HARMFUL ALGAE 2012

15차 국제 적조회의보고서

The 15th International Conference on Harmful Algae

October 29 - November 2, 2012, CECO,
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INTERNATIONAL SOCIETY FOR THE STUDY OF HARMFUL ALGAE

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Aerial view of merry-go-round clay mitigation around fish cages in Yokjido Island, in the South Sea of Korea, August 21, 2008 (Photographed by Mr. JongSuk Jung)

EDITORS

Hak Gyoon Kim
Pukyong National University, Busan, Korea

Beatriz Reguera
Instituto Español de Oceanografia, Vigo, Spain

Gustaaf M. Hallegraeff
University of Tasmania, Hobart, Australia

Chang Kyu Le e
National Fisheries Research & Development Institute, Busan, Korea

Myung Soo Han
HanYang University, Seoul, Korea

Joong Ki Choi
Inha University, Incheon, Korea

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For bibliographic purposes, this document should be cited as follows:

Kim, H.G., B. Reguera, G.M. Hallegraeff, C.K. Lee, M.S. Han, and J.K. Choi. (Eds). Harmful Algae 2012, Proceedings of the 15th International Conference on Harmful Algae. International Society for the Study of Harmful Algae, 2014
ISBN 978-87-990827-4-2.

The preparation of this publication was supported by the Organizing Committee of the 15th International Conference on Harmful Algae and funded by the Gyeongsangnam-do Provincial Government, Korea.

Printed in 2014
by Maple Design Agency, Busan, Korea
(http://mapledesign.blog.me)

Growth response of *Pseudo-nitzschia circumpora* (Bacillariophyceae) to different salinities

Hong-Chang Lim[1], Sing-Tung Teng[2], Chui-Pin Leaw[1], Siti-Zubaidah binti Kamarudin[2], and Po-Teen Lim[1]
[1]Bachok Marine Research Station, Institute of Ocean and Earth Sciences, University of Malaya, 16310 Bachok, Kelantan Malaysia. E-mail: hclim24@gmail.com; [2] Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak Malaysia

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 circumpora* was found in four locations in Malaysian waters, indicating the wide distribution of the species. In laboratory studies, *P. circumpora* 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 circumpora*, 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 caused 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 recorded (Lim *et al*. 2012, 2013; Teng *et al*. 2013). 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 tamiyavanichii* (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. circumpora*.

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 25ºC, 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, Cornelius, OR, USA). Natural and cultured materials were treated with acid for species identification under transmission electron microscope (TEM). *Pseudo-nitzschia circumpora* 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

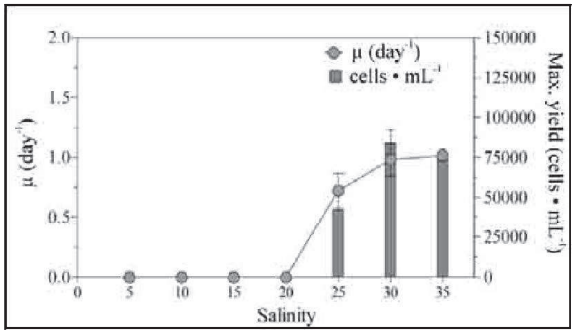

Figure 1. Growth rate, μ (d^{-1}) and maximum yield of *P. circumpora* strain PnSb58 under salinity treatments of 5 - 35 PSU.

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 (Straits 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.

Acknowledgements

HC Lim, supported by the Ministry of Higher Education through MyBrain15 MyPhD scholarship, thanks ISSHA and FAO for ISSHA Travel Award to the 15th ICHA in Changwon, South Korea. This work was funded by the Malaysian Government through Science Fund to PT Lim (04-01-09-SF0092) and CP Leaw (02-01-09-SF0054).

References

Bates, S.S., Bird, C.J., Freitas, A.S.W.D. et al. (1989). Can. J. Fish. Aq. Sci. 46: 1203-1215.

Fritz, L., Quilliam, M.A., Wright, J.L.C. et al. (1992). J. Phycol. 28: 439 - 442.

Iwasaki, H. (1961). Biol. Bull. 121: 173-187.

Lelong, A., Hégaret, H., Soudant, P. et al. (2012). Phycologia 51: 168-216.

Lim, H.C., Leaw, C.P., Su, S.N.P. et al. (2012). J. Phycol. 48: 1232-1247.

Lim, H.C., Teng, S.T., Leaw, C.P. et al. (2013). J. Phycol. 49: 902-916.

Lim, P.T., Leaw, C.P. & Ogata, T. (2007). Bot. Mar. 50: 14-21.

Lim, P.T., Leaw, C.P. & Usup, G. (2004). In: Phang, S.M., Chong, V.C., Ho, S.S. et al. (eds.) Marine Science into New Millennium: New perspectives and challenges. University of Malaya Maritime Research Centre, Kuala Lumpur, pp. 661-667.

Lim, P.T., Leaw, C.P., Usup, G. et al. (2006). J. Phycol. 42: 786-799.

Scholin, C.A., Gulland, F., Doucette, G.J. et al. (2000). Nature 403: 80-84.

Schultz, J. & Wolf, M. (2009). Mol. Phylog. Evol. 52: 520-523.

Subba Rao, D.V., Quilliam, M.A. & Pocklington, R. (1988). Can. J. Fish. Aq. Sci. 45: 2076-2079.

Teng, S.T., Leaw, C.P., Lim, H.C. et al. (2013). Bot. Mar. 56: 375-398.

Teng, S.T., Lim, H.C., Lim, P.T. et al. (2014). Harmful Algae 34:17-28.

Trainer, V.L., Wells, M.L., Cochlan, W.P. et al. (2009). Limnol. Oceanogr. 54: 1461-74.

Usup, G., Ahmad, A., Matsuoka, K. et al. (2012). Harmful Algae 14: 301-312.