CHAPTER I

INTRODUCTION

Lagerstroemia speciosa (L.) Pers. (Lythraceae), locally known in Thai as "อินทนิลน้ำ", is a folkloric medicine. This medicinal plant, popularly known as banaba, is an ornamental plant that grows widely in the Philippines, India and South East Asian countries. The leaves of this tropical plant have been used as a folk medicine for treatment diabetes mellitus (Matsuyama, 2001; Quisumbing, 1978; Yamaguchi *et al.*, 2006). Banaba extracts are also known to have antiobesity (Suzuki *et al.*, 1999), anti-oxidant (Unno *et al.*, 1997) and anti-gout (Unno *et al.*, 2004) effects. Corosolic acid, an active ingredient of the extract, displays a potential anti-diabetic activity (Fukushima *et al.*, 2006; Judy *et al.*, 2003; Kakuda *et al.*, 1996; Lui *et al.*, 2001; Miura *et al.*, 2004; Miura *et al.*, 2006; Murakami *et al.*, 1993; Shi *et al.*, 2008), anti-oxidative stress, anti-inflammation, and antihypertention (Yamaguchi *et al.*, 2006).

L. speciosa has long been used in traditional medicines. However, scientific standards or pharmacognostical parameters are not yet available to ascertain the identification and to determine the quality of this herb. At present, *L. speciosa* tea from some traditional drugstores had decreased anti-diabetic activity. It may be occurred from incorrect herbal identification. Pharmacognostic specification and DNA fingerprinting could be used as tools for authentication and detection of adulterants.

Examinations of macroscopic and microscopic characteristics are the first step towards establishing the herbal standardization of materials, and should be carried out before any further tests are undertaken. In addition, the constant number of leaf is parameters that are unique to the plant (Radhika *et al.*, 2010). A chemical profile, the thin layer chromatographic pattern, was produced with the aim for testing the purity. R_f values indicated the position at which the substance was located on the chromatogram. The advantage of R_f value was widely recognized as a guide for identification of medicinal plants. Phytochemical screening portrays that most of the natural products tested for were present in the plant material. Physicochemical parameters of the crude drugs were important parameters to prevented adulteration or improper handling of drugs. The moisture content and loss on drying of crude drugs

should be minimized in order to prevent spoilage due to microbial contamination or decomposition of chemical. Ash contents are accountable for controlling the admixture of foreign inorganic matter. The extractive values also determine the quality control as well as purity of crude drugs. Furthermore, corosolic acid had been used for chemical marker for quantitative assessment of crude drugs, which were collected and purchased from traditional drugstores throughout Thailand. Hence, all of pharmacognostical parameters are major and reliable criteria for confirmation of the identity and determination of quality and purity of the crude drugs.

The accurate identification and quality control of the plant material is, therefore, an essential prerequisite for ensuring the quality, safety, and efficacy of *L. speciosa* leaves and other herbal medicines. General approaches to herbal identification depend on morphological, anatomical, and chemical analyses, but these characteristics are often affected by environmental and/or developmental factors during plant growth (Li *et al.*, 1994). Nevertheless, the use of chromatographic techniques and marker compounds to standardize botanical preparations has limitations because of the varied sources and chemical complexity of such preparations. In particular, many extrinsic factors such as methods of cultivation, harvesting, drying and storing may affect the ultimate chemical profile of a given herb. So, DNA based polymorphism assay may offer an alternative method to identify herbal medicines. The analysis of DNA has the advantages of being applicable to all parts of plants and not being affected by conditions of culture (Shim *et al.*, 2003). A number of recent studies have indicated that DNA markers are ideal tools for elucidating the molecular evolution and phylogeny of the species concerned, as well as for identifying crude herbal materials (Xue *et al.*, 2006). Amplified fragment length polymorphism (AFLP) is a DNA fingerprinting technique that approaches the ideal as a marker system for resolving genetic diversity among individuals, populations and species (Muller and Wolfenbarger, 1999). This technique is highly reproducible, and can be used to survey overall genetic difference in the genome without any prior sequence knowledge (Jones *et al.*, 1997)

The goal of this study is to develop various necessary pharmacognostic specification and DNA fingerprint of *L. speciosa* leaves for medicinal plant authentication. The present investigation of *L. speciosa* leaves is undertaken to establish pharmacognostic profiles of the leaves which will be useful in crude drug identification as well as in standardization of the quality and purity. The DNA

fingerprint analysis was designed to investigate the genetic relationship among species belonging to *Lagerstroemia* using the AFLP marker. The results of this study will provide useful information for its correct identification and may enable those who handle this plant to maintain its quality control. In addition, the results of this present study could be useful for preparation of a Pharmacopoeial Monograph of this plant.