CHAPTER I

INTRODUCTION

Medicinal plants which are natural resources, are at present, being promoted as therapeutic agents or raw materials in pharmaceutical industry.

In order to utilize the medicinal plants as therapeutics purpose, scientific evidences in various fields such as pharmacology, immunology and toxicology are essential. In addition, the qualitative and quantitative control of active ingredients is also necessary. It is the purpose of this research work to determine both quality and quantity of diterpenoid constituents in a widely used medicinal plants, *Andrographis paniculata* (Burm.) wall.ex Nees.

Andrographis paniculata (Burm.) wall.ex Nees, a well known small shurb belonging to the Acanthaceae family, is known in Thai name, as Fah Talai Joan, Nam Laai Phangphon and Yaa Kannguu (1). The Plant is an erect annual one 30-90 cm hight; stem quadrangular; leaves opposite, smooth, pointed, on short petioles, lanceolate, entire dorsal surface dark green and shining, ventral surface paler and finely granular. The leaves vary much in size, the largest are usually 7.5 cm in length and 2.5 cm in width. Inflorescenes terminal racemes 3-10 cm long,

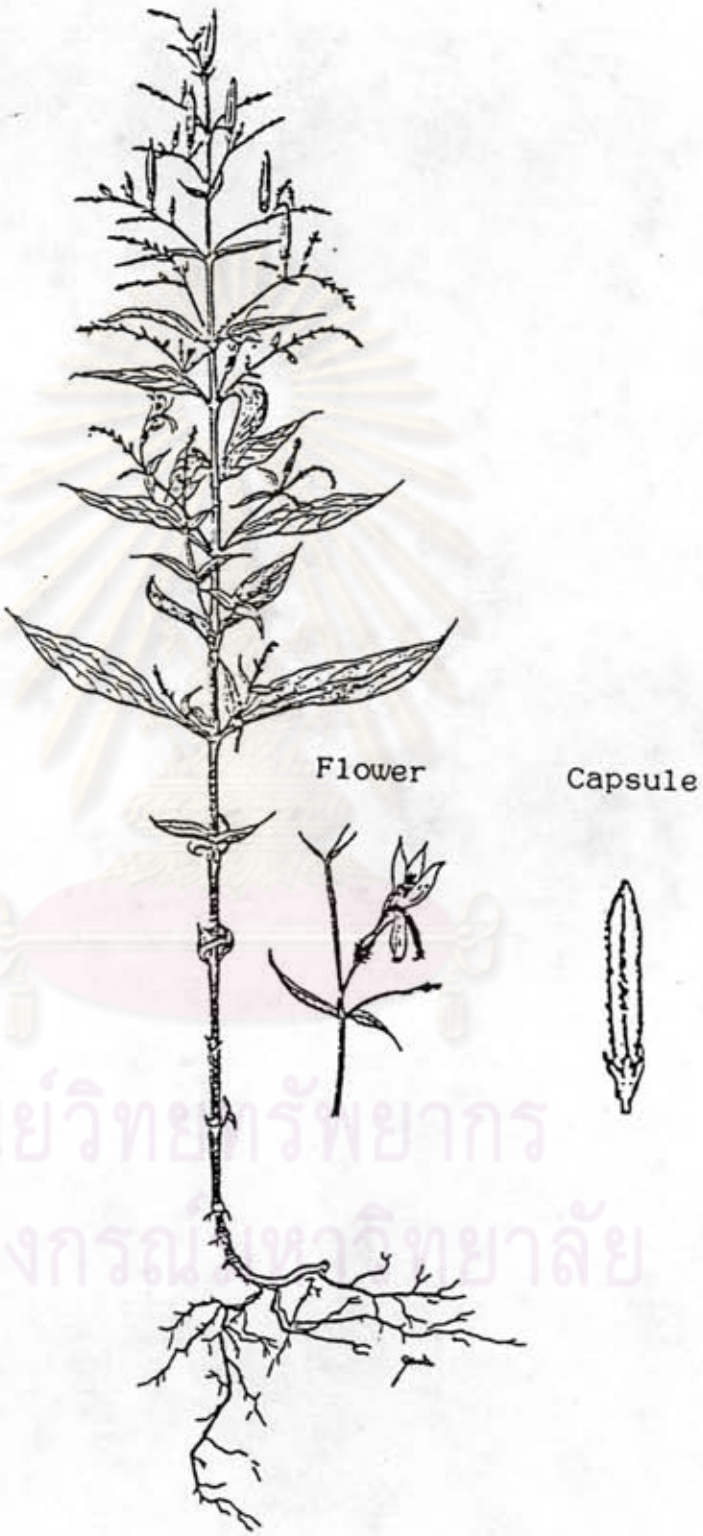

Figure 1 *Andrographis paniculata* Wall.ex Nees Acanthaceae

Thai name : Nam Laai Pangphon, Fah Talai Joan.

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flower alternate, pedicels 0-0.5 cm distance, usually pubescent; bract 0.15 cm linear; bracteoles smaller or not. Calyx 0.3 cm long deeply five-cleft, corolla 1.5 cm long, bilabiate, tips linear, reflected, upper one three toothed, lower one two toothed, white colored streaked with rose purple. Filaments 2 hairing upwards. Ovary and base of style subglabrous or very thinly hairy. Capsule 1.8 cm x 0.3 cm, young slightly glandular-hairy, mature glabrous. Seeds 8-10 deep browny subguadrate, osseous, rugose, without hair or scales. Roots fusiform, simple woody with numerous fine radicles (2,3). *Andrographis paniculata* is popularly cultivated and is also easily propagated, the plant is widely distributed over the area of cultivation through the spread of seeds in mature capsules. All parts of the plant have bitter taste.

Andrographis paniculata, a tropic plant grows widely throughout the plains of India, where is assumed to be its native land (4). In India, the plant is well reputed under the name "Kalmegh" as a common bitter prescribed to children with stomach and liver troubles and also as tinctures or extracts which earned the recognition in the Indian Pharmacopoeia,1955. Indian and Bangladesh people used this plant in the treatment of malaria, dysentery, diarrhea, liver dysfunction and as snake venom antidote (5).

In Mianmar and the People Republic of China, the whole part of *Andrographis paniculata* is prescribed for

dysentery and fever (6).

In Southeast Asia, *Andrographis paniculata* is widely used in traditional medicine as an antidote for snakes and insects poisons, and as an antimalarial agent (7).

In Thailand, the decoction of the whole part of *Andrographis paniculata* was used as expectorant after the operational therapy for tonsinlitis (8), its leaves was used for treatment of fever (9), dysentery, diarrhea (10), inflammatory injury (11), herpes zoster infection, herpes simplex infection (12). The Board of Primary Health Care, Ministry of Public Health has established a policy on promotion of the usage of this plant in the community hospital thoughout the country.

A clinical study on the usage of *Andrographis paniculata* as the capsule preparation, which contain fine powder of its whole part, when compare with tetracycline hydrochloride in diarrhea patient, was recently reported. *Andrographis paniculata* reduced more amount of stool and electrolyte loss than tetracycline hydrochloride did. In addition, *Andrographis paniculata* can also reduce more amount of bacteria in stool (13).

The Office of Primary Health Care have been used this medicinal plant in the treatment of common cold and sore throat in seven community hospitals of Thailand. Nowadays this medicinal plant are widely used in Thailand.

Phytochemical investigations indicated that the leaves of *Andrographis paniculata* contains various diterpene lactones such as andrographolide (14-16), neoandrographolide, deoxyandrographolide-19β-D-glucoside, deoxyandrographolide (16), dehydroandrographolide (17), paniculide A, paniculide B, paniculide C (18), Other compounds such as caffeic acid (3,4-dihydroxycinnamic acid), chlorogenic acid, 3,5-dicaffeoyl-*d*-quinic acid (19), were also reported.

In 1989, Sirima *et al.*(20),reported that the crude powder of the leaves of *Andrographis paniculata* posses effect on the inhibition of the gastric lesion induced by stress in mices and aspirin in rats. Two diterpene lactones, andrographolide and 14-deoxy-11,12-didehydroandrographolide isolated from the leaves of this herbal medicine, depressed the response of the isolated stomach and intestinal smooth muscle preparation of the rabbit and the guinea pig to acetylcholine, histamine and carbachol (21,22).

The Pharmacopoeia of the People's Republic of China (23), described in connection with the usage of *Andrographis paniculata* that the pure isolated constituents, andrographolide have been used in the form of tablets or its sodium bisulfite injection preparation.

It is reason to state that ones of the active constituents in *Andrographis paniculata* are diterpenoids.

More information on both qualitative and quantitative analysis for diterpenoid contents in *Andrographis paniculata* sample should be done together with the research on their other pharmacological actions.

The Pharmcopoeia of the People's Republic of China (23), described the quantitative control of the plant by the method of colorimetry. Color occurrence principle base on the reaction of 3,5 dinitrobenzoic acid with diterpene lactones in *Andrographis paniculata*. The Division of Medical Research, Department of Medicinal Sciences, Ministry of Public Health, Thailand (24) , had also reported the determination of total lactones from this plant by breaking the lactone ring with sodium hydroxide solution, then back titration with standardized hydrochloric acid. Moreover, C. Dechang *et al.*(25), had reported the method for determining andrographolide, neoandrographolide and deoxyandrographolide contents in *Andrographis paniculata* by thin layer spectral densitometry.

Nowadays high performance liquid chrormatographic method is widely used to determine organic compounds since it is less time consumed and versatile. It also give high sensitivity, good resolution, and applicable to both quantitative and qualitative analysis. The purpose of this research is to find a good and convenience procedure for determining diterpenoid contents in the leaves of *Andrographis paniculata*. Data on variation of each

diterpenoide contents in the leave of this plant are also monitoried, so that additional information which will be beneficial for further clinical evaluations of the plant usage can be obtained.

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