HARMFUL ALGAE 2012

The 15th International Conference on Harmful Algae
October 29 - November 2, 2012, CECO,
Changwon, Gyeongnam, Korea

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INTERNATIONAL SOCIETY FOR THE STUDY OF HARMFUL ALGAE
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Growth response of *Pseudo-nitzschia circumpara* (Bacillariophyceae)
to different salinities

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Abstract

Pennate diatoms from the genus *Pseudo-nitzschia* Peragallo are known to produce domoic acid and cause
Amnesic Shellfish Poisoning (ASP). Although *Pseudo-nitzschia* spp. are commonly found in phytoplankton
samples, no ASP has been documented in Malaysia to date. Clonal cultures of *Pseudo-nitzschia* were
established and characterized using morphology through electron microscope for ultrastructural analysis. A
newly described species, *Pseudo-nitzschia circumpara* was found in four locations in Malaysian waters,
indicating the wide distribution of the species. In laboratory studies, *P. circumpara* from Malaysia showed a
salinity tolerance from 25-35 psu, with an optimum growth at 30 psu. Further ecophysiological and
toxinological studies are needed for a better knowledge of this newly described *Pseudo-nitzschia* species
from Malaysia.

Keywords: *Pseudo-nitzschia circumpara*, morphology, physiology

Introduction

Research interests on marine diatom *Pseudo-nitzschia*
have risen dramatically after it was confirmed as
the causative organism for the first incidents of
human intoxication in Prince Edward Island, 1987
(Subba Rao et al. 1988). The illness was later
known as Amnesic Shellfish Poisoning (ASP) and the
species responsible for the event was identified as
*P. multiseries* (Bates et al. 1989). ASP not only
cause poisoning to human beings but also caused
death of marine birds and marine mammals in
subsequent years (Fritz et al. 1992; Scholin et al.
2000). Since then, the occurrence of *Pseudo-nitzschia*
was well documented worldwide by various research
groups (Lelong et al. 2012). Studies on the
occurrence of *Pseudo-nitzschia* in Malaysia showed a high species diversity with 24 species
One of these was found to produce high level of
DA in cultures (Teng et al. 2014). In Malaysia,
paralytic shellfish poisoning remained as the
biggest concern for the seafood industry and public
health due to blooms of the toxic dinoflagellates
*Pyrodinium bahamense* (reviewed in Usup et al.
2012), *Alexandrium minutum* (Lim et al. 2004) and
*Alexandrium tamiaiyavanichii* (Lim et al. 2004,
2006, 2007). Since 2009, studies were initiated to
document the occurrence, distribution and genetic
diversity of *Pseudo-nitzschia* species in order to
assess the potential risk of ASP in Malaysian coastal
waters. This contribution presents preliminary
studies on the ecophysiology of *P. circumpara*.

Materials and Methods

Plankton samples were collected with a 20-µm
plankton net. Clonal cultures of *Pseudo-nitzschia* were
established using SWII medium (Iwasaki 1961) at 30 psu and maintained under 25°C, 12:12
light: dark photoperiod with light intensity of
approximately 100 µmol photons m⁻² s⁻¹ in a cool-
white fluorescence incubator (SHEL LAB, Comelius,
OR, USA). Natural and cultured materials were
reated with acid for species identification under
transmission electron microscope (TEM). *Pseudo-
nitzschia circumpara* was cultured at different
salinities ranging from 0-35 psu with sterilized
SWII medium; cell densities were enumerated
every two days to determine growth rates.

Results and Discussion

In the present study, the stability of morphological
characteristics of *P. circumpora* were examined from field samples and resulted with similar morphometric data. Morphometric comparison among the closely related species from the *P. pseudodelicatissima* complex showed that the number of poroids (in 1μm) and of dividing sectors are the most useful and distinctive morphological characteristics to discern *P. circumpora* from the others.

In terms of salinity tolerance, cell divisions were only observed within a salinity range of 25-35 psu (Fig. 1). This explains why *P. circumpora* can only be found in coastal waters of Malaysia but not in more brackish inner waters. No growth was recorded at salinity lower than 20 psu. Cell yield was highest (84,100 cell mL⁻¹) at 30 psu and lowest (<50,000 cells mL⁻¹) at 25 psu. The growth rate (μ) increased with increased salinities from 0.72 d⁻¹ at 25 psu to 1.01 d⁻¹ at 35 psu (Fig. 1).

The distribution of *P. circumpora* was documented. Only four out of seventeen sampling locations were recorded to have *P. circumpora* and these included: Port Dickson in Negeri Sembilan (Strait of Malacca), Sibu Laut and Bintulu in Sarawak, and Semporna in Sabah.

Future ecophysiology and toxin production studies on this species are essential to enhance our understanding on this *Pseudo-nitzschia* species from Malaysian waters.

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**References**


