

DOCTORAL THESIS

Pharmacognostical studies on medicinal spices: ethnobotanical, bencalogical and plant taxonomic studies

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**Pharmacognostical Studies on Medicinal Spices
-Ethnobotanical, Bencaological and Plant Taxonomic
Studies**

WU Menghua

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for the degree of

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ABSTRACT

Spices, as culinary condiments, play an important role in people's daily life. The pursuit of perfect flavor is crucial in most cuisines of the world. By definition, according to the *Handbook of Spices, Seasonings, and Flavorings* written by Raghavan, "spice" refers to "all parts of a plant that provide flavor, color, and even texture". In China, these spices are used not only in cuisine, such as hotpot and marinated food, but also in medicine. In fact, the categories of food, spices, medicine, and herbs cannot always be clearly separated from one another. Medicinal spices were studied in this thesis, based on the ethnobotanical survey, bencaological research and plant taxonomic study.

Chapter II is an ethnobotanical survey of medicinal spices used in Chinese hotpot. Chinese cuisine is one of the most famous cuisines of the world. The use of spices and condiments is an indispensable procedure in Chinese culinary culture, especially the hotpot culture. However, there has been no systematic investigation on spices and condiments used in Chinese hotpot so far. An ethnobotanical survey was conducted to collect information on spices and condiments used in Chinese hotpot. Data were obtained from open-ended and semi-structured interviews, direct observations, and literature research. Crude materials (obtained from herbal and spice markets and hotpot chefs) and voucher specimens (collected on-site at production areas) were identified by plant taxonomic study experts. The results showed that a total of 67 spices were commonly used for the preparation of Chinese hotpot, involving 82 plant species of 50 genera in 26 families. All of these spices are also used medicinally in China yet half of them are not native to China. In Chinese hotpot, plants of the families Zingiberaceae and Apicaceae are particularly important, and fruits are the main botanical parts used.

Chapter III is a new bencaological study of CMM named *Doukou*. Among the 67 spices involving 82 plant species used in Chinese hotpot, many share the same Chinese common names *Doukou*, and they are also used as medicine. Moreover, the name *Doukou* is used to refer to more than one species, that is, it has been used to refer to the Chinese crude drug derived from different plants during different historical periods. In order to identify the original botanical identities of *Doukou* during different historical periods and the relationship between these *Doukou*, new bencaological studies of CMM named *Doukou* were carried out. These studies included literature investigations, image examination, market investigation and systematic botanical research. This work has revealed that *Caodoukou* (*Alpinia katsumadai* Hayata) was used as *Doukou* widely in China from the Song Dynasty to the Qing Dynasty, while *Doukou* (*Amomum krarvanh* Pierre ex Gagnep. and *Amomum compactum* Soland ex Maton) is currently regarded as *Doukou* in Chinese

Pharmacopeia 2010. Therefore, to clarify ambiguities, it is suggested that the Chinese name *Doukou* (*Amomi Rotundus Fructus*) should be changed to *Baidoukou* in order to distinguish it clearly from *Caodoukou*.

Chapter IV is a plant taxonomic study of seven Zingiberaceous seeds based on comparative anatomy and secondary metabolites. The plants of the family Zingiberaceae are difficult to distinguish from each other because their vegetative forms are very similar. In the plant keys, the inflorescence and flower (including labellum and filament etc.) provide the most significant distinguishing features. As their flowering phase is typically three months or less, often the features needed to identify a specimen using the keys are not present. On the other hand, seeds are often present, lasting from season to season, and offer various morphological structures which are relatively stable. Thus, seeds, especially the seed coat, could be the basis for plant taxonomic study and identification. Comparative anatomy of the seed transverse section of seven species belonging to *Alpinia*, *Amomum* and *Elettaria* genera was carried out, and the corresponding key based on seed anatomy was constructed. The key will be helpful for identifying the genus and species of medicinal spices which are Zingiberaceous fruits and seeds. In addition, the constituents in essential oils from seven Zingiberaceous fruits and seeds were analyzed by gas chromatography-mass spectrometry (GC-MS). Their occurrence is sporadic but may be specific to families, genera and sometimes even for species. From the distribution of these constituents, a chemotaxonomic key to these three genera was created. It will be useful for indentifying Zingiberaceous fruits and seeds used as spices and Chinese medicinal materials found in markets at least to genus.

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