Thesis Title Polyphasic Taxonomy and Prebiotic Potential of Cyanobacteria *Nostochopsis* spp. from Northern Thailand

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ABSTRACT

Nostochopsis spp. are edible cyanophyte which form thick mucilaginous colonies, 0.1-8 cm in diameter, attached on under water rocks, cobbles or concrete blocks in transparent shallow streams or rivers. They are classified in the Phylum Cyanobacteria, Order Nostocales and Family Hapalosiphonaceae. *Nostochopsis* spp. were collected during November 2010 to April 2011 from nine sampling sites. Four sampling sites were glass houses of Queen Sirikit Botanical Garden, Mae Rim, Chiang Mai Province, two were at Nan River, one was at Nam Yao River, Nan Province and two were at Mae Hong Son Province. The water quality at all sampling

sites were clean - moderate. Crushing cells with liquid nitrogen with the addition of Polyvinylpolypyrrolidone (PVPP) was most suitable for *Nostochopsis* spp. genomic DNA extraction to obtain high amount of DNA and reduce contamination from proteins and polysaccharides. The DNA is suitable for PCR template. Morphological and ultrastructural studies as well as evolutionary relationship by phylogenetic analysis of the 16S rRNA gene with the 16S-23S intergenetic segment and *nif*H gene of 10 isolates were conducted. Isolates of *Nostochopsis* were 98% similar to *Fischerella*, *Hapalosiphon* and *Westiellopsis*. *Nostochopsis* sp.2 showed 98% similarity with *Nostochopsis* sp. HA4207-MV1. Some isolates may be new genus.

The biomass yield of 1,061±0.01 mg dry wt.l^{-1} was obtained when this cyanobacteria was grown in BG-11 medium without nitrogen source for 2 months using limestone as substrate. It was also found that, the substrate was essential for cyanobacterial growth.

Polysaccharides were extracted by hot water method. The highest polysaccharide content of 49.03±0.08% (w/w) (p<0.05) and the highest total sugar of 49.28±5.08 % w/w were obtained in the samples from Nan River. The highest reducing sugar was 7.16±0.26 % (w/w) (p<0.05) in the samples from Queen Sirikit Botanical Garden. Degree of polymerization of polysaccharide (DP) varied from 6-9. The monosaccharides from *Nostochopsis* were glucoronic acid, galactose, glucose, fructose, mannose and rhamnose. The possibility of using polysaccharide (DP9) and oligosaccharide (DP4) from *Nostochopsis* as prebiotic was determined in pure and mixed cultivation. It was found that a probiotic species; *Lactobacillus fermentum* CM33 was able to grow. However, no growth inhibition of pathogenic species; *Salmonella enteritidis* and a normal flora; *Escherichia coli* O157:H7 were observed.