CHAPTER I

INTRODUCTION

General Introduction of Khaao-Yen-Nuea Khaao-Yen-Tai

The crude drugs Khaao - Yen - Nuea Khaao - Yen - Tai have long been used as Thai folk remedies for venereal disease, cancer, leprosy, dermatitis and alterative by Thai people as described in the ancient medicinal reference books e.g. Sila Cha-ruk Wat Phrachetupon (1), Thamraya Cha-ruk Nai Wat Po (2), Traditional Lanna Thai Medicine (3) and also in the texts of Thai traditional medicine e.g. Pramual Supphakhun Ya Thai (4), Mai Thet Muang Thai (5). Since Khaao-Yen-Nuea Khaao-Yen-Tai ranked the seventy-fifth and eighty-fifth respectively in terms of frequency of usuage among 2449 recipes (6), they can be considered as moderately popular medicinal ingredients.

While Khaao-Yen-Nuea is generally believed to be a native plant of Thailand, Khaao-Yen-Tai is an exotic plant brought here from Teochiu Province of China Mainland (4,5). The part used as medicinal ingredient is the rhizome. The rhizome is reddish in Khaao-Yen-Nuea and white in Khaao-Yen-Tai. In Thailand Smitinand T. (7) has indicated that Khaao-Yen-Nuea derived from *Smilax corbularia* Kunth while a Chinese Study (8) mentioned that *Smilax glabra* was the most commonly used *Smilax* in Chinese crude drugs in the name "Tufuling". There is still confusion in many old-styled drugstores about the true products of Khaao-Yen-Nuea Khaao-Yen-Tai. In commercial markets some of the

plants sold as Khaao-Yen-Nuea Khaao-Yen-Tai may be *Smilax*, *Dioscorea*, *Pygmaeopremna* or etc. In 1977 Maunwongyathi P. (9) reported that Khaao-Yen-Nuea was derived from *Dioscorea piscatorum* Prain et Burkill. Indeed some genuine drugs sold in commercial market are sometimes found to be adulterated with other plant drugs or some of them are subsituted by others. This may be the case when drugs as Khaao-Yen-Nuea Khaao-Yen-Tai are collected from wild plants, carelessness or ignorance on the part of the collecter can result in complete or partial substitution.

Problems concerning the identity of drugs and their botanical origins that usually occur are :

1. Plant drug of different origins sold under the popular names of another plant.

2. Because of shortage supply or great market demand, medicinal plants are harvested immaturely with lower level of active ingredients resulting in a "substandard" vegetable medicine.

3. Adulteration, contamination an impurities found in vegetable medicines.

To overcome the above-mentioned problems , standard specifications, quality control procedures for these medicine are required by researchers or scientists to check their authenticity, quality and purity. Hence the author have studied Khaao-Yen-Nuea Khaao-Yen-Tai in order to perform identification and specification and quality control of these vegetable drugs.

Specification of Vegetable Drugs

It can be arranged for study under the following headings :

1. Origin

Botanical origin represents the scientific name of the plant yielding the drug (10). The scientific name together with the taxonomic level of the vegetable drug is always of importance to the pharmacognosist.

Commercial origin of a drug represents its trade or commercial source (10). Vegetable drugs are brought into market in various commercial forms. Crude drugs may be obtained nearly entirely as seeds, flowers, fruits, leaves and some roots and rhizomes ; or they may be cut broken, or sliced, as in woods, barks, many roots and a few rhizomes (11).

2. Cultivation and preparation

The details of cultivation of the plants, methods of collection, drying, packing and other treatments of the drug are during its preparation for the market (12).

It is important when plants are cultivated in a certain geographic area to ascertain that they will develop the desired type and amount of constituents. In many instances plants have been cultivated in their native habitats, either because of dwindling natural supply or to improve the quality of the drug.

In order to obtain and maintain a high quality in a drug the most important factors to accomplish this are as follows :

- the collection of the drug from the correct natural source at the proper time and in the proper manner.

- the preparation of the collected drug by proper cleaning drying and garbling.

- the proper preservation of the cleaned, dried, purified drug against contamination with dirt, moisture, fungi and insects.

3. Characters

The morphological, macroscopical, microscopical (histological and powdered drug) characters must also be studied and are often of fundamental importance.

It may be necessary to study plant morphology which deals with the external character of the plants and of their parts or organs in order to determine the nature of certain structures in drugs.

Macroscopical characteristics of a drug may be divided into four headings (13) :

1. shape and size
2. color and external marking
3. fracture and internal color
4. odor and taste

These characters are useful in judging the identity,purity and, to a certain extent, the quality of the drug in its entirety. Since these characters are mostly subjective and there are also substitutes or adulterants that resemble externally to the genuine

drug, it is therefore often necessary to substantiate the findings of the macroscopical examination with that of microscopical.

Microscopical characteristic

The microscopical examination is not only essential for checking the study of adulteration of powdered drug but is indispensable in the identification of the pure powdered drug.

Plant parts are made up of tissues, each of which performs a definite function essential to the life of the plant. Histology refers to the character and arrangement of these tissues as they are present in the drug. Many drugs possess a characteristic structure helpful in identification of the drug. Histologic specimens are made from very thin transverse (radial) or longitudinal (tangential) section properly mounted is suitable stain, reagents or mounting media (13).

Powdered drug possess very few macroscopic features of identification outside of color, odor and taste; hence the microscopical characteristics are very important. In the powdered form (which should be reduced to not less than a No. 40 powder) the cells are mostly broken, except those with lignified walls, but the cell contents (starch, calcium oxalate crystals, aleurone, etc.) are scattered in the powder and become very evident in the mount specimen.

The proper reagent or mounting medium to be used depends on the characteristic tissue element or cell content to be studied. Starch is best examined in water mount; lignified tissues in a phloroglucin-hydrochloric acid mount ; calcium oxalate, leaf epidermis, trichomes and others in chloral

hydrate mount. Special test reagents as iodine TS, chlor-zinc-iodine TS, ferric chloride TS, and other reagents are also used where occasion demands (13).

4. Evaluation

This includes the identification of a drug and the determination of its quality and purity.

4.1 Identity of a drug can be established by actual collection of the drug from a plant which has been positively identified from the botanical stand point. A second method of identification is by comparison with a known true sample of the drug in conjuction with a description of the drug. A third method, and the most common is by an acquired knowledge of the several characteristics of the true drug (11).

4.2 Quality refers to the amount of medicinal principles of active constituents present in the drug.

The substance present in crude drugs which give them their medicinal activity and value belong to the group of non-protoplasmic cell-contents and may be classified as follows (13) :

1. Carbohydrates and related compound
2. Glycosides
3. Tannins
4. Lipids compounds: fixed oils, fats and waxes
5. Volatile oils
6. Resins and resin-combination : resins, oleo-resins, gum-resins, oleo-gum-resins and balsams.
7. Alkaloids

8. Sterols
9. Hormones
10. Vitamins
11. Enzymes and other proteins
12. Antibiotics
13. Biologics
14. Allergens
15. Toxic principles
16. Pesticides

4.3 Purity of a drug depends upon the absence of foreign matter. In the collection of a drug and its preparation for the market, it is hardly possible to attain a state of absolute purity and a limited amount of innocuous, extraneous matter adhering to the drug or admixed with it is usually not detrimental (11).

Foreign organic matter refers to any part of the plant or plants yielding the drug, except that part or those parts designated as constituting the drug, and to any other plant parts, or vegetable tissues or substances. The method to determine the amount of foreign organic matter involves simple hand separation and requires that the analyst be well trained in the identification of foreign organic matter.

Foreign inorganic matter such as adhering dirt and sand, may be determined by the total ash and acid insoluble ash method (13).

Total ash is derived from the plant tissue itself (physiological ash) and from the extraneous matter, sand and soil (non-physiological ash). To determine acid

insoluble ash is a method to measure the amount of silica sand and siliceous earth present in the drug.

Moisture is normally present, even in the dried drug, to the extent of from 5 to 10 percent. Its added weight as that excess moisture is conductive to the promotion of mold and bacterial growth and subsequently to deterioration and spoilage of the drug (13).

5. Tests and Assay

Chemical test are employed to identify crude plant drugs and to ascertain the purity of certain drugs (13). The tests of identity are based upon the nature of the color reactions or solubilities of drugs or their constituents (10). Chemical assays of cellular and noncellular drugs of plant origin usually are dependent on pharmaceutical extractive processes with subsequent purification of the chief constituent. In many drugs the chemical assay represents the only method of determining the official potency (13).

Thin-layer Chromatography (TLC) are preferred to conduct for purpose of identification and separation of drug principles. It is a technique which had been known in principle for many years has now achieved remarkable success in the separation of mixtures of all classes of natural products and is established as an analytical tool in modern pharmacopoeias.

In outline the method consists of preparing on a suitable glass plate, a thin layer of material which may be either an adsorbent as used in column adsorption chromatography or an inert support which holds an aqueous phase as in

column partition chromatography. The mixtures to be resolved are dissolved in a suitable solvent and placed as a seried of spots on the film towards one end of the plate : this end is then dipped in a suitable solvent mixture and the whole enclosed in an airtight container. The solvent front travels up the film and after a suitable time the plate is removed, the solvent front marked, the solvent allowed to evaporate and the positions of the separated compounds determined by suitable means.

TLC has certain advantages over paper chromatography. Fractionations can be effected more rapidly with smaller quantities of the mixture, the separated spots are usually more compact and more clearly demarcated from one another and the nature of the film is often such drastic reagent, such as concentrated sulphuric acid which would destroy a paper chromatogram, can be used for the location of separated substances (14).

Extractive ; the determination of extractive is a method designated to measure the amount of constituents which are extractable by the solvent under the specific condition, the solvent water and alcohol are commonly used (11). It is applied to those vegetable drugs for which there is no suitable method of chemical and biological assay for their active constituents of present available.

6. Adulteration

In the broad and legal sense, is the debasement of any article. Adulteration involves a number of different conditions (11) (13) :

6.1 Sophistication or True Adulteration. It means the addition of a spurious or inferior material to any article with intent to defraud.

6.2 Admixture. By admixture is meant the addition of one article to another through accident, ignorance or carelessness. If the admixture be done intentionally to defraud, it is sophistication.

6.3 Substitution. It occur when an entirely different article used or sold in place of the one required or asked for. A complete substitution, even through intentional and fraudulent, is not sophistication, as none of the true article is present.

6.4 Deterioration. The term deterioration is applied to any impairment of the quality or value of an article by the abstraction of destruction of valuable constituents by distillation, extraction, aging, moisture, heat, fungi, insects or other means.

6.5 Spoilage refers to a form of substandard drug in which the quality or value or usefulness of an article is so impaired or destroyed by the action of fungi ; as to render the article unfit for human consumption.

6.6 Inferiority refers to any substandard drug or substance regardless of cause (11) (13).