ABSTRACT OF THE DISSERTATION

1. Introduction

Topic of the dissertation:

"Study on Botanical Characteristics, Chemical Composition and Biological Effects of *Bombax malabaricum* DC., (family Bombacaceae)".

Specialized in: Traditional Pharmacy **Code number:** 62.72.04.06

Name of candidate: Ho Thi Thanh Huyen

Name of advisors:

1. Ass. Prof. Dr. Nguyen Thai An
2. Ass. Prof. Dr. Thai Nguyen Hung Thu

Institution: Ha Noi University of Pharmacy

2. Summary

2.1 Objectives

1. Study on botanical characteristics of *Bombax malabaricum* DC., (*Bombacaceae)* collected in Ha Noi.
2. Study on chemical compositions of the collected plant samples.
3. Study on acute toxicity and biological effects of the collected plant samples.

2.2 Methods

2.2.1. Botanical studies:

- Identify scientific name of the plant samples on the basis of the morphological characteristics and reproductive system in comparison with the standard specimens in herbarium, the taxonomic references and by the aids of taxonomic experts.
- Investigate anatomical characteristics of the plant samples: cutting and making anatomical specimens and powdering leaves, flowers and stem bark; observing, describing and photographing the anatomical specimens and the powders.

2.2.2. Chemical composition studies:

- Qualitative analysis of organic compound groups in the total extract by chemical indentification and thin layer chromatography.
- Extraction of the components by solvents with different polarization.
- Isolation of compounds by column chromatography using Silica gel (MERCK) as adsorbent and reversed phase chromatography YMC.
- Identification of the isolated compounds based on the MS, NMR, melting point, also confirmed by a comparison with the referenced spectra and documents.
- Development of HPLC methods for quantitative determination of isolated compounds.

2.2.3. Acute toxicity and biological effect studies:

- Evaluation of the acute toxicity of water extract of *B. malabaricum* DC. leaves, flowers and stem bark on mice following the guideline of MOH.
- Evaluation of the analgesic effects of water extract and ethyl acetate fraction of *B. malabaricum* DC. stem bark on mice. The writhing model induced by acetic acid (as described by Koster) and hot wheels were employed.

- Evaluation of the acute anti-inflammatory effects of water extract and ethyl acetate fraction of *B. malabaricum* DC. stem bark on Carrageenin-induced paw edema on rats.
- Evaluation of the chronic anti-inflammatory effects of water extract and ethyl acetate fraction of *B. malabaricum* DC. stem bark on Carrageenin-induced granuloma on rats.
- Evaluation of the hepatic protective effects of water extract of *B. malabaricum* DC. leaves on mice. The paracetamol-induced liver injury model was employed.

2.3 Results and discussion

2.3.1. Botanical identification of *B. malabaricum* DC.

- Plant materials were collected in Huong Son, My Duc (Hanoi). The scientific name of plant matched with *B. malabaricum* DC.
- The plant micromorphology of studied sample was identified on the microsurgery characteristics of leaves, branches and powdered leaves, flowers, stem bark. The obtained result is a contribution to the standardization of the plant materials.

2.3.2. Chemical studies of *B. malabaricum* DC.

- Groups of substances have been identified in stem bark of *B. malabaricum* DC. including: cardiac glycosides, alkaloids, saponins, flavonoids, coumarins, tannins, organic acids, reducing sugars and sterols;
- Groups of substances have been identified in flowers and leaves of *B. malabaricum* DC. Including: cardiac glycosides, alkaloids, saponins, flavonoids, coumarins, tannins, organic acids, reducing sugars, sterols, amino acids and carotenes.
- Eight compounds were isolated from stem bark of *B. malabaricum* DC. including: friedelin, catechin, epicatechin, momor cerebroside I, daucosterol, stigmasterol and diethylhexyl adipate.
- Seven compounds were isolated from leaves of *B. malabaricum* DC including daucosterol, stigmasterol, mangiferin, lupeol, taraxeryl acetate, taraxerol and 7α-hydroxysitosterol.
- This was the first time when momor cerebroside I, 7α-hydroxysitosterol were isolated from family Bombacaceae and friedelin, epicatechin, catechin were isolated from genus *Bombax* L. Lupeol, daucosterol and stigmasterol were isolated from both stem bark and leaves.
- Reverse-phase HPLC method for simultaneous quantitative determination of crystallized compounds isolated from *B. malabaricum* DC. leaves, flowers and stem bark was developed with following conditions: reverse-phase Zorbax C18 column, 280-nm detector, acetonitrile and methanol gradient solvents. This method was fully validated and could be applicable for quantitative determination of compounds isolated from *B. malabaricum* DC. leaves and stem bark. This result is a contribution to the modernization of the plant

material standardization.

- The results of the quantitative determination showed as follows: 100g of dried stem bark contains: epicatechin – 12.3mg, catechin – 6.7mg, daucosterol – 1.8mg, lupeol – 9.5mg, stigmasterol – 1.9mg, friedelin – 7.6mg; 100g of dried leaves contains: mangiferin – 8.1mg, daucosterol – 1.1mg, 7α-hydroxysitosterol – 0.9mg, lupeol – 5.7mg, taraxeryl acetate – 4.1mg, stigmasterol – 0.9mg, taraxerol – 5.1mg.

2.3.3. Biological effects of *B. malabaricum* DC.

The results of the acute toxicology studies on white mice showed that:

- No dead was found in all tested batches when mice was orally administered of water extract of stem bark and leaves at the dose of 100 – 300g/kg body weight.
- No dead was found when mice was orally administered of water extract of flowers at the dose below 220g/kg body weight, however, at the dose above 220g/kg body weight, some mice were found dead. LD_{50} of *B. malabaricum* flowers was 500.71g/kg.

Biological effects of B. malabaricum DC.

- The water extract and ethyl acetate fraction of *B. malabaricum* DC. stem bark at the dose of 6g and 12 g/kg body weight showed peripheral analgesic but not central analgesic effect in mice.
- The ethyl acetate fraction of *B. malabaricum* DC. stem bark at the dose of 8 g/kg body weight showed anti- acute inflammatory effect in white rats.
- The water extract and ethyl acetate fraction of *B. malabaricum* DC. stem bark at the dose of 12g/kg body weight showed anti- chronic inflammatory effect in white rats.
- The water extract of *B. malabaricum* DC. stem bark at the dose of 12 g/kg body weight reduced bleeding time in white mice.
- The water extract of *B. malabaricum* DC. leaves at the dose of 6 and 12g/kg body weight showed hepatic protective effect in white mice: significantly decreased the acute increasing of ALAT and ASAT enzyme levels in serum, limited the hepatic damages caused by paracetamol (at the dose of 400mg/kg body weight).
- The water extract of *B. malabaricum* DC. leaves at the dose of 6 and 12g/kg body weight showed reduction effect on liver weight and antioxidant effect by reducing MDA concentration in homogenized liver ($p < 0.05$) in mice.

The scientifict advisors **Doctoral candidate**

Ass. Pro, Dr. Nguyen Thai An ***Ass. Pro, Dr. Thai Nguyen Hung Thu*** ***MSc. Ho Thi Thanh Huyen***