CHAPTER 1

INTRODUCTION

1.1 General introduction

Despite the availability of a number of modern efficacious medicines nowadays, herbal medicines are still widely used and their importance is increasing. However, one of the main problems of phytotherapy is the standardization of herbal preparations. The use of preparations inadequately standardized involves a considerable risk of distortion and produces a false negative overall result (Franz, 2002). Reaching to a good therapeutic efficacy of an herbal medicine is depended on various factors including varieties, cultivation, harvesting, post-harvesting, packing and storage of the herbal plants. In fact, the plants are from different sources and seasons, so these will cause a variation of active compound content that effect on quality of products. Many researchers have been therefore interested in study on pharmacognostic and the factors affecting the content of the active constituents in herbs. For example, it has been reported on pharmacognostic and chemical specification studies of *Rhinacanthus nasutus* leaves (Panichayupakaranant *et al*., 2006). It will be beneficial for the public consumers if an appropriate quality of pharmacognostic and chemical specifications of crude drugs or herbal extracts are established. Recently, various Thai herbal plants are used widely for preparing of herbal medicines. Unfortunately, vast of commonly used herbal plants and extracts are still lacks of standard information for their quality control. Thus, nowadays many organizations involved with this field focus on the standardization of the plant extracts to qualify those herbal medicines.

The plants that belong to the family of Acanthaceae have been widely used as traditional medicines, one of which is *R. nasutus*. This plant has long been used in Southeast Asia, South China and India for a treatment of dermatomycosis such as tinea vesicolor and ringworm (Farnsworth and Bunyapraphatsara, 1992). It has been reported that *R. nasutus* possesses several interesting biological activities, e.g. antifungal (Wu *et al*., 1998[a], Panichayupakaranant *et al*., 2000; 2003, Kongchai and Panichayupakaranat, 2002), antiviral (Kernan *et al*., 1997), antitumour

(Thirumurugan *et al*., 2000), anti-platelet aggregation (Wu *et al*., 1998[b]) and antibacterial (Sattar *et al*., 2004). In Thailand, the Thai Foundation Health Committee, Ministry of Public Health, has recommended the leaves and roots of *R. nasutus* for the treatment of tinea and ringworm (Farnsworth and Bunyapraphatsara, 1992).

In this study, the antifungal activity of *R. nasutus* was focused. The fungal infections are mostly found in the tropical country such as in Thailand. It causes illness as well as effects on a quality of life of the patients. Nowadays, the commercial antifungal drugs are available but the cost is expensive. Thus, the researchers involved in phytomedical field are searching for the medicinal plants that possess antifungal activity with low toxicity, in order to be an alternative medicine. It has been reported that the rhinacanthin high-yielding *R. nasutus* leaf extract exhibited satisfactory antifungal activity and had a potential for a further development of a topical antifungal medicine (Kongchai and Panichayupakaranant, 2002). The antifungal active constituents in the leaf extract are rhinacanthin-C, -D, and –N. Thus, the quantitative analysis method for standardization of the rhinacanthin high-yielding *R. nasutus* leaf extract is necessary for the development of the antifungal medicine. Recently, there is only one paper published using HPLC to determine rhinacanthin-C content in *R. nasutus* leaves (Gotoh, 2004). However, validation of the analytical procedure is not yet established. Therefore, there is a need to develop and validate a method to simultaneous quantification of rhinacanthin-C, -D, and -N in *R. nasutus* leaves in order to be as valuable informative tool for the quality control.

In addition, the lack of chemical specification, physical properties and stability information of rhinacanthin high-yielding *R. nasutus* leaf extract has been an obstacle of the further development of the herbal medicine. The chemical specification of the rhinacanthin high-yielding *R. nasutus* leaf extract is necessary for the establishment of the monograph of the extract. This monograph is useful for standardization of the extract. In addition, some physical properties e.g. solubility and the stability information of the rhinacanthin high-yielding *R. nasutus* leaf extract are useful for formulation of the antifungal preparations.

1.2 Objectives

The objectives of this study were as follow:

1.2.1 To establish and validate the HPLC method for simultaneous quantitative analysis of rhinacanthin-C, -D, and -N in *R. nasutus* leaf extract

1.2.2 To study some physical properties and stability of the extract in order to get a useful information for future studies on development of the herbal medicine from the extract

1.2.3 To establish the monograph of the rhinacanthin high-yielding *R. nasutus* leaf extract for a further standardization.