

## CHAPTER 1

### INTRODUCTION

Biodiversity is the full range of variety and variability within and among living organisms and the ecological complexes (Jensen and Tom, 1990). Cyanobacteria are the member of many ecosystem. They are most diverse, widely distributed group of photosynthetic prokaryotes which found everywhere in almost all ecosystems on the earth from normal environments namely from marine to freshwater, bare rocks to soils, in extreme biotopes from acidophiles to alkaliphiles, psychrophiles to thermophiles and also in hypersaline conditions (Wehr and Sheath, 2003; Satyanarayana *et al.*, 2005). In almost all, cyanobacteria play the important role as primary producers in the food chains and some species can fix atmospheric nitrogen to the ecosystems. Currently, cyanobacteria are concerned for their possibility to be used in several aspects such as supplementary food, fertilizers, biofuel, pharmaceuticals and production of secondary metabolites including pigments, antioxidant substances, enzymes and so on (Stanier and Cohen-Bazire, 1977; Deepa *et al.*, 2010). Therefore, the studies of this organism are done in many fields of interest i.e. their taxonomy, classification and systematics, agricultural and biotechnology as well.

Hypersaline environments are the habitats that contain total dissolved salts in excess of seawater levels. These habitats can be found in many parts throughout the

world. In Thailand, there are also hypersaline biotopes almost in the whole country, particularly near sea coastal areas (Middle, Eastern and Southern parts) and in several inland areas (Northeastern part). The origination of these areas in Thailand was separated by two reasons from natural processes and artificial of man-made production. The best well known of hypersaline environment in Thailand is solar salterns.

The study on biodiversity, systematic and taxonomy including ecology and life cycles of these organisms in hypersalinic biotopes of Thailand such as solar salterns, is rare. It has been investigated widely by foreign scientists in other parts of the world for understanding their life, adaptations and how they protect themselves under high salt concentrations. In fact, it was expected to be potentially valuable for applications in agriculture, commercial industry, environments and other sectors as with other extremophilic cyanobacteria.

Thus, in this study, biodiversity, distribution, taxonomy and classification of cyanobacteria in some saline soils of Thailand including some physical and chemical characteristics of their habitats, were studied. The identification and classification of cyanobacteria were analyzed. The interested strains were selected and determined by polyphasic methods (morphology combined with molecular biology and electron microscopy). Moreover, isolation and cultivation of individual species were done. The ecophysiology characteristics of each isolated strain were also studied, particularly the dependence of growth on the salt concentrations.

## 1.1 Objectives

The objectives of this study are as follows:

- 1.1.1 To study the diversity and distribution of cyanobacteria which inhabit some saline soil areas, especially in Petchaburi and Samut Songkhram solar salterns including some physico-chemical properties of their habitats.
- 1.1.2 To describe and evaluate taxonomically cyanobacterial species found in hypersaline localities in Thailand.
- 1.1.3 To analyze the phylogenetic and taxonomic background of some interesting species.
- 1.1.4 To isolate and cultivate the dominant and some species found from sampling sites for further studies.
- 1.1.5 To study the ecological characteristics of some isolated species *in vitro*.