
- Ju, Z.Y.; Forster, I.P. and Dominy, W.G.** (2009). Effects of supplementing two species of marine algae or their fractions to a formulated diet on growth, survival and composition of shrimp (*Litopenaeus vannamei*). *Aquaculture*, 292: 237-243.
- Latasa, M.** (1995). Pigment composition of *Heterocapsa* sp. and *Thalassiosira weissflogii* growing in batch cultures under different irradiances. *Sci. Mar.*, 59 (1): 25-37.
- Martins, T.G.; Odebrecht, C.; Jensen, L.V.; D'Oca, M.G.M. and Wasielesky Jr. W.** (2014). The contribution of diatoms to bioflocs lipid content and the performance of juvenile *Litopenaeus vannamei* (Boone, 1931) in a BFT culture system, *Aquaculture Research*, 1–12.
- McCarthy, J.J.** (1981). The kinetics of nutrient utilization. *Can Bull. Fish. Aquat. Sci.*, 210: 211-233.

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- Moss, S.M.; Forster, I.P. and Tacon, A.G.J.** (2006). Sparing effects of pond water on vitamins in shrimp diets. *Aquaculture*, 258: 388-395.
- Parslow, J.S.; Harrison, P.J. and Thompson, P.A.** (1984). Development of rapid ammonium uptake during starvation of batch and chemostat cultures of a marine diatom *Thalassiosira pseudonana*. *Mar. Biol.* 83: 43-50.
- Passow, U.** (2002). Production of transparent exopolymer particles (TEP) by phyto- and bacterioplankton. *Marine Ecology Progress Series*, 236: 1-12.
- Peers, G.S., Milligan, A.J. and Harrison, P.J.** (2000). Assay optimization and regulation of urease activity in two marine diatoms. *J Phycol.*, 36: 523-528.
- Qin, J.G.; D'Antignan, V.; Zhang, W. and Franco, C.** (2013). Discovery of antimicrobial activities of a marine diatom, *Thalassiosira rotula*. *African Journal of Microbiology Research*, 7 (50): 5687-5696.
- Richmond, A.** (2004). *Handbook of Microalgal Culture: Biotechnology and applied phycology*. Edit. Blackwell Publishing, USA, pp: 566.
- Sanchez, D.R.; Fox, J.M.; Gatlin, D. and Lawrence, A.L.** (2012). Dietary effect of fish oil and soybean lecithin on growth and survival of juvenile *Litopenaeus vannamei* in the presence or absence of phytoplankton in an indoor system. *Aquaculture Research*, 45(8), 1367-1379.
- Syrett, P.** (1981). Nitrogen metabolism of microalgae. *Aquat Sci.*, 210: 182-210.
- Storseth, T.R.; Hansen, K.; Reitan, K.I. and Skjermo J.** (2005). Structural characterization of β -D-(1 \rightarrow 3)-glucans from different growth phases of the marine diatoms, *Chaetoceros mulleri* and *Thalassiosira weissflogii*. *Carbohydrate Research*, 340: 1159-1164.
- Urbani, R.; Magaletti, E.; Sist P. and Cicero, A.M.** (2005). Extracellular Carbohydrates released by the marine diatom *Cylindrotheca closterium*, *Thalassiosira pseudonana* and *Skeletonema costatum*: Effect of P-depletion and growth status. *Science of the Total Environment*, 353: 300-306.
- Viso, A.C.; Pesando, D. and Baby, C.** (1987). Antibacterial and antifungal properties of some marine diatoms in culture. *Bot. Mar.*, 30: 41-45.