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Original Article

Species diversity and polyunsaturated fatty acid content of thraustochytrids from fallen mangrove leaves in Chon Buri province, Thailand

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ABSTRACT

Screening and isolation were carried out of thraustochytrids from fallen, senescent mangrove leaves from three mangrove forests in Chon Buri province, Thailand. In total, 715 thraustochytrid isolates were obtained and classified into 10 species: *Aurantiochytrium mangrovei*, *A. limacinum*, *Aurantiochytrium* sp.1, *Aurantiochytrium* sp.2, *Aurantiochytrium* sp.3, *Aurantiochytrium* sp.4, *Aurantiochytrium* sp.5, *Aurantiochytrium* sp.7, Unknown 1 and Unknown 2. The frequency of occurrence of thraustochytrids ranged from 2.50% to 57.50% and was higher in the dry season than the rainy season. The dominant species found in these areas were *A. mangrovei* and *A. limacinum*, and the leaves of *Avicennia alba* had the greatest abundance of *A. mangrovei* (57.50%) and *A. limacinum* (28.75%). The biomass of *A. mangrovei* and *A. limacinum* was in the range 6.88–22.49 g/L, and 9.39–20.71 g/L, respectively. The highest content of polyunsaturated fatty acids (PUFA) was docosahexaenoic acid (DHA, C22:6n-3) in *A. limacinum* and *A. mangrovei* at 1.43–29.67% and 0.84–31.09% of total fatty acid, respectively. The arachidonic acid (ARA, C20:4n-6) and eicosapentaenoic acid (EPA, C20:5n-3) contents were highest in *A. limacinum* (0.03–0.10% of total fatty acid), and *A. mangrovei* (0.13–0.60% of total fatty acid), whereas the amount of docosapentaenoic acid (DPA, C22:5n-3) was similar in *A. limacinum* (0.41–6.08% of total fatty acid) and *A. mangrovei* (0.23–7.51% of total fatty acid). The results from this study add to the database of biodiversity of thraustochytrids in Thailand and showed that high amounts of C22:6n-3 in some selected strains have potential for use in aquaculture or commercial use.

Introduction

Thraustochytrids are non-photosynthetic marine protists of the eucaryota with monocentric thalli, an ectoplasmic net and biflagellate zoospores. The thallus possesses a multi-layered wall of scales composed predominantly of L-galactose (Bongiorni, 2012). They have been classified into the Class Labryinthula of the Kingdom Chromista or Straminipila (Burja et al., 2006; Raghukumar, 2002), and not as fungi, based on the taxonomy of the phylogenetic analysis through 18S rRNA sequencings (Cavalier-Smith et al., 1994), but they are closely related to the red and brown algae (Mannella et al., 1987). They can be found in seawater, algae, seagrass, coral reef, estuarine, mangrove forest, sediment and oceanic habitats worldwide (Leaño, 2001; Fan et al., 2002; Shene et al., 2010). They play an important role as a decomposer in marine environments, especially in the decomposition of leaf materials in mangrove forests, as a food source for filter feeders and detritus feeders in mangrove food webs and also as secondary producers in coastal zones (Raghukumar, 2002; Leaño, 2001; Wong et al., 2005; Perveen et al., 2006; Chang et al., 2012) and additionally as detritivores, bacterivores or pathogens of edible marine invertebrates (Mo and Rinkevich, 2001; Scharer et al., 2007). Another important feature of thraustochytrids is the ability to degrade hydrocarbons following oil spill events (Raikar et al., 2001).

Thraustochytrids produce high amounts of n-3 polyunsaturated fatty acids (n-3 PUFA), especially C22:6n-3 (DHA) and C20:5n-3 (EPA) which are essential for human health. C22:6n-3 is important for brain, eye and heart health, while C20:5n-3 is a precursor for prostaglandin-3 (inhibits platelet aggregation), thromboxane-3, and leukotriene-5 groups (Jain et al., 2007). *Thraustochytrium aureum* Goldstein ATCC 34304 and ATCC 28211 were reported to contain 47.40% C22:6n-3 and 52.30% total fatty acid (Bajpai et al., 1991). Numerous studies on thraustochytrids mentioned that

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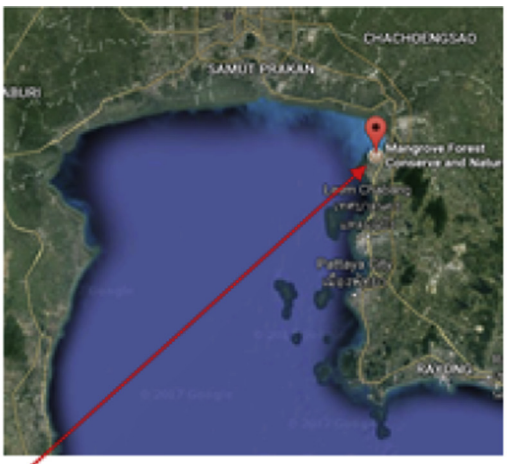

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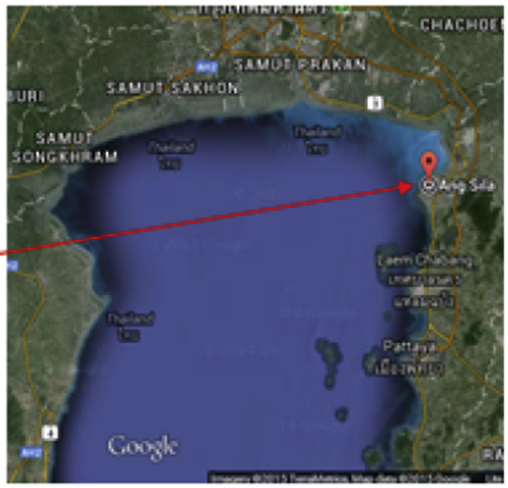

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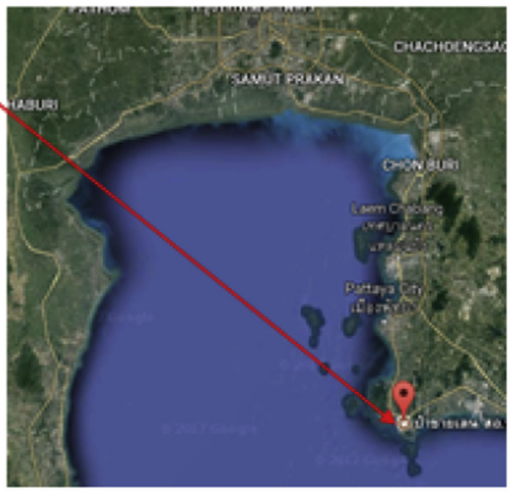

St.3 Sattahip Naval Base, Sattahip

Fig. 1. Study sampling sites.

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