

SUMMARY OF DISSERTATION

Name of Doctoral candidate: Tran Van Quang

Dissertation title: “ Study on botanical characteristics, chemical composition, memory improvement effects on hAPP transgenic fruit fly model of *Polygala karensium* Kurz collected in Sa Pa, Lao Cai .”

Specialty: Medicinal Materials - Traditional Pharmacology

Code of specciality: 9720206

Name of academic advisors:

1. Assoc.Prof.Dr. Nguyen Thuong Dong
2. Assoc.Pro Dr. Pham Thi Nguyet Hang

Name of academic institute: National Institute of Medicinal Materials

Dissertation summary:

1. Objectives

- Identify botanical characteristics and appraise scientific names.
- Determine the chemical composition of the roots of *Polygala karensium* Kurz
- Evaluate the pharmacological effects on the ability to improve short-term memory and motor behavior on fruit flies of the roots of *Polygala karensium* Kurz.

2. Research Methods

2.1. Botanical study

- Appraise scientific name of researched species based on analysis of plant morphological characteristics, compare with published documents of species and plant taxonomy courses.
- Determine microscopic characteristics of stems, roots, leaves and powder characteristics of medicinal roots by microscopy.

2.2. Chemical study

- Preliminary qualitative method of groups of substances: Qualitative by chemical reactions using specific reagents of each group of substances.
- Methods of extraction and isolation of compounds:

+ Extraction method

The procedure for preparing the extract fractions is as follows:

The roots of *P. karenium* are de-cored, dried, ground into coarse powder, soaked, ultrasonically extracted 3 times with MeOH to obtain methanol extract. After removing the solvent under reduced pressure, the MeOH extract is evenly distributed in distilled water and layered with n-hexane, dichloromethane and ethyl acetate, respectively, to obtain the n-hexane extract and water layering fractions.

+ Isolation of compounds from fractions by column chromatography and prepared high performance liquid chromatography systems. Fractions during isolation are monitored by thin layer chromatography.

- Methods to determine the chemical structures of compounds: Determine the structures of isolated compounds based on physical parameters and spectral methods FT-IR, UV-Vis, ESI-MS, HR-EI -MS, 1-way and 2-way NMR, combined with published documents, determine the sugar in the compound by GC-MS method.

2.3. Biological study

- Evaluate the effect of *Polygala karenium* Kurz on the migratory behavior of fruit fly tertiary larvae carrying the Alzheimer's disease hAPP gene based on Crawling assay method.

- Evaluate the effect of *Polygala karenium* Kurz on climbing behavior of adult fruit flies carrying the Alzheimer's disease hAPP gene based on Climbing assay method.

- Evaluate the effect of improving short-term memory of *Polygala karenium* Kurz by smell memory test on third-order fruit fly larvae carrying the Alzheimer's disease hAPP gene based on Odor-taste learning assay method.

3. Main results and conclusions

3.1. On botanical characteristics of the species *Polygala karenium* Kurz.

- Scientific name of the sample which collected in Sa Pa, Lao Cai Province was identified as *Polygala karenium* Kurz, (family Polygalaceae).

-Described the characteristics of leaf, root and stem micro-dissection and the characteristics of root powder of *Polygala karenium* Kurz, contributing to the standardization of medicinal herbs.

3.2. On the chemical composition of the species *Polygala karenium* Kurz.

The groups of compounds present in *Polygala karensium* Kurz species have been identified, including: OH-phenolic substances, saponins, flavonoids, reducing sugars, organic acids, fats and sterols.

17 compounds have been isolated from the high segments of the roots of the *Polygala karensium* Kurz plant, there are 7 compounds belonging to the xanthone group, including the new substance karenxanthon, and 6 compounds glomeratose C, wubangzicide B, 1,7-dihydroxyxanthon, 7-hydroxy-1-methoxyxanthon, 6-hydroxy-1,7-dimethoxyxanthon, 7-hydroxy-1-methoxyxanthon. There are 2 compounds with euflavonoid structure: quercetin, rutin. There are 5 compounds with sucrose structure, including 2 new substances karensucrose A-B and compounds 3-(E)-3,4,5-trimethoxycinnamoyl-6'-benzoylsucrose, tricornose B, tenuifoliside. The remaining compounds have a sterol structure, including spinasterol, daucosterol, stigmasterol.

Of the 17 isolated compounds, 3 are new and 14 are known. Three new compounds are first isolated in nature, including two sucrose esters, **karensucrose A** (3-O-[(Z)-3,4,5-trimethoxycinnamoyl]- β -D-fructofuranosyl-(2 \rightarrow 1)-(6-O-benzoyl)- α -D-glucopyranoside), **karensucrose B** ([3-O-(E)-3,4,5-trimethoxycinnamoyl]-[4-O-sinapoyl]- β -D-fructofuranosyl-(2 \rightarrow 1)-(6-O-sinapoyl)- α -D-glucopyranoside), and a new xanthone is **karenxanthon** (1,7-dihydroxyxanthon 7-O- α -L-rhamnopyranosyl-(1 \rightarrow 6)- β -D-glucopyranoside).

3.3. On the biological effects of Polygala karensium Kurz species.

The total ethanol extract fraction, the ethyl acetate extract fraction of the study sample has the effect of improving the migratory behavior of fruit fly tertiary larvae and adult transgenic fruit flies carrying Alzheimer's disease.

The total ethanol extract fraction, the ethyl acetate extract fraction and the aqueous fraction of the study sample has the effect of improving short-term memory of the tertiary transgenic fruit fly larvae carrying Alzheimer's disease.

Ha Noi, January 30th, 2023

ACADEMIC ADVISORS

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