CHARPTER 1

INTRODUCTION

1.1 Background

At the present Thai government focuses on herbs and Thai traditional medicine in primary health care. This help decreasing the need for imported drugs and products from oversea. Bua Bok is one of the herbal vegetable that can be used in cosmetic and medicine industries.

The scientific name of Bua Bok is *Centella asiatica* (L.) Urban. It belongs to the family Umbelliferae. It can grow well in humid condition, direct sunlight, dim light or shade and from low plains up to 3,480 meters above the sea level (Hedge and Lamond, 1992). It is native to Thailand, and a popular vegetable here. Thais have consumed it for a long time as a side dishe eaten with chilli sauce or spicy minced meat salad or as a medicine for curing apthous ulcer, etc. In addition, stolons and leaves are processed to produce Bua Bok juice, a popular beverage. The analysis of the nutritional value of fresh Bua Bok found that it contains fiber, calcium, protein, beta-carotene, vitamin C etc. Bua Bok is used Thai traditional medicine for treat in many diseases, especially for burns and scalds. The photochemical analysis of Bua Bok found many groups of natural chemicals such as triterpenes, essential flavones derivatives, phytosterols, amino acids and saponin glycoside etc. The most important natural chemicals in Bua Bok are asiaticoside and madecassoside. They are members of saponin group. Asiaticoside is a substance which has much force in pharmacology both in *vitro* and *vivo* such as power in wound healing, ulcerprotection; power in psychoneuro-pharmacological, immunomodulatory and antiviral, etc (Shukla et al., 1999; Shukla et al., 2003; Punturee, 2005; Huang et al.,

2004). Which high potential properties mentioned above, at the present, Bua Bok has been increasingly applied in pharmaceutical and natural products in various forms including beverage such as Bua Bok juice (for being healthy), tea, tea power juice, shampoo and cosmetics from Bua Bok etc.

Bua Bok has been grown in Thailand for a long time, mostly in the back yard for family use with local species. It has rarely been cultivated for commercial in large areas. The areas that grow Bua Bok commercially conclude Chiang Mai, Khon Kaen, Ubon Ratchathani, Maha Sarakham, Nakhon Pathom, Ratchaburi, Samut SaKhon and Nakhon Si Thammarat. In India Bua Bok is exported to German, United States, French, Japan and Hong Kong for medicine and cosmetic industries.

The researches in Thailand about Bua Bok mostly focused on clinical property, chemical property, extraction and the use of active compounds. There are not many researches or reports on cultivation or production of raw material. Therefore development of Bua Bok is from raw material to product. The end product must be demanded by consumers and must be quality. There are many factors related to herbs or herbal products. One of the main factors is quality of raw material. The quality of raw materials in international trade routes, or the global market will be the standard. One of the requirements for Bua Bok is that the triterpene ester glycoside (asiaticoside and madecassoside) be not less than 2.0% weight per weight (World Health Organization, 1999). The production of quality raw materials starting from the cultivation process by selecting highly active chemical cultivars, plant well, providing optimum fertilizer. The harvesting of crops should be done only the part of plant that accumulated the highest active chemical and at the suitable time, since each part of plant has different active

chemicals. In addition, appreciated packaging and storage will help preving the degradation of raw materials.

It can be concluded that, the main factors to produce good raw material depends on the cultivated areas, varieties and cultivation process. The cultivation are relevant to environment, light, temperature and humidity. Light is the main factor of plant growth, since it is the key in the process of photosynthesis, which finally produces carbohydrate as a source of energy for plant growth, including secondary metabolites.

In Journal Flora of Thailand (Hudge and Lamond, 2005) reported that family Umbelliferae, Genus Centella in Thailand, had only *Centella asiatica* (Bua Bok). But variation occurred in Bua Bok growth in different areas (Piriyapattarakit, 2008; Muthur et al., 2000). The variation of Bua Bok includes leaf margin, leaf size, color of stolon and petiole. Furthermore Bua Bok grown under different light intensity affects chemical content (Mathur et al., 2000). Generally Bua Bok is harvested at 60-90 days after cutting stolons by picking the whole plant or cut only petioles and leaves, both immature and mature leaves.

This research took Bua Bok from different sources for studying the effects of leaf age and light intensity on growth, nutrition value, and asiaticoside content of Bua Bok.

1.2 Objectives

1.2.1 To study the effects of leaf maturity on asiaticoside and nutritional value in Bua Bok.

1.2.2 To study the effect of pre-harvest light condition on asiaticoside and nutritional value in Bua Bok.

1.2.3 To study the effect of temperature and storage time to accumulate asiaticoside in Bua Bok.

1.3 Scope of research

1.3.1 Experiment 1. Effect of leaf maturity on asiaticoside and nutritional content in Bua Bok.

1.3.2 Experiment 2. Effect of light condition during growing on asiaticoside and nutritional content in Bua Bok.

1.3.3 Experiment 3. Effect of storage temperature on quality and asiaticoside content in Bua Bok.

1.4 Prospective

The results from this research will help to clarify the accessions of Bua Bok that produces the highest asiaticoside the suitable leaf maturity and light intensity, temperature and storage time to preserve asiaticoside. It can also used as production guidelines for commercial use.