

RED TIDE IN THE INNER GULF OF THAILAND

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Introduction

The first scientific record on tide phenomena in Thai waters has been reported by Charernphol in 1958, since then the red tide phenomena and their impacts on the fisheries industry have been observed more frequently and continuously. Green *Noctiluca scintillans* and *Ceratium furca* were the main causative red tide organisms in the inner Gulf of Thailand. The massive fish kills were sometimes recorded during the blooms of *Noctiluca* but there had no any serious problems associated with the toxic harmful microalgae occurred in the Gulf of Thailand. The only one case of PSP was reported in 1983 at the area of Pranburi river mouth, Prachuabkirikan province but the causative organism has not been clarified. During the period of 1985-1995, the research and monitoring program on red tide were carried out intensively. Recently, Pollution Control Department, Chulalongkorn University, Kasetsart University, Burapha University and Prince of Songkla University have carried out the monitoring and research program in the upper Gulf of Thailand to provide more understanding on red tide phenomena in Thai waters.

Occurrence of Red Tides

Red tides were frequently observed in the inner Gulf of Thailand, especially around the river mouth areas, which were Bangpakong river, Chao-Phraya river, Tha-Chin river and Mae Klong river. Generally, red tides could be observed all year round in the inner gulf. The results from monitoring program during the period of 1991-1993 revealed that red tide in the inner gulf seemed to be a seasonal phenomenon, in particular for *Noctiluca* red tide. As showed in Table 1, 2, 3 and Fig.1, the outbreak of *Noctiluca* red tide were often observed during the period of December to February in the western part of the inner gulf whereas in the eastern part of the inner gulf the blooms were often observed during the period of March to August. Recently, the blooms of *C. furca* occurred more often at both areas of the inner gulf.

Beside *Noctiluca* and *Ceratium*, the bloom of other red tide organisms such as *Trichodesmium*, *Chaetoceros*, *Cosinodiscus* and *Skeletonema* were also sometimes observed.

Current Research and Monitoring Program

Since red tide were more often observed in the inner gulf, Pollution Control Department was assigned to set the red tide monitoring program in 2003. For the research works, a number of research topics including taxonomy, physiology and toxicology on red tide organisms have been conducted almost in the university namely, Chulalongkorn, Kasetsart, Burapha and Prince of Songkla.

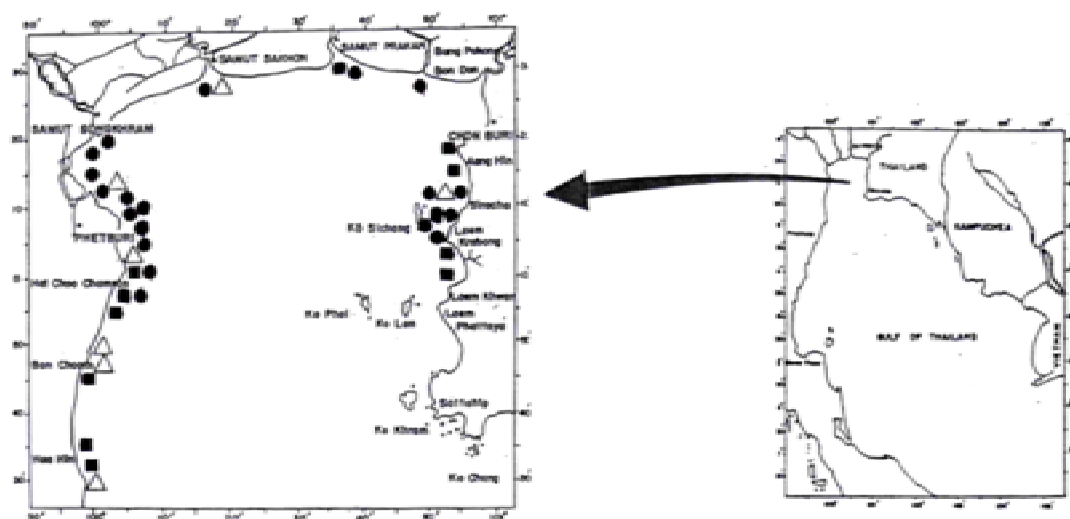


Figure 1 The Inner Gulf of Thailand and occurrences of red tides
(▲ : 1991, ■ : 1992, ● : 1993)

Table 1. Occurrences of red tide in the Inner Gulf in 1991.

Date	Water colour	Affected Areas	Causative Organisms
1. 16 Jan	Redish Brown	Ta-Chin River Mouth	<i>Mesodinium rubrum</i> <i>Cochlodinium</i> sp.
2. 22 Jan	Green	Cha-am (Petchaburi Province)	<i>Noctiluca scintillans</i>
3. 7 Feb	Green	Cha-am (Petchaburi Province)	<i>Noctiluca scintillans</i>
*4. 17-20 Aug	Green	Angsila-Leam Chabang (Chonburi Province)	<i>Noctiluca scintillans</i>
5. 14-17 Sep	Green	Ban Leam-Cha-am (Petchaburi Province)	<i>Noctiluca scintillans</i>
6. 2 Nov	Green	Prachuab Khiri Khan	<i>Noctiluca scintillans</i>
7. 21 Dec	Green	Ta-Yang (Petchaburi Province)	<i>Noctiluca scintillans</i>

*massive fish kill

Table 2. Occurrences of red tide in the Inner Gulf in 1992.

Date	Water colour	Affected Areas	Causative Organisms
1. 11 Jan	Green	Ta-Yang (Petchaburi Province)	<i>Noctiluca scintillans</i>
2. 31 Jan	Green	Ta-Yang (Petchaburi Province)	<i>Noctiluca scintillans</i>
3. 15 Feb	Green	Hua Hin (Prachuab Khiri Khan Province)	<i>Noctiluca scintillans</i>
4. 22 Feb	Green	Hua Hin (Prachuab Khiri Khan Province)	<i>Noctiluca scintillans</i>
5. 18 March	Green	Chaophraya River Mouth	<i>Noctiluca scintillans</i>
*6. 1 Jul	Green	Bangsan (Chonburi Province)	<i>Noctiluca scintillans</i>
7. 8 Jul	Green	Banglamung (Chonburi Province)	<i>Noctiluca scintillans</i>
8. 15 Aug	Green	Bangsan-Phai Bay (Chonburi Province)	<i>Noctiluca scintillans</i>
9. 23 Aug	Green	Sichang-Sriracha (Chonburi Province)	<i>Noctiluca scintillans</i>
10. 4 Oct	Redish Brown	Chonburi Bay (Chonburi Province)	Water sample was not collected
11. 8 Nov	Green	Cha-am (Petchaburi Province)	<i>Noctiluca scintillans</i>
12. 22 Nov	Green	Ta-Yang (Petchaburi Province)	<i>Noctiluca scintillans</i>

*massive fish kill

Table 3. Occurrences of red tide in the Inner Gulf in 1992.

Date	Water colour	Affected Areas	Causative Organisms
1. 7 Jan	Green	Coastal areas of Petchaburi Province	<i>Noctiluca scintillans</i>
2. 10 Jan	Green	Chaophraya River Mouth	<i>Noctiluca scintillans</i>
3. 14 Jan	Redish Brown	Ban-Leam (Petchaburi Province)	<i>Cochlodinium</i> sp.
4. 15 Jan	Green	Ban-Leam (Petchaburi Province)	<i>Noctiluca scintillans</i>
5. 20 Jan	Green	Leam Pakbia-Hat Chao Samran (Petchaburi Province)	<i>Noctiluca scintillans</i>
6. 24 Jan	Green	Samut Songkhram	<i>Noctiluca scintillans</i>
7. 6 Feb	Green	Leam Pakbia (Petchaburi Province)	<i>Noctiluca scintillans</i>
8. 16-21 Feb	Green	Ban Bang Taboon (Petchaburi Province)	<i>Noctiluca scintillans</i>
9. 18 Mar	Green	Petchaburi River Mouth	<i>Noctiluca scintillans</i>
10. 17 Apr	Brown	Ta-Yang (Petchaburi Province)	<i>Trichodesmium erythraeum</i>
11. 23-27 Apr	Green Brown	Ban Leam (Petchaburi Province)	<i>Noctiluca scintillans</i>
12. 1-5 May	Green	Mae Klong River Mouth	<i>Noctiluca scintillans</i>
13. 8 May	Green	Sriracha (Chonburi Province)	Water sample was not collected.
14. 20 May	Green	Ta-Chin River Mouth	<i>Noctiluca scintillans</i>
15. 19-20 June	Green	Leam Chabang-Pattaya (Chonburi Province)	<i>Noctiluca scintillans</i>
16. 3 July	Green	Sichang-Leam Chabang (Chonburi Province)	<i>Noctiluca scintillans</i>
17. 18 July	Green	Sichang-Leam Chabang (Chonburi Province)	<i>Noctiluca scintillans</i>
18. 23 July	Green	Sichang-Sriracha (Chonburi Province)	<i>Noctiluca scintillans</i>
19. 28 July	Brown	Bang Prakong River Mouth (Chonburi Province)	Water sample was not collected.