

CHAPTER 1

INTRODUCTION

Algae are the most important producer in the aquatic ecosystem. They absorb carbon dioxide to produce oxygen in the photosynthesis. So, they may be an alternative in reducing the impact of global warming phenomenon in the future (Wetzel, 2001). Algae are rich sources of carbohydrate, protein, enzyme and fiber. Besides, many vitamins and minerals e.g. vitamin A, C, B1, B2, B6, magnesium and calcium are abundantly found in algae. Being such a rich source of essential nutrients, they are a major source of food, especially, in Asian countries such as China, Japan and Korea. Nowadays, they are used as food supplements and are consumed throughout the world for their nutritional value. Seaweeds are important food supplement for animals and can also be used as fertilizers. They also have the potential in producing vegetable oil. Diatoms are micro-algae with cell wall composed of silicon oxide which makes them highly resistant to decay and, therefore, can be used in forensic medicine.

At present, algae can be used to produce biodiesel, which has a good possibility to become an efficient alternative source of fuel. Due to increasing price of petroleum products, biodiesel can serve as a cheaper source of energy. Besides, it is environmentally friendly and can be effective in regulating global warming and

climate change by controlling the level of pollution. One of the most promising strategies is using algae to mitigate the amount of carbon dioxide emitted into the atmosphere. Algae can fix carbon dioxide at a faster rate than most plants and can be used as food, biofuels, pharmaceuticals, cosmetical, in agriculture, as well as in textile industry and as a source of essential nutrients to the treatment of a number of diseases. In addition, algae are able to tolerate flue gas pollutants such as sulfur oxide and nitrogen oxide. So, they have a wide range of applications.

Pediastrum spp. are green algae belonging to the Division Chlorophyta, Class Chlorophyceae, Order Chlorococcales, Family Hydrodictyaceae. Preliminary data indicated that *Pediastrum* spp. grow significantly faster than other algae and has a high protein content up to 46% (Lee *et al.*, 2009). There have been only few previous studies on *Pediastrum* spp. in Thailand. In addition, the applications of *Pediastrum* spp. have not yet been fully studied due to lack of basic information, limitation in species identification and ecological data. The main objective of this research was to investigate the biodiversity of *Pediastrum* spp. in water resources of Thailand. In addition, the cultivation and application of this alga as novel source of supplementary protein was investigated. This research provides basic information for both academic and industrial sectors.

Research Objectives

1.1 To study the diversity of *Pediastrum* spp. in water resources of Thailand

1.2 To evaluate nutritional value of dominant species of *Pediastrum*