Harmful Algae 107 (2021) 102070

Contents lists available at ScienceDirect

Harmful Algae

journal homepage: www.elsevier.com/locate/hal

Original Article

The harmful raphidophyte *Chattonella* (Raphidophyceae) in Western Pacific: Its red tides and associated fisheries damage over the past 50 years (1969–2019)

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ARTICLE INFO

Keywords:
Chattonella
Chattonella marina
Chattonella subsalsa
Distribution
East Asia
Fisheries damage
Mucocyst
Population structure
Southeast Asia

ABSTRACT

Red tides and associated fisheries damage caused by the harmful raphidophyte *Chattonella* were reassessed based on the documented local records for 50 years to understand the distribution and economic impacts of the harmful species in the Western Pacific. Blooms of *Chattonella* with fisheries damage have been recorded in East Asia since 1969, whereas they have been only recorded in Southeast Asia since the 1980s. Occurrences of *Chattonella* have been documented from six Southeast Asian countries, Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam, with mass mortalities mainly of farmed shrimp in 1980–1990s, and farmed fish in 2000–2010s. These occurrences have been reported with the names of *C. antiqua, C. marina, C. ovata, C. subsalsa* and *Chattonella* sp., owing to the difficulty of microscopic species identification, and many were not supported with molecular data. To determine the distribution of *C. marina* complex and *C. subsalsa* in Southeast Asia, molecular phylogeny and microscopic observation were also carried out for cultures obtained from Indonesia, Malaysia, Japan, Philippines, Russia, Singapore and Thailand. The results revealed that only the genotype of *C. marina* complex has been detected from East Asia (China, Japan, Korea and Russia), whereas both *C. marina* complex (Indonesia and Malaysia) and *C. subsalsa* (Philippines, Singapore and Thailand) were found in Southeast Asia. Ejection of mucocysts has been recognized as a diagnostic character of *C. subsalsa*, but it was also observed in our cultures of *C. marina* isolated from Indonesia, Malaysia, Japan, and Russia. Meanwhile, the co-occurrences of the two

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https://doi.org/10.1016/j.hal.2021.102070
Received 7 January 2021; Received in revised form 4 June 2021; Accepted 12 June 2021
Available online 13 July 2021