

## CHAPTER 1

### GENERAL INTRODUCTION AND THESIS OUTLINE

At present, cyanobacteria or blue green algae are interesting sources of functional food. These microbes have been reported as rich sources of healthy substances such as proteins, carbohydrates, vitamins, minerals, amino acids and fatty acids (Pandey and Pandey, 2008a). *Nostochopsis* spp., (commonly known as Lon, Dok Hin or Khai Hinin in northern Thailand) are filamentous cyanobacteria normally found in the form of mucilaginous balls. These cyanobacteria luxuriantly attach to rock surfaces in clean or moderate water quality lakes and slow running streams. The local people in northern Thailand, especially in Nan province, consume them as food and medicine (Peerapornpisal *et al.*, 2006). However, their biodiversity has not been investigated not only in Thailand but also in most areas of the world. So, this study aimed to investigate the biodiversity of *Nostochopsis* spp. by identification of morphological characteristics such as shape and size of trichomes, cell types and size location of heterocytes, including molecular markers for analysis of genetic diversity. Besides, the cultivation for biomass using various substrates, biochemical components such as chlorophyll, phycocyanin, phycoerythrin and carotenoids were examined. Moreover, the mucilaginous morphological characteristic of *Nostochopsis* spp. has been suggested to compose of carbohydrates or polysaccharides that may be possible to apply in many products. Polysaccharides and oligosaccharides from various algae have been found to contain several bioactive activities such as antibacterial activities (Kolankinathan *et al.*, 2009) antioxidant potential (Cornish and Garbary, 2010), anti-

inflammatory property (Peerapornpisal *et al.*, 2006; Hong *et al.*, 2011), anti-coagulant activity (Rodrigues *et al.*, 2011), antimicrobial activity (Kantachumpoo and Chirapart, 2010), anti-viral activity (Sinha *et al.*, 2010) and apoptotic activity (Kwon and Nam, 2007). However, there were few studies on polysaccharide from fresh water algae, especially from *Nostochopsis*. Also, this study was to compare polysaccharide of these cyanobacteria from different areas of northern Thailand. Prebiotics properties were also studied.

**The objectives of the research are;**

1. To study the polyphasic taxonomy of *Nostochopsis* spp. from northern Thailand
2. To study the cultivation of *Nostochopsis* spp.
3. To examine potential use of polysaccharides from *Nostochopsis* spp. as prebiotic

**The research is divided into the following chapters;**

**Chapter 1** Introduction

**Chapter 2** Review of the taxonomic classification of cyanobacteria, polysaccharide, cyanobacterial polysaccharides and prebiotics

**Chapter 3** Water quality, sampling sites and colonial growth of *Nostochopsis* spp.

**Chapter 4** Improvement of DNA extraction protocols for *Nostochopsis* spp.

**Chapter 5** Polyphasic taxonomy of *Nostochopsis* spp. morphotypes from northern Thailand

**Chapter 6** Cultivation of *Nostochopsis* sp. 2 CM4

**Chapter 7** Potential use of polysaccharides from *Nostochopsis* spp.  
as prebiotic