# MEDICINAL PLANTS OF THAILAND

## Past and Present

**Cover :**

**'Chaleo'**

A symbol created by bending and interlacing a silver of bamboo to form a five-pointed star. Traditional Thai herbalists place this sign on top of earthenware pots whilst brewing herbal medicine to prevent people or evil spirits from tampering with the potions.

# PREFACE

From research into the Thai lifestyle, we have learned that our forefathers were observant, innovative, and able to make use of what they could find in their surroundings.

In our studies, we have discovered that the term "medicinal plants" refers primarily to those common plants and herbs that can be used therapeutically. Further studies reveal that "medicinal plants" have other uses, the effects of which have been felt since the distant past until the present.

This publication is an attempt by the National Identity Board to present to the reader a comprehensive account of what is known about Thai medicinal plants. It is hoped that the reader will gain an insight into the wonders of natural resources and their impact on human life, and become aware of the needs to conserve world environment for the future generations.

National Identity Board
September 1992

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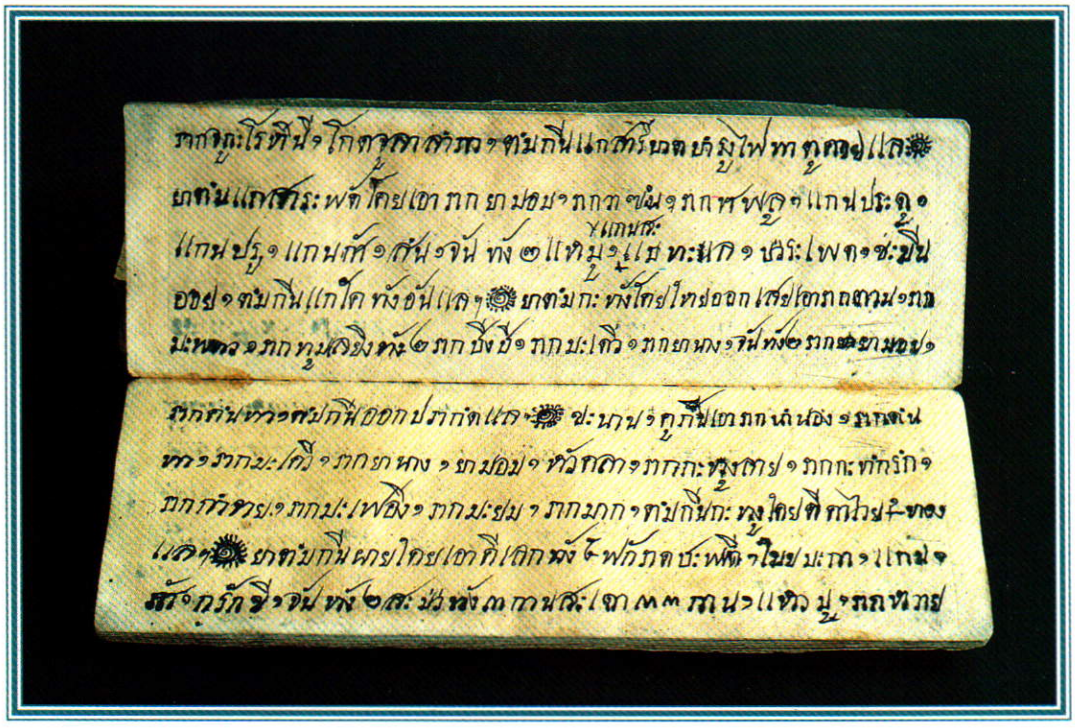


# INTRODUCTION

Under the law of nature, all human beings are subjected to the same fundamental needs which consist of food, clothing, shelter and medicine. All forms of folklore medicine evolved out of man's desperate attempt to rid himself and his fellowmen of physical suffering, coupled with his overwhelming desire for eternal life. The countless numbers of recipes for longevity in folk medicines bear testimony to man's quest for immortality. Through trial and error, man painstakingly accumulated his knowledge of the curative properties of the indigenous flora abounding all around him. This knowledge was handed down from generation to generation, firstly as word of mouth and later on as written documents.

It is not known exactly when the art of self-healing using medicinal plants began in Thailand. The earliest evidence unearthed was the remnant of a large stone metate and stone roller used in drug compounding: this relic is believed to have originated during the Dvaravati period (circa 6th century). Furthermore, well preserved documents recording the use of herbal medicine have been found etched, engraved or hand-written on various materials ranging from palm leaves to 'khoi' paper to marble tablets.

Thai indigenous medicine is a unique blend of knowledge attained through centuries of practice together with the knowledge 'adopted' from other systems of medicine, mainly those of Indian and Chinese origins. Thai people in each region of the country have developed their own unique style of indigenous medicine ranging from the simple use of medicinal plants as ingredients in foods and drinks to sophisticated compound drugs formulated as specific remedies for certain ailments.

The art of herbal remedy is a complex one and involves many disciplines of science. It is remarkable that Thai people in the ancient times were able to acquire the knowledge on the medicinal properties as well as the toxicity of so many drug ingredients. With this knowledge, they were able to formulate specific cures for each ailment as well as to devise appropriate techniques for the detoxification of certain drug ingredients. The methods used to detoxify drug ingredients in traditional Thai medicine include sun-drying, roasting, exsiccating, acidifying, fermenting, grilling, and mixing with drugs of opposite attributes.

In the past century, the use of herbal medicine in Thailand has been on the decline, due largely to the introduction of modern medicine which is more effective and easier to use. However, there is a worldwide trend toward the use of drugs of natural origin since they are believed to possess less harmful side-effects than synthetic drugs. This results in an increased public awareness of our rich and valuable heritage in traditional Thai medicine. There has also been a concerted effort by both the government and the private sector to develop Thai medicinal plants into safe and effective drugs. Examples of these endeavours are the development of an anti-asthmatic drug from 'plai' (*Zingiber cassumunar* Roxb.), an antipeptic ulcer drug from 'plaunoi' (*Croton sublyratus* Kurz) and a drug from goat's foot creeper (*Ipomoea pes-caprae* (Linn.) Sweet) for jelly-fish poison.

Plaunoi plantation

Thailand, with its prestigious geographical location and advantageous terrain ranging from the cool mountainous areas of the North to the dense tropical rain forests and the vast expanses of coastlines of the South, boasts a large number of indigenous flora, of which over one thousand species are believed to possess medicinal properties. It is pertinent that this vast and untapped natural resource be developed into useful drugs.

This book is a brief introduction to traditional Thai medicine and Thai medicinal plants, underlining their history, unique features and vast potential. As history has repeatedly proven, the fact remains that no human invention can ever rival nature's own creation. Based on this logic, natural drugs must be safer and more beneficial to man than synthetic drugs. Thai people are justly proud of the wealth of knowledge in traditional Thai medicine and their rich natural resources. Every endeavour will be undertaken to effect appropriate development of Thai medicinal plants for the benefit of mankind.

Chapter 1

# THAI HERBAL MEDICINE - - - A HISTORICAL ACCOUNT

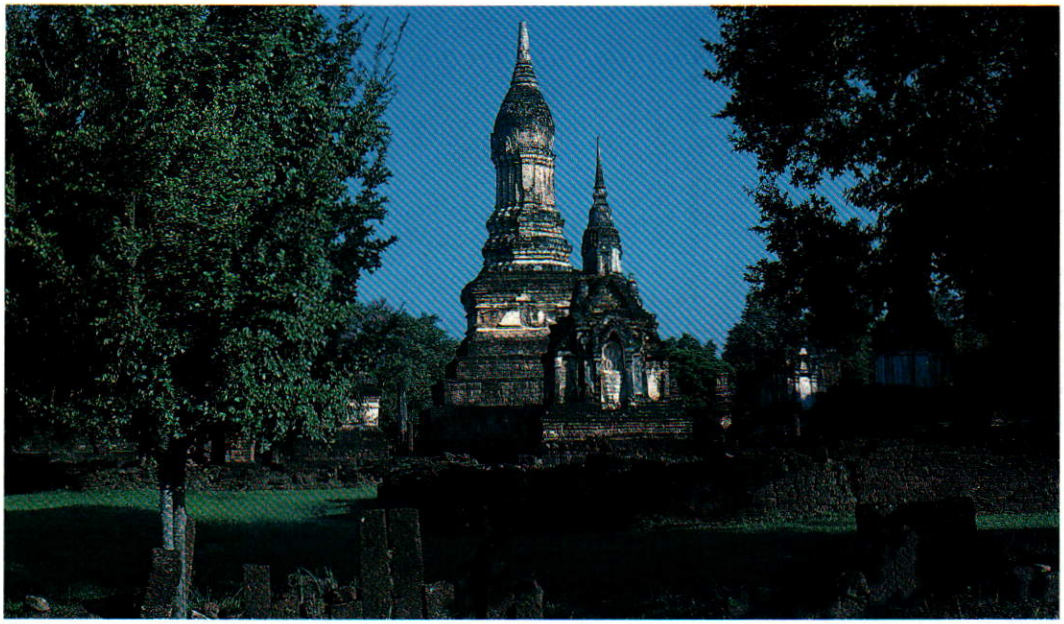
Panom Rung Castle in Buri Ram Province.

Before Suwannaphum "the Land of Gold" came under the rule of the 'Thai' or 'Tai' people, most of the Indochinese Penninsular was under the influence of the ancient Khom Empire. The first recorded evidence of the use of medicinal plants by the Khoms was in the form of stone tablets inscribed in Sanskrit dating back to the reign of King Chaiworaman VII, who ordered the construction of the famous Angor Wat together with 102 arokayasala (hospitals) throughout the kingdom in the 12th century. Remnants of drug inventories inscribed in stone at Prasart Taprom in Cambodia showed a list of 29 items including drugs of botanical origin, such as the infested heartwood of 'chan-daeng' (*Dracaena loureiri* Gagnep.), animal-derived drugs, e.g. beeswax, clarified butter and minerals, e.g. alkaline salt. The inscription also showed a number of drug formulae, one of which was a remedy for haemorrhoids consisting of gum asafetida, banana oil and other oils, 'ma-khuea-khuen' (*Solanum aculeatissimum* Jacq.), ginger, 'khod-saw' (*Angelica anomala* Pall.), shallots and garlic.

The art of drug compounding in the ancient Khom civilization was largely influenced by the Mahayana Sect of Buddhism which was led by Phra Bhaisajkuru.

The Ramkamhaeng Stone Inscription.

## Sukhothai Period
## (1238 - 1377 A.D.)



Very little is known regarding the form of medicine practised during this period as no concrete evidence in the form of 'Khumpee Bai Laan'*, 'Samud Khoi'+ or stone inscription containing drug recipes from this era could be traced. The most important relic left over from the Sukhothai period is the 'Ramkamhaeng Stone Inscription', which vividly described the way of life of the period. Unfortunately, there was no mention as to the use of medicinal plants in this important document. However, it is believed that there was much trading between the kingdom and its neighbouring countries, such as Burma, India, Persia, China, Japan, Sumatra and Sri Lanka. There may have been some importation of herbal medicine as well as the transfer of drug compounding technology from these countries. It is most likely that the form of medicine practised during the Sukhothai period was a combination of the knowledge acquired from the ancient Khoms, the Indians, the Chinese as well as indigenous Thai medicine.

It should also be mentioned that during this period the kingdom adopted the Hinayana Sect of Buddhism headed by Chewaka Komarapaj as its official religion.

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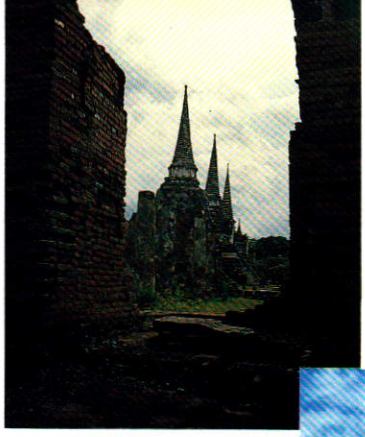
* Khumpee Bai Laan, ancient Thai scriptures hand-written onto dried young Talipot palm *(Corypha lecomtei* Becc.) leaves; such writings may last for several centuries without spoilage.

+ Samud Khoi, another form of documentation commissioned on a type of paper made from the bark of Siamese Rough Bush *(Streblus asper* Lour.*)*.



# Ayutthaya Period
# (1350-1767 A.D.)

Much of the documentation pertaining to the history of the period was destroyed during the 'Great War' with Burma in 1767. However, there is evidence pointing to the fact that there was much trading between Ayutthaya and Europe in the middle part of the Ayutthaya period, particularly during the reign of King Ramathibodhi II who had contact with Portugal in 1512. Other countries such as Spain, Holland and Britain also sent trade missions to the capital in the later part of the Ayutthaya period. With the trade envoys from Europe came the missionaries who brought with them not only the Bible but also a myriad of drugs which they distributed to the people while attempting to spread the words of Christianity.

'Samud Khoi'

An assortment of crude drugs.

Pills.

A number of drug preparations employed during the Ayutthaya period survived the test of time and is still in use in certain districts in the Central Plains today. One of these is 'Tamrub Phra Osod Phra Narai' or 'King Narai's Drug Recipes' which originated from the period between 1659-1661. It includes an ointment used for boils and open wounds as well as a diuretic preparation. Ingredients used in these recipes include materials derived from plants, animals and minerals.

## Rattanakosin Period
## (1782-present)

The Grand Palace, Bangkok.

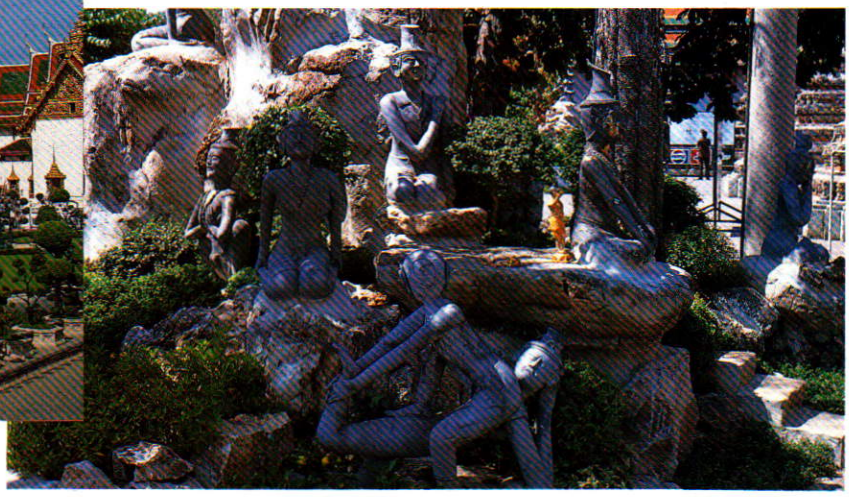
Some 15 years elapsed between the fall of Ayutthaya and the beginning of the Rattanakosin period. During this time a new capital was established in Thonburi and the task of rebuilding of the nation began.

In 1782, King Rama I moved the nation's capital to Bangkok, the site of the present metropolis and the nation, once again, began to prosper. The revival of both its economy and culture took place in earnest.

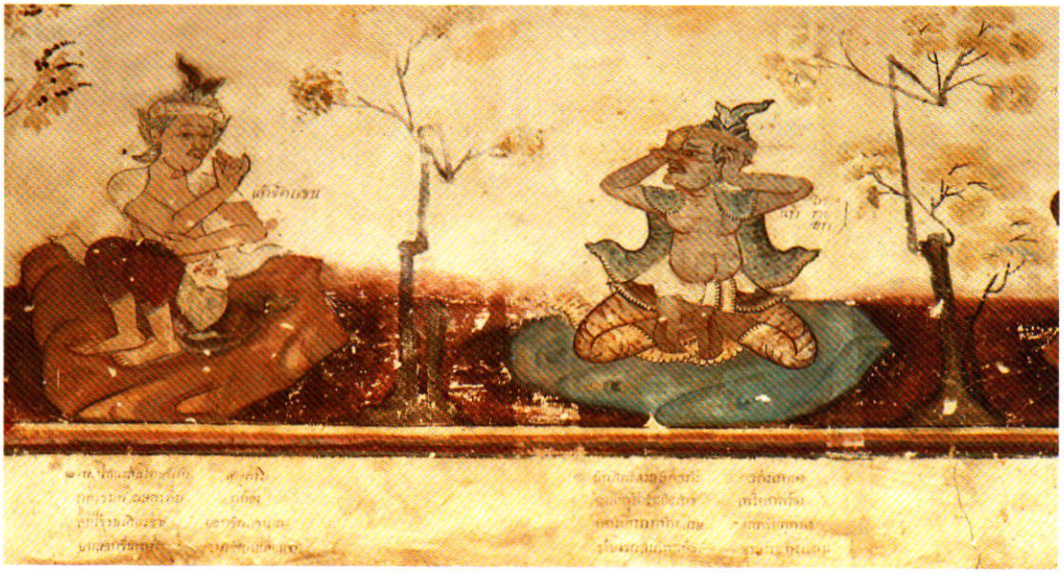
Only 23 herbals*, originating during the Ayutthaya period, survived the Great Fire in 1767. Two other herbals were appended to these during the reign of King Rama I: the first one was 'Phra Khumpee Suppakun' by HRH Prince Wongsathirajsanit and the second 'Phra Khumpee Chantasart' by Phraya Chantaburi (Klom). The latter was a compilation of knowledge from all the important texts on herbal drugs available at the time.

*Old writings on drug matters.

Figures of contorted hermits in the compound of Wat Po, Bangkok.



Mural painting, Wat Machimawas, Songkhla.



Thai herbal medicine reached its peak in the reign of King Rama III who in 1821, ordered the renovation of Wat Raj Oros in Thonburi. He also gave instructions for the inscription of herbal drug formulae onto marble tablets for use as temple wall decorations. A total of 180 herbal drug formulae was inscribed onto 55 marble tablets which were used to adorn the walls of Phra Ubhosod (principal building) as well as the corridors of the building which housed the reclining Buddha and other corridors in Wat Raj Oros. In 1832, another important temple was reconstructed under royal patronage: this temple was named Wat Phra Chetuphon Wimonmangkhalaram (Wat Po) where 317 marble slabs bearing 1,100 drug formulae were used to decorate the inner walls. Similar inscriptions of herbal drug formulae originating from the same period are also to be found at Wat Machimawas in Songkhla Province. Systematic compilation of traditional drug recipes from various sources was also instigated during this period.

During the reign of King Rama V (1868-1910), Krommamuen Phubodirajaharuethai (Chief of the Royal Medical Department), received a Royal Decree to review and revise the state of the art of Thai herbal remedy in order to assemble the information into a Thai medical textbook. This resulted in 'Paetsart Sonkhrau Chabub Luang', a two-volume text commissioned in 1870: this could be considered to be the first comprehensive manuscript on Thai herbal medicine. In addition to 'Paetsart Sonkhrau', there have been numerous books written on the subject of Thai medicinal plants; these include 'Vejasuksa' by Phraya Phisanuprasartvej, the second edition of which appeared in 1913 and 'Mai Ted Muang Thai' by S. Pongboonrod, the first edition of which appeared in 1961.

In the early part of the Rattanakosin era, royal herbalists were conferred with 'Krabong Daeng' (Baton Rouge), meaning red sceptre, accompanied with 'Yaam Daeng' (Scarlet Bag). The holders of these sacred articles had absolute authority to collect drug ingredients from anywhere within the kingdom.

Replicas of Yaam Daeng and Krabong Daeng.

HRH Prince Mahidol of Songkla, the Father of modern Thai medicine.

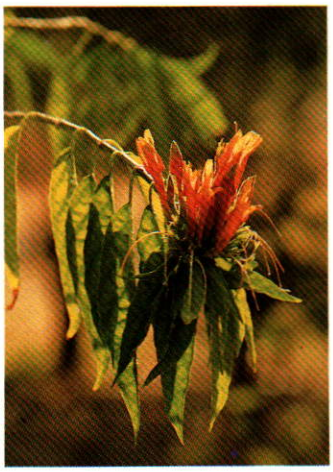
Siriraj Hospital in its early days.

## The Decline of Thai Herbal Medicine

The establishment of Siriraj Hospital in 1888 marked the beginning of the decline in the use of herbal medicine in Thailand. At first, most of the drugs used in this hospital were those derived from medicinal plants. As the number of western-educated physicians began to increase, the use of modern drugs began to rise. This trend was to continue until the use of herbal drugs was entirely replaced by that of modern drugs, particularly in state-run hospitals and health service centres around the country.

## The Revival of Thai Herbal Medicine

With the realization that Thailand has been importing vast quantities of modern drugs from western countries at a cost in excess of 20,000 million baht per annum, the Royal Thai Government, a decade ago, began laying down strategies for research into Thai medicinal plants as well as the reintroduction of scientifically proven herbal drugs as substitutes for modern medicine. Thai scientists as well as their counterparts, on the other hard, have taken great interest in Thai medicinal plants and have conducted research on a large number of plants samples collected from Thailand for over the past 30 years. One such endeavour has resulted in the discovery of a new 'miracle drug' which is one of the most potent antipeptic ulcer drug known to date. This drug was isolated from a plant considered as a troublesome weed in Thailand but whose appearance in at least 30 herbal recipes in four different herbals attested to its curative property.



Drugs in various dosage forms.

The search for new drugs from Thai medicinal plants will continue through the concerted effort from all parties concerned and hopefully such endeavours may result in new cures for the seemingly incurable diseases such as cancer and AIDS.

Chapter 2

# PREPARATION OF TRADITIONAL THAI MEDICINE

Turmeric : dried and powdered rhizomes.

The word 'yaa' or drug in traditional Thai medicine usually refers to the use of at least two different ingredients compounded together to yield a drug. Inevitably, traditional Thai drugs consist of numerous ingredients which may be classified into the following categories:

- Major ingredient(s) — those which exert the main action
- Auxiliary drug(s) — those with complimentary or synergistic action
- Flavouring agents — to make the drug more palatable.

Traditional herbalists must have full knowledge of the types, parts used, colours, odours and tastes of all natural drug ingredients. When formulating a preparation, the herbalists must take into consideration the following factors:

- The parts of the ingredients to be prescribed — these may be the bark, roots, flowers or other parts of a plant.
- The form(s) in which they are used — some ingredients are used in a dried form while others may be used fresh.
- The amounts of ingredients to be used — the quantity of a drug ingredient may depend on the age and health profile of the patient.
- Other pertinent information — for instance, certain drugs may contain toxic substances which require detoxification before use.

In the formulation of traditional Thai medicine, the old system of measurements is utilized. The most common denominations for weight are the 'baht' and 'salueng'. An example of the traditional system of measurements for weight, volume and length is given below.

Weight Measurement

| | | | |
|---|---|---|---|
| 1 chang (1,200 g) | = | 20 | tum-lueng |
| 1 tum-lueng (60 g) | = | 4 | baht |
| 1 baht (15 g) | = | 4 | salueng |
| 1 salueng (3.75 g) | = | 2 | feung |
| 1 feung (1.875 g) | = | 4 | pai |
| 1 pai (0.468 g) | = | 2 | utt |

Volume/Capacity Measurement

| | | | |
|---|---|---|---|
| 1 kwian (2,000 lt) | = | 2 | bun |
| 1 bun (1,000 lt) | = | 50 | sud |
| 1 sud (20 lt) | = | 20 | tanan |
| 1 tanan (1 lt) | = | 4 | kob-mue |

Length Measurement

| | | | |
|---|---|---|---|
| 1 ong-ku-lee (2.5 cm) | = | 4 | paddy grains |
| 1 paddy grain | = | 2 | sesame seeds |

An old style balance for weighing herbal drugs.

Drug grounding apparatuses.

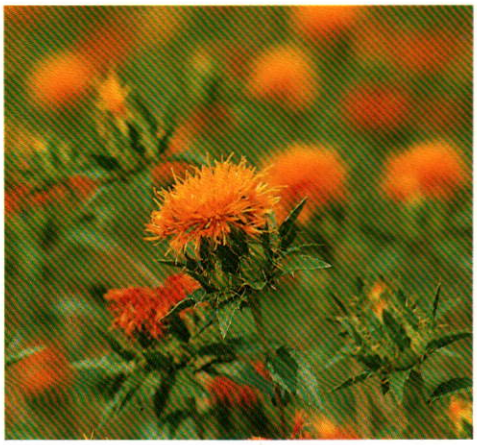
Nowadays the acquisition of drug ingredients is made easy by the existence of retail traditional drug stores where a vast array of crude drugs is in stock. In rural areas, traditional herbalists may grow a number of the more common medicinal plants while others may be collected from trees growing in the forests. Once all the ingredients have been acquired, they may be further processed by pulverization if the drug is to be made into pills or tablets. Grinders made of stone or metal alloy may be utilized in the pulverization process and the powdered drug is then passed through a sieve before being shaped into the desired form.

There are several dosage forms in which traditional drugs may be prescribed. These include solid dosage forms, such as pills, tablets, snuff, suppository and liquid dosage forms such as fluid extracts, alcoholic extracts, teas and expressed juices. These drugs may be taken internally, applied externally, used as a snuff, an inhalant or as a poultice. Of the dosage forms previously mentioned, only 5 or 6 are commonly in use and these are described below.

A typical clay pot used for brewing herbal drug concoction.

## Fluid Extracts

To prepare an extract, a handful of the ingredients is placed in a clay pot shaped like a gourd. The crude drugs may be coarsely chopped or tied into a sheaf the size of one's palm prior to being transferred to the pot. Water is then added to the ingredients until it just covers the drugs. The mixture is boiled for 10-30 minutes, after which the supernatant is decanted and drunk when luke-warm.



A field of safflowers.

A tea made from dried safflowers.

## Infusions and Herb Teas

The ingredients used in herb teas are usually cut into fine strips and then air-dried. Occasionally, the ingredients may be roasted to give an agreeable aroma. One part of the drug mixture is placed in a container with a lid, into which ten parts of boiling water are added. This is then put aside to brew for 15-20 minutes.

## Alcoholic Macerates

In most cases, air-dried ingredients are roughly pounded and wrapped in a piece of muslin before being placed in a glass jar containing rice whiskey for a period of 7-10 days. The resultant macerate is then decanted and taken as directed.

## Pills

Fresh herbs are sliced and left to dry in the sun. After the drying process, the herbs are pulverized while they are still warm. Two parts of this powdered drug are thoroughly mixed with one part of honey or syrup and allowed to stand for 2 hours. The mixture is then shaped into round balls with a diameter of approximately 0.2-1 centimetre. The finished pills are laid out in the sun to dry and the heat treatment process repeated after a fortnight to prevent fungal infestation.

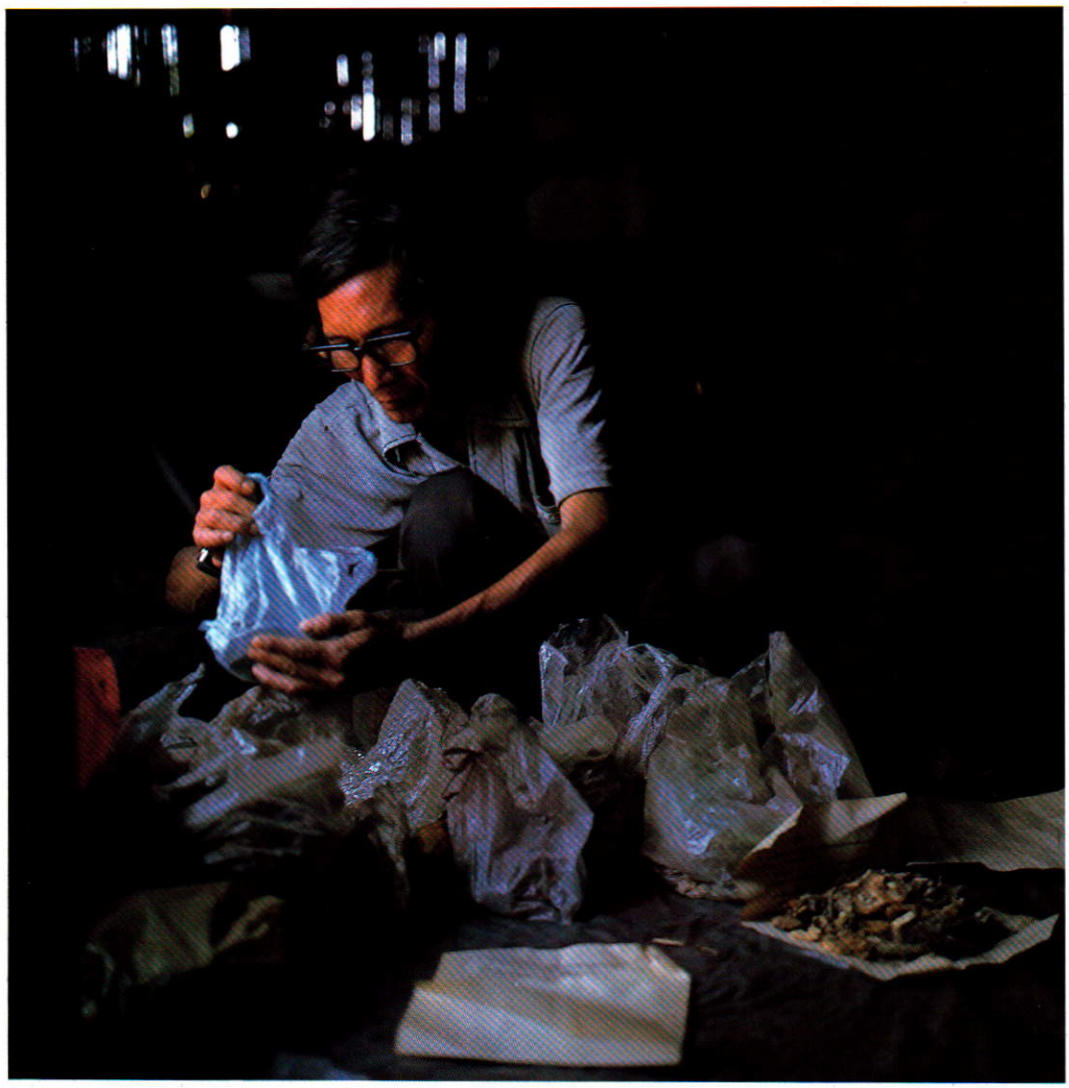
Rhizomes of 'Kra-chaai'.

## Expressed Juices

To prepare the above dosage form, fresh herbs are pounded to a pulp, to which a small amount of water may be added. The juice is then squeezed out and taken as directed. Certain drugs, such as 'ka-thue' (*Zingiber zerumbet* (Linn.) Smith) and 'kra-chaai' (*Boesenbergia rotunda* (Linn.) Mansfield), must be grilled before use.

## Poultices

Fresh herbs are used for this form of treatment. The pounded herbs, to which a small amount of water or spirit may be added, are made into a thick paste and the paste applied to the affected areas. The drug is kept moist and the dressing changed 2- 3 times a day.



The above mentioned forms of drugs are the most commonly prescribed forms in traditional Thai medicine, though other dosage forms are still in use. In the preparation of these drugs a number of vehicles may be used; these include water, spirit, syrup, honey and lime water. In general, they serve to make the drugs soluble and in some cases they may enhance the action of the major drugs.

As a safety precaution, finite periods of shelf life are recommended for various drug products. Thus, a powdered drug consisting entirely of leaves has a shelf life of 3 to 6 months while a drug containing heartwoods may be stored for as long as 6 to 8 months. In general, pills and tablets store better than powders, and pills consisting of roots or rhizomes are considered to be safe for use for up to one and a half years. Therefore, knowledge of the drug ingredients, appropriate methods of preparation as well as safety aspects is essential in the formulation of traditional Thai drugs.

Chapter 3

# TRADITIONAL AND MODERN USAGE OF THAI MEDICINAL PLANTS

The use of herbal medicine in the Indochinese Peninsular can be traced back to the early days of the Khom civilization and beyond. The early form of Thai herbal medicine was greatly influenced by the Khoms who were in turn much influenced by the Ayurvedic System of medicine of India. In Thai herbal medicine as practised by traditional healers, the drugs used were almost invariably in a compounded form where a multitude of herbs was mixed together to form a preparation. Each preparation consisted of 2 to 20-30 ingredients or more, derived entirely from plants, animals and/or minerals. Besides the principal drugs, these preparations quite often contained drugs which acted as laxatives and tonics as well as some inert ingredients and flavouring agents. Certain herbal drug recipes were well guarded secrets in some quarters. Herbal preparations were usually prescribed on an individual basis where the age, sex, history and health profile of each patient were taken into consideration.

While this somewhat sophisticated form of remedy is advocated by traditional healers who inherit their trade from their fore-fathers, a simpler form of household remedy also exists. This usually involves the use of single plant drugs which are readily available. These household remedies include the use of aromatic plants such as ginger, sacred basil as carminatives, the use of 'phyaa-yaw' (*Clinacanthus nutans* Lindau) for insect bites and the use of betel leaves for skin rashes, for instance. It is probably true to say that most Thai people have an inbred knowledge of the use of medicinal plants from observing their elders. People in rural areas, in particular, still resort to using medicinal plants, mostly for common ailments and in cases of emergency. With the recent revival of interest in herbal medicine and the reintroduction of the use of medicinal plants into the primary health care system, a number of medicinal plants has been carefully selected for their efficacy and safety and recommendation was made for the use of these plants in primary health care in cases of common ailments.

In contrast to the use of medicinal plants in the form of crude drugs in traditional medicine, modern drugs employ mostly pure substances, although a number of plant extracts are still in use. In this category, medicinal plants represent sources of several important drugs such as digoxin from foxglove, morphine and codeine from opium, quinine and quinidine from cinchona bark, to name but a few. A number of Thai medicinal plants are currently employed for the isolation of active principles for use in modern drug production; these include rauvolfia root (*Rauvolfia serpentina* Benth. ex. Kurz), 'plaunoi' (*Croton sublyratus* Kurz) and Asiatic pennywort (*Centella asiatica* (Linn.) Urban).

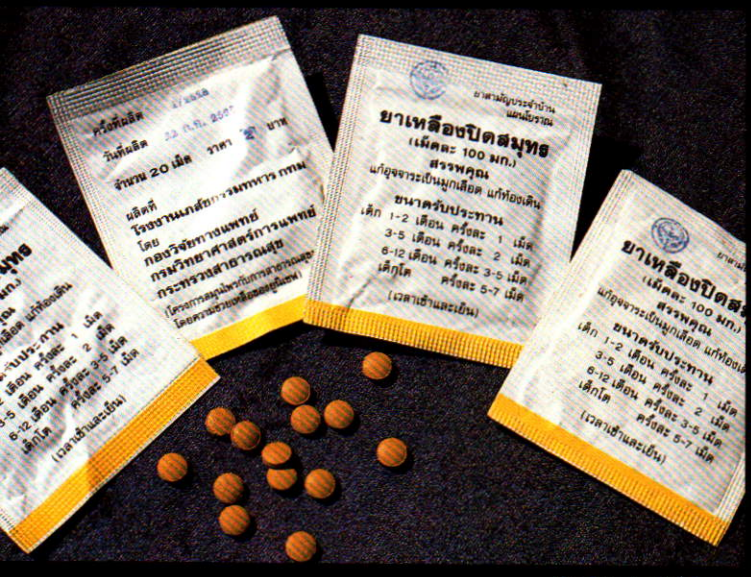
# Medicinal Plants in Traditional Thai Medicine

**Compound Drugs** : A large number of herbal recipes has been recorded in various herbals (or khumpee). A total of 25 herbals on Thai medicine is currently in use. Of these numerous recipes, 16 have been selected as common household herbal medicines for use in common ailments. As part of the UNICEF-sponsored project, eight of these recipes were selected for large scale production by the Department of Medical Science for distribution to drug-cooperatives in rural areas. These preparations include antidysenteric and antipyretic drugs as well as simple and stimulating fragrant remedies. Two examples of these are Yaa Lueang Pid Samut, an antidysenteric preparation and Yaa Chantaleela, which is used for fevers.

## Yaa Lueang Pid Samut

This recipe consists of nut grass (*Cyperus rotundus* Linn.); zedoary (*Curcuma zedoaria* Rosc.); the bark of 'phay-kaa' (*Oroxylum indicum* Vent.); the roots of 'kluai-teep' (*Musa sapientum* Linn.), roasted cloves of garlic (*Allium sativum* Linn.); 'chan-yoi' (resin from *Shorea* spp.); stick lacs (*Laccifera chinensis* Mardihassan); black catechu (*Acacia catechu* Willd.); pale catechu (*Uncaria gambir* Roxb.); henna leaves (*Lawsonia inermis* Linn.); the leaves of pomegranate (*Punica granatum* Linn.). One part by weight of each of the above ingredients is mixed with six parts of turmeric (*Curcuma longa* Linn.) and the mixture pulverized to a powder. The drug is used as an antidysenteric and antidiarrhoeal in children. When used as an antidysenteric, a vehicle consisting of roasted rhizomes of 'kra-chaai' rubbed against the lid of an earthen pot together with lime water is thoroughly mixed with the powder. The mixture is shaped into round balls of approximately 0.1 gram in weight. As an antidiarrhoeal agent, the decoction, resulting from boiling the pericarp of pomegranate or the bark of agasta (*Sesbania grandiflora* (Linn.) Poiret) with lime water, is used. The dose specified for children is 3-7 pills.

'Khumpee Bai Laan' containing herbal drug recipes.




Yaa Lueang Pid Samut.


Yaa Chantale

## Yaa Chantaleela

One part each of 'khod-saw' (*Angelica anomala* Linn.); 'khod-kamow' (*Atractylodes* sp 'khod-chulalamphaa' (*Artemisia* sp.); sandalwood (*Santalum album* Linn.); 'chan-daeng'; k dom fruits (*Gymnopetalum cochinchinense* Kurz); the stems of 'borapet' (*Tinospora crispa* Mie ex Hook.f. & Thoms.); the roots of 'plaalaipueak' (*Eurycoma longifolia* Jack) is mixed togeth and pulverized. One half to one gram of this powder is mixed with boiled or jasmine scent water and taken for various kinds of fevers.

**Single Ingredient Drugs** : As opposed to the somewhat sophisticated compound drugs prescribed by traditional healers, household remedies for common ailments usually consist of single ingredient drugs with well proven properties. The use of the fruits of long pepper (*Piper longum* Linn.) as a carminative, the pulp of tamarind (*Tamarindus indica* Linn.) as a laxative and the fruits of ebony tree (*Diospyros mollis* Griff.) for intestinal worms typify this category of herbal medication.

Cinnamon.

**ดีปลี** (Dee-plee)
**Long Pepper**
*Piper longum* Linn.
*P. retrofractum* Vahl

PIPERACEAE

Both species are climbers with oblong, shining green leaves. The inflorescence is subcylindrical and is composed of numerous greenish white flowers. The fruits are cylindrical in shape and reddish orange in colour when ripe.

Long pepper is the dried entire spike of immature fruits derived from either of the above species. It resembles black pepper in taste and odour but is quite distinctive and is less strong. It contains about 1 percent of volatile oil, 6 percent of piperine and a pungent resin, chavicin. In traditional Thai medicine, long pepper is used as a carminative and an expectorant. It is also used as a spice in pickling.

**มะขาม** (Ma-khaam)

**Tamarind**

*Tamarindus indica* Linn. LEGUMINOSAE

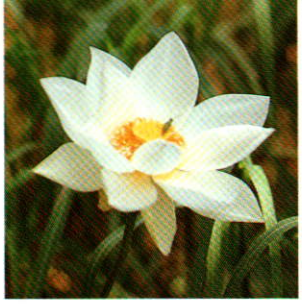
A large spreading evergreen tree with feathery compound leaves. The flowers are in lateral racemes and are yellow with red stripes. The pods are long and slightly curved, plump and cinnamon brown in colour. They contain a soft brownish pulp which has a sweet and agreeably acidic taste.

The pulp is used as a laxative in traditional Thai medicine while the kernels from roasted ripe seeds are used as an anthelmintic for threadworms in children. The pulp contains 12-15 percent of organic acids including tartaric, citric and lactic acids.

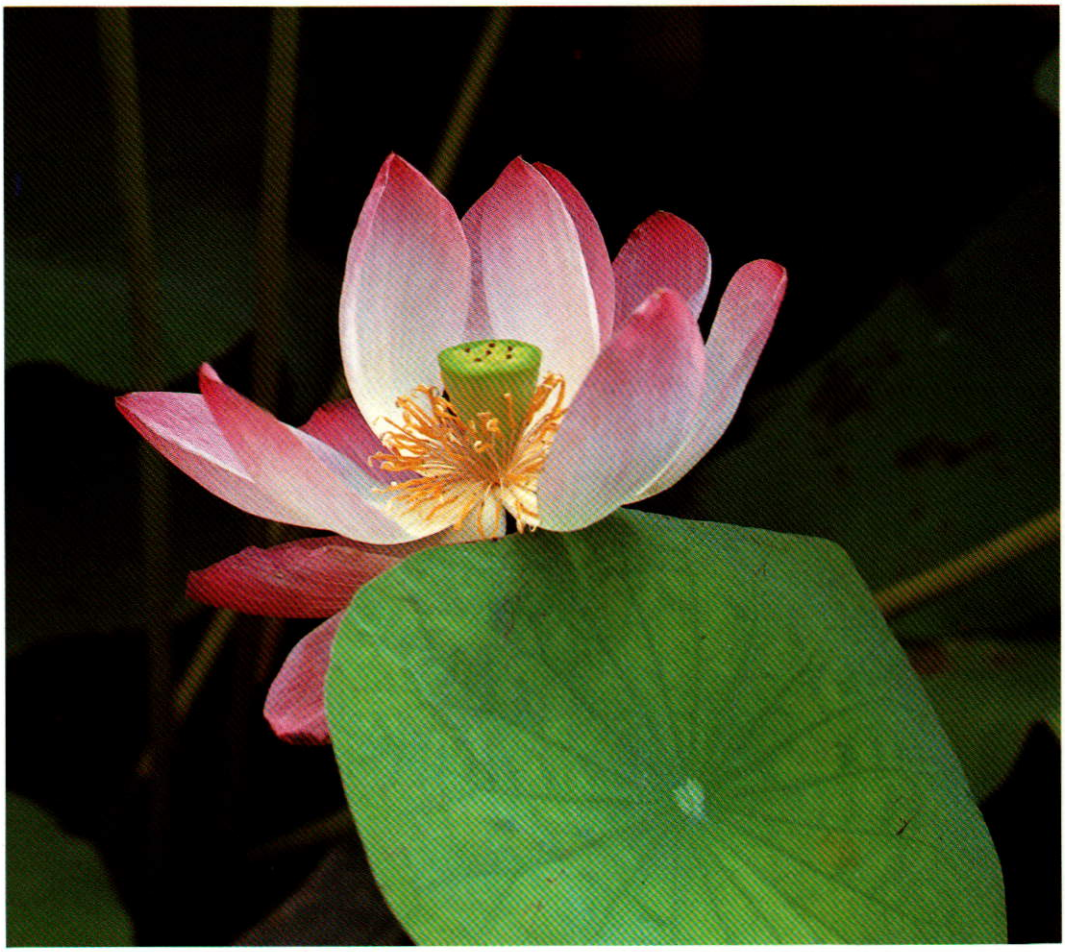
**ไพล** (Plai)
*Zingiber cassumunar* Roxb. ZINGIBERACEAE

A perennial herb with large, branched rhizome (underground stem). The leaves are large, pale green in colour, lance-shaped, and are arranged in two rows. The inflorescence is cone-shaped with a long stalk, emerging from the underground stem. Individual flowers are pale yellow in colour.

The pressed juice from pounded fresh rhizomes has long been used to relieve sprains. The powder derived from the dried rhizomes is used in traditional medicine as an anti-asthmatic agent. A compound, 4-(4-hydroxy- 1-butenyl) veratrole, with antispasmodic activity, has been isolated from 'plai', confirming its use in folklore medicine. The rhizome also contains 0.8 percent volatile oil and a yellow colouring matter, curcumin.



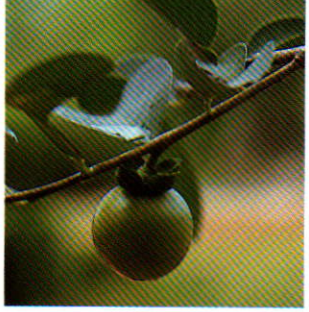
**บัวหลวง** (Bua-luang)
**Sacred Lotus**
*Nelumbo nucifera* Gaertn. NELUMBONACEAE



An aquatic plant, symbolic of perpetual life in Buddhism. Large, shield-like leaves are borne on long, prickly petioles above the water. The flowers are large, cone-shaped, in delicate pink or white colours. They are borne on long stalks and possess a haunting fragrance.

The dried stamens, containing volatile oil, are employed as a cardiotonic in traditional medicine along with other flowers, notably those of jasmine, bullet wood (*Mimusops elengi* Linn.), Indian rose *(Mesua ferrea* Linn.) and 'saaraphee' (*Mammea siamensis* Kosterm. (syn. *Ochrocarpus siamensis* T. Anders.)).

Lotus flowers are traditionally used as an offering to the Lord Buddha during religious ceremonies. The edible seeds are used in various Thai desserts. The green embryos are bitter and are used in certain heart conditions in folkloric medicine.



**มะเกลือ** (Ma-kluea)
**Ebony Tree**
*Diospyros mollis* Griff. EBENACEAE

A large evergreen dioecious tree with orange-yellow flower clusters and simple oval-shaped leaves. The fruits are round with persistent calyx. Young fruits are green, the colour turning to grey when ripe.

Fresh, unripe fruits have long been used as an anthelmintic, particularly for hookworms and tapeworms. Diospyrol diglucoside isolated from 'ma-kluea' fruit has been shown to be the active agent against parasitic worms. Besides their use in medicine, 'ma-kluea' fruit also yield a black dye which has been used for dyeing cloths.

## Medicinal Plants in Modern Medicine

It is a grossly misguided notion that modern drugs are entirely man-made. In fact, between 20-25 percent of all modern drugs in use today originate from plants, animals, microorganisms and minerals. Important drugs such as the opiate analgesics, morphine and codeine; the anticancer drugs, vincristine and vinblastine; the antimalarial drug, quinine and the cardiotonic glycosides, digoxin and lanatosides A and B are all extracted from plant sources. Steroid drugs, including oral contraceptives, are mostly modified from plant steroids. Microorganisms furnish all the antibiotics in use today. Drugs from animals include hormones, vaccines and a number of enzymes.

A number of Thai medicinal plants are currently employed in the manufacturing of modern drugs. The most recent example of such plants is 'plaunoi' which is the source of a novel antipeptic ulcer drug. Rauvolfia root, senna and Asiatic pennywort are all sought after as the sources of antihypertensive, laxative and antikeloid drugs, respectively.

**เปล้าน้อย** (Plaunoi)

*Croton sublyratus* Kurz EUPHORBIACEAE

A shrub, 2-3.5 metres high, with simple, lance-shaped leaves which turn a distinctive bright orange colour prior to being shed. Young leaves are covered with soft brown hairs. The inflorescence is composed of tiny cream-coloured flowers. The fruit is small and round and consists of three lobes. Although there are 4-5 different species of *Croton* known as 'plaunoi' in Thailand, this particular species is the only one which is presently being used in the pharmaceutical industry. A comprehensive survey of *Croton* species in Thailand revealed *C. sublyratus* to be distributed mainly in Prachuab Khiri Khan in the south-western region and Prachin Buri, in the south-eastern region of Thailand.

Over the past 13 years, *Croton sublyratus* has been the subject of intensive scientific studies and investigations, which have resulted in the discovery of a new antipeptic ulcer drug. The active constituent, plaunotol, was found to be a long chain diterpene alcohol with a unique chemical structure. Clinical trials indicated that this compound is one of the most potent and wide-spectrum antipeptic ulcers known. Although the drug is present in all the aerial parts of the plant, young leaves were found to give the highest yield of plaunotol and it is this part of the plant which has been used for the extraction of the drug. A huge commerical plantation of 'plaunoi', covering an area of over 3,000 acres, has been established in Prachuap Khiri Khan Province to produce the raw material to meet the demand of the drug industry. Production of dried 'plaunoi' leaves has been estimated at 1,700 tons per annum.

**ระย่อม** (Ra-yom)

**Rauvolfia Root, Snakeroot or Weasel-Root**

*Rauvolfia serpentina* Benth. ex Kurz APOCYNACEAE

A small shrub with long elliptic leaves. The whitish pink flowers are in axillary stalked clusters. The fruits are oval in shape, turning black at maturity.

The roots and rhizomes are used for reducing high blood pressure. The drug also acts as a mild tranquilizer. The roots contain some 20 alkaloids, including reserpine, rescinnamine and ajmaline. Reserpine, the principal alkaloid, has both a sedative and a hypotensive effect. At present, rauvolfia root is used as a source of reserpine. Thailand and India are the two major exporters of this drug into Europe. In traditional Thai medicine, the roots are used as a bitter tonic.

**มะขามแขก** (Ma-khaam-khaek)
**Indian Senna**
*Cassia angustifolia* Vahl LEGUMINOSAE

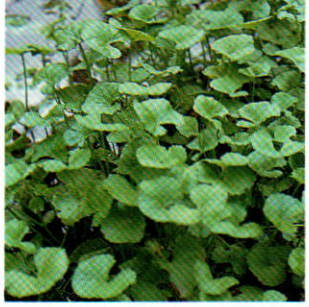
A low-growing shrub with branched stems, feathery compound leaves with pale yellowish green leaflets and yellow flowers borne in axillary racemes. Its pods are broadly elliptical and 8-seeded. It is mainly cultivated in Saraburi and Lop Buri Provinces in central Thailand.

The leaflets and pods are extensively used as a purgative. The principal active constituents of senna are the dimeric anthraquinone glucosides, sennosides A and B.

**แพงพวยฝรั่ง** (Paeng-phuai-farang)
**Madagascar Periwinkle**
*Catharanthus roseus* G.Don. APOCYNACEAE

An erect everblooming herb with oblong, glossy green leaves and showy flowers in white and pink hues. It is now widely cultivated in the tropics as an ornamental.

Madagascar periwinkle contains some 60 alkaloids including vinblastine and vincristine, the major anticancer principles. Since the active alkaloids are present in very small amounts in the plant, large quantities of the crude drug are required for commercial production. Therefore, collections are made from both natural and cultivated sources to supply the drug industry.



**บัวบก** (Bua-bok)
**Asiatic Pennywort**
*Centella asiatica* Urban UMBELLIFERAE

A prostrate, perennial stoloniferous plant, the stems rooting at the nodes. The kidney-shaped leaf blades are borne on long petioles. The flowers are in clusters, individual flowers being small and reddish purple in colour. The whole plant is faintly aromatic. It is widely distributed in marshy lands throughout Thailand.

In traditional Thai medicine, the fresh herb is reputed as a diuretic, an alterative and a tonic. A triterpenic glycoside, asiaticoside, has been isolated from this plant and has found use in modern medicine as an antikeloid agent. An extract containing a mixture of glycosides of Asiatic pennywort is currently available in the forms of powder, tablet, cream, and injection . The drug is said to assist the natural healing process of surface wounds as well as peptic ulcers and to prevent the formation of keloids.

## Spices and Condiments

In addition to their use as medicinal agents, a number of Thai medicinal plants also feature in everyday life in the form of spices and condiments. Thai culinary style requires the use of a large array of spices and condiments to give a special blend of taste and aroma characteristic to Thai food. The most commonly used spices and condiments are chilli peppers, garlic, shallots, sacred basil, lemongrass, pepper, ginger, leech lime, galanga, clove, anise and cumin. Drinks made from certain medicinal plants are also popular in Thailand. One of the most familiar sights in most markets is a push-cart stall selling 'nam-bua-bok', a green-coloured drink made from Asiatic pennywort. Herb teas, such as ginger tea, roselle tea and a tea made from dried bael fruits are also common drinks among the Thai people.

**พริกขี้หนู** (Prik-khee-nuu)
**Chilli Pepper**
*Capsicum frutescens* Linn. SOLANACEAI

An erect, branched, shrub-like herb. The leaves are oblong-ovate in shape. The flowers are solitary with long peduncles and white to pale green in colour. The fruits are green turning to red when ripe.

Both the fresh and dried fruits are very hot and pungent and are used for flavouring and garnishing savoury dishes.

**กระเทียม** (Kra-thiem)
**Garlic**
*Allium sativum* Linn. ALLIACEAE

An annual herb with underground bulbs consisting of several cloves. The leaves are dark green, flat with a pungent smell. The umbrella-shaped flower clusters are pale-pink and are borne on long stalks.

The dried, mature bulbs are a popular condiment in Thai cuisine. Garlic is used in numerous Thai dishes where it serves as a flavouring agent as well as a preservative. Thinly-sliced garlic, fried to a crisp golden brown colour, is used to garnish savoury Thai dishes.

**ข่าตาแดง** (Khaa-taa-daeng)
**Galanga**
*Alpinia nigra* (Gaertn.) Burtt ZINGIBERACEAE

A large perennial herb with underground stem. The leaves are large and oblong in shape. The flowers are in raceme at the terminal of a two-ranked leafy stem; individual flowers are white with purple stripes.

Both the fresh and dried rhizomes are used in Thai-style soups and curries.

**กระชาย** (Kra-chaai)

*Boesenbergia rotunda* (Linn.) Mansf. ZINGIBERACEAE

A perennial herb with a small, slightly branched dark brown rhizome. The fleshy roots are cylindrical to spindle in shape, yellowish brown in colour and are arranged at right angle to the rhizome. The leaves are fairly large, oval in outline with acute apex. The inflorescence is composed of 4-6 flowers, the flowers blooming gradually from the base towards the apex of the inflorescence. Individual flowers are reddish purple in colour.

The aromatic tuberous roots are used as condiments in Thai food. The rhizomes and roots are reputed to increase physical efficiency. They are used as an antidysentery and a carminative in traditional Thai medicine. The rhizomes contain 0.08 percent of volatile oil, composed of cineol, boesenbergin A, camphor, etc.

**จันทน์เทศ** (Chan-thed)
**Nutmeg Tree**
*Myristica fragrans* Houtt. MYRISTICACEAE

An evergreen tree growing to the height of 8 to 17 metres. Its leaves are leathery, shiny, dark green and oblong-ovate in outline with acute apex and base. Its pistillate flowers are small, yellow and axillary. Its fruit is a yellow, nearly ovoid, fleshy, 2-valved capsule. The seed is surrounded by a fleshy, orange-red to red aril. It is cultivated in the southern part of Thailand.

The dried ripe seeds (nutmeg) and dried arils (mace) are used as spices. Medicinally it is used as a stimulant and a carminative. The seeds and arils contain myristica oil which is composed mainly of myristicin and saffrole.

## Natural Cosmetics

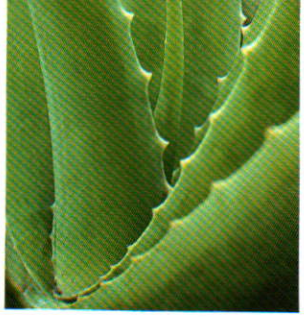
For centuries, Thai ladies have adorned themselves with natural cosmetics ranging from Thai style fragrant water, scented powder, to lip gloss and rouge. Certain medicinal plants such as aloë gel, gameng *(Eclipta prostrata* Linn.) and leech lime are reputed to keep the hair black and shiny. Thailand is endowed with numerous fragrant flowers, many of which have been used to make aromatic waters, sachets and other odouriferous products.

A form of beautification by cleansing the face and the body with steam saturated with aromatic oils from certain medicinal plants was popular in the kingdom in the old days. This Thai-style sauna was also employed in traditional Thai medicine, particularly for women after childbirth.

**เทียนกิ่ง** (Thian-ging)
**Henna**
*Lawsonia inermis* Linn. LYTHRACEAE

A shrub with spiny branches and simple, opposite, small, lance-shaped leaves. The large inflorescence is arranged in terminal cymes. There are two varieties, one with white flowers and the other cinnabar-coloured flowers. The fruits are round with numerous, dark brown seeds. The plant was introduced into Thailand from India and is mostly cultivated as an ornamental.

The dried leaves and extracts are used as a hair dye giving an orange brown tinge. They are also used as ingredients in shampoos, hair colourants and other hair care products. The leaves contain a compound called lawsone which occurs as orange crystals. In traditional medicine, the fresh leaves, mixed with salt and burnt cooked rice or with curcuma, are made into a poultice and applied onto abscessed nails.

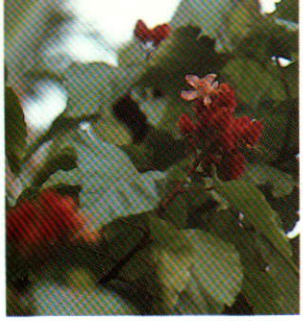


**ว่านหางจระเข้** (Wan-hang-chorakhe)
**Aloë, Star Cactus**
*Aloë barbadensis* Mill.
(syn. *A. vera* Linn.)

LILIACEAE

A perennial herb with short stem and fleshy, dagger-shaped leaves arranged as a rosette. The leaves are up to 1 metre long, edged with spines. The orange flowers are tubular and borne on a long stalk of inflorescence. The plant has been introduced into Thailand as an ornamental.

The freshly-cut leaves are peeled and the yellow fluid washed off; the resulting mucilage is used as an ingredient in lotions, shampoos, creams and gels. Aloë gel is mainly used in cosmetics as a moisturizer and a sun screening agent. Medicinally, the gel has been used for scalds, bruises, cuts, welts, ulcerated skin lesions and eczema. The active constituent in the gel is believed to be a glycoprotein called aloctin A. It has been shown that this compound stimulates cell growth and thereby accelerates the healing process.



**ชาด** (Chaad)

**Anatto Tree, Lipstick Tree**

*Bixa orellana* Linn. BIXACEAE

A small evergreen tree with broad, smooth, heart-shaped leaves. The flowers are pink and the spiny fruit is red and dehiscent when ripe. The fruit contains numerous nearly round seeds. The plant is introduced from tropical America and is widely distributed as an ornamental.

The seeds are extracted with water to yield an orange-red colouring agent called "bixin". The dye from anatto seeds was used to colour the lips and cheeks of traditional Thai dancers in olden days.

## Thai-style Hot Vapour Bath

A form of sauna employing steam saturated with aromatic oils from various medicinal plants has been practised in Thailand for centuries. The practice was recommended in traditional Thai medicine as a mean of cleansing the body, particularly for women after childbirth. It was also used as a cure for certain ailments such as aches and pains as well as certain skin conditions such as rashes and itching. More recently, Thai-style sauna has been employed for cosmetic purposes which include the improvement of skin conditions and weight reduction.

Medicinal plants used in Thai-style sauna can be divided into four main groups.

Group 1 consists of volatile oil-containing plants such as turmeric rhizomes, the leaves of lime *(Citrus aurantifolia* Swing.*)*, the fruits of leech lime and citronella *(Cymbopogon nardus* Rendle).

Group 2 consists of acid-containing plants, including tamarind leaves, the leaves and pods of 'som-poi' (*Acacia rugata* Merr.) and the fruits of leech lime cut into halves.

Group 3 consists of sublimable substances such as camphor and Borneo-camphor.

Group 4 constitutes medicinal plants for specific ailments, for instance 'phak-bung-ruam' (*Enydra fluctuans* Lour.) as an anti-inflammatory, shallots and sweet flag (*Acorus calamus* Linn.) for colds and garden quinine (*Clerodendrum inerme* Gaertn.) and sea holly (*Acanthus ebracteatus* Vahl or *A. ilicifolius* Linn.) for skin rashes.

Steps involved in the preparation of Thai-style sauna are as follows:-

- Fresh herbs are placed in a large, closed container and plenty of water is added.
- The mixture is heated to boiling.
- The resulting steam is then routed into a small enclosure ready for use.

Several health clubs and beauty salons in Bangkok offer Thai-style sauna as part of their health or beauty programmes.

## Natural Colouring Agents and Dyes

Before the advent of synthetic dyes, plants and minerals were the main sources of colouring agents and dyestuff. The oldest plant recorded as being used for this purpose was probably henna, a hair dye and nail polish dating back to the time of the ancient Egyptians. Henna leaves and extracts are still in use today mainly for cosmetic purposes. Food colouring is another skill acquired since early civilizations. In Thai culinary practice, extracts from a number of plants have been used to impart attractive colours to Thai desserts and drinks for centuries. Examples of these are the use of the blue flowers of butterfly pea (*Clitoria ternatea* Linn.) to give a violet colour to a Thai dessert called 'khanom chaw muang' and the use of the leaves of oyster plant (*Rhoeo spathacea* (Sw.) Stearn) for flavouring and imparting a wine red colour to a drink. Natural dyes derived from barks, leaves and other parts of certain plants have been employed to dye hand-woven cloths which are characteristic to that particular part of the country, such as 'teen-chok' cloth from Phrae Province and 'mud-mee' silk from the Northeast of Thailand. Natural dyes were also used to produce the vivid-colours of the famous Thai silk in the olden days. The heartwood of jack fruit tree and the root bark of wild Indian mulberry yield a yellow dye containing morin while the leaves of Indian almond (*Terminalia catappa* Linn.) give a green dye. Black dyes may be obtained from the fruits of ebony tree and whole plant of gameng. The seeds of lipstick tree and indigo leaves yield red and blue dyes, respectively.

**ฝาง** (Faang)

**Sappan**

*Caesalpinia sappan* Linn. LEGUMINOSAE

A climbing shrub or small tree with scattered prickles. The leaves are feather-like with 10-15 pairs of oblong leaflets. The flowers are yellow, in terminal panicles. The pod is oblong to oblong-ovate with 3-5 seeds. It is widely distributed in Thailand, India, Malaysia and the Philippines.

The heartwood yields a red colouring matter, the main component of which is brazilin. The concentrated aqueous sappan extract is used to impart a pinkish shade to aromatic drinking water.

**เตยหอม** (Toei-hom)
**Fragrant Screw Pine**
*Pandanus amaryllifolius* Roxb. PANDANACEAE

An erect shrub, 0.5-1 metre high, the stem bearing a few prop-roots. The leaves are spirally crowded toward the tip of the stem; individual leaves are smooth, narrow with pointed tips. It is widely cultivated as an ornamental.

Fresh leaves contain an aromatic oil which is cardiotonic. The fresh leaves are bruised and the expressed juice is used as a green colourant in Thai desserts. A drink is also made from fresh leaves by boiling in water. After filtering, sugar is added to taste. Dried leaves are often used as an ingredient in many herb teas.

**คราม** (Khraam)

**Indigo**

*Indigofera tinctoria* Linn. LEGUMINOSAE

An erect, slightly hairy shrub, 1 to 1.5 metre high. The compound leaves consist of small leaflets. The flowers are pinkish in colour. It was a source of the natural indigo of commerce.

The plant yields a valuable dye-stuff called indigo which is obtained from the fermentation of the fresh green plant. The oxidised product, chiefly Indigo-blue, which settles to the bottom is collected, washed, pressed and finally dried. The dye-stuff is used to impart a dark blue colour to 'suea-maw-hom' (a type of shirt) mainly produced in the North of Thailand.

**ฮ่อม** (Hom)

*Baphicacanthus cusia* Brem. ACANTHACEAE
(syn. *Strobilanthes flaccidifolius* Nees)

A shrub, 0.6-1.3 metre high, branches 4 -angled. Leaves are elliptic-lanceolate, hairy on both sides. Flowers are in spikes, the corolla, pale blue, velvety hairy, limb somewhat 2-lipped. It is distributed mainly in the North.

Young leaves are macerated in lime water for 1 week with occasional stirring. The blue lake collected at the bottom of the vessel is filtered and used for dyeing cotton fabric.

**ยอป่า** (Yaw-paa)
**Wild Indian Mulberry**
*Morinda coreia* Ham. RUBIACEAE

A small to medium-sized tree with a straight cylindrical stem, 4-10 metres in height. The leaves are elliptical or spear-shaped. The flowers are in fleshy heads formed by the joining of the calyx-tubes, white and scented. The round or ovoid collective fruit is edible. It is widely distributed in mixed deciduous forests in the North and Northeast of Thailand.

The roots of the plant are used for dyeing cotton. The root bark gives a yellow dye containing morindone and its glucoside, morindin.

**ขนุน** (Khanun)
**Jack Fruit Tree**
*Artocarpus heterophyllus* Lamk. MORACEAE

A medium-sized tree, 8-15 metres in height. Leaves are elliptic-oblong to oval, shining. Flowers are in heads, the male inflorescence being terminal or axillary, the female ones emerging from the trunk or large branches. The large collective fruit is edible. All parts of the plant contain a milky sap. It can be found throughout the country and is also cultivated for its fruit .

The heartwood, called 'grag', containing morin, a yellow pigment, is used for dyeing silk and cotton.

แก่แล (Kae-lae)
*Maclura cochinchinensis* Corner
(syn. *Cudrania javanensis* Trec.)

MORACEAE

A woody, spiny climber to shrub. The leaves are oval to nearly round, and shining. The female flowers are in round heads and the male ones are raceme-like, the male and female flowers being on separate plants. Fruits are fleshy and up to 5 centimetres in diameter. All parts of the plant contain a milky sap. It is distributed mainly in the North and South of Thailand.

The heartwood contains a yellow pigment called morin and is used for dyeing all types of cloth.

**กรรณิการ์** (Gannigaa)
**Night Jasmine, Coral Jasmine**
*Nyctanthes arbor-tristis* Linn. VERBENACEAE

Khunying Kanita Lekhakula

A small, erect tree with simple, thick-bladed and coarsely-textured leaves. The inflorescence is short and individual flowers have 5-7 white petals culminating into long orange-coloured corolla tubes. The flowers are faintly scented and bloom in the evening.

The flowers, containing a yellow pigment, nyctantin, have been used as a source of dyestuff. An orange dye may be obtained from the dried corolla tubes by boiling with water. After filtration, a small amount of potash alum is added to the filtrate and the cloth to be dyed is immersed in this mixture. After a period of time, the cloth is removed and allowed to dry in the shade. This process yields a yellow to saffron-coloured cloth. In the old days, these trees were usually planted in temples and the flowers used to dye the saffron robes worn by Buddhist monks.

## Medicinal Plants for Export

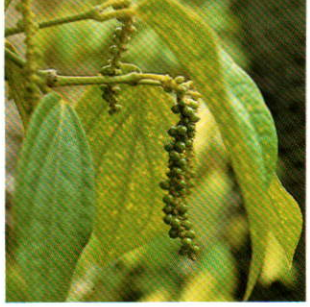
Certain medicinal plants such as bastard cardamons, Siam cardamons, ginger and black pepper constitute important export commodities for Thailand, earning valuable foreign currencies. Other Thai medicinal plants sought for export include rauvolfia root, Madagascar periwinkle, valerian root, senna pods and malva nut. West Germany, the United States of America, China and the United Kingdom are the main importers of Thai medicinal plants. According to the Department of Business Economics, Ministry of Commerce, in 1986, Thailand exported some 7,000 tons of medicinal plants, spices and related products, valued at over 400 million baht. Among the leading export items were betel leaves (2,500 tons), pepper (2,000 tons), ginger (1,250 tons), bastard cardamons (185 tons), rauvolfia root (9.7 tons), and Siam cardamons (4.6 tons).

With its rapid economic growth, Thailand continues to export a relatively large quantity of medicinal plant products each year. The volume of export of Thai medicinal plants is likely to increase since the government has been promoting the cultivation of certain medicinal plants for export in its 6th National Social and Economic Development Plan.

**ขิง** (Khing)
**Ginger**
*Zingiber officinale* Rosc. ZINGIBERACEAE

An erect plant with thickened, fleshy and very aromatic rhizome. The stem is 0.4 to 1 metre high with long and narrow leaves arranged alternately in two ranks along the stem. The inflorescence is cone-shaped, borne on a long stalk which emerges from the underground stem. Individual flowers are greenish-yellow with a small dark purple tip. The rhizomes differ in shape and size in the different cultivars.

Ginger is cultivated on a large scale in the central and northern regions of Thailand. It is estimated that between 1982-1986, Thailand exported a total of 24,580 tons of dried ginger, worth some 200 million baht. The main product for export to Japan is canned young ginger which is used as food.



**พริกไทย** (Prik-thai)

**Pepper**

*Piper nigrum* Linn. PIPERACEAE

Yingyong Phaisuksantiwattana

A branching, perennial climber. The leaves are simple, ovate, entire with a nearly rounded base and a somewhat acute tip. Flowers are minute, in spikes. The fruits are small, round and green in colour turning to bright red when ripe. Fruiting spikes are variable in length.

There are two kinds of pepper, namely black and white pepper. Black pepper consists of the dried fully developed unripe fruits, which are dried in the sun for about one week. It has a characteristically black coat with deep set wrinkles. White pepper is also obtained from *P. nigrum*, but the fruits are allowed to become more completely ripe. After soaking the fruits in water, the rind is removed by rubbing and washing and the seeds are dried.

Prik-thai is cultivated on a large scale in eastern and southern Thailand. The export of whole pepper corns from Thailand gradually increased from 100 tons in 1982 to 1,698 tons in 1986.

รง (Rong)

**Gum Cambodge Tree**

*Garcinia hanburyi* Hook.f. GUTTIFERAE

A small to medium-sized evergreen tree, 10-17 metres high. The leaves are leather-like in texture and oval in shape with obtuse tips. The flowers are unisexual, female flowers being larger than male ones. The fruits are round and are of the size of a small plum.

Rong is the indigenous source of gamboge which occurs as a yellowish latex in all parts of the tree. It is obtained by making a spiral incision on the bark of the tree and the exudate collected in bamboo culms. The yellow sap is concentrated by heating in a metal pan and then poured into bamboo pipes and allowed to set. Gamboge is esteemed as a pigment on account of the brilliancy of its colour. It is used in the preparation of water colours and gold-coloured spirit varnishes for wood and metals. In Thailand, a golden yellow ink is prepared from it for writing on black paper. Rong was used as a powerful cathartic in traditional Thai medicine but is no longer used in medicine because of its serious side effects. Thai gamboge is mainly exported to China.

**เร่ว** (Reo)

**Tavoy Cardamon, Bastard Cardamon**

*Amomum xanthioides* Wall. ZINGIBERACEAE

An annual herb with underground stem. The plant is 1-1.5 metre high, the entire plant being covered with soft brown hairs. The leaves are large, oblong, thick-bladed with pointed apex, arranged in two ranks along the stems. Small flower clusters, emerging from the rhizome, appear just above the ground near the base of the plant. Individual flowers, possessing prominent pink bracteoles, are pale pink in colour. The fruit is round and is covered with soft brownish green hairs. The fruit consists of numerous, tightly-packed, grayish brown seeds.

Tavoy cardamon of commerce is the dried ripe seeds derived entirely from wildly grown 'reo' plants which occur in abundance in Chantaburi, Prachuab Khiri Khan and Loei Provinces. Commercial cultivation of this plant has not been successful and the export of this product has been on the decline with less than 200 tons exported in 1986 compared to over 600 tons in 1982.

'Reo' contains a volatile oil with *p*-methoxy-trans-ethylcinnamate as the principal constituent. It has a pungent taste and a sweet aromatic odour and is used mainly as a spice.

## Miscellany

Apart from the many applications of Thai medicinal plants previously mentioned, certain medicinal plants such as areca nut and betel leaf found use as a masticatory. The practice of chewing betel quid became popular among the Thai people since ancient times and survived well into the Rattanakosin period when people from all walks of life were seen indulging in this favourite pastime. However, during World War II the practice was banned by Field Marshal P. Pibulsongkhram, the Prime Minister of Thailand, as it was deemed unsociable for a country which had just started to adopt western culture.

With the abundance of fragrant and colourful flowers all year round, Thai ladies, especially courtiers, have busied themselves with the arts of Thai-style arrangement, perfume and sachet making for centuries. These crafts have been passed on from generation to generation and still exist today.

The chewing of betel quid is an ancient habit in many oriental countries, including Thailan Myanmar (Burma), Malaysia and India. The habit occupies the same position that tobacc smoking does in western countries. On a worldwide basis, it is estimated that over 250 millio individuals are addicted to betel quid chewing.

The main ingredients used in this masticatory are areca nut, betel leaf, slaked lime an tobacco. Areca nuts or 'maak' are derived from seeds of areca nut palm (*Areca catechu* Linn. very tall and unbranched palm with prominent annular scars while betel leaves or 'phluu' a the fresh leaves of betel vine (*Piper betel* Linn.). The daily ritual begins with the preparation the required ingredients. Firstly, the green areca fruits are cut into small pieces and the seed partially separated from the pericarp. The second step involves the painting of red slaked lim onto the underside of betel leaves which are then neatly rolled up and secured with cotto fibres. These ingredients as well as dried, shredded tobacco leaves are neatly arranged into betel quid set. A piece of areca nut is placed into one's mouth, followed by the painted bet leaf. A knob of shredded tobacco leaves may also be placed inside the cheek while the qu is being chewed. The practice of betel quid chewing was very popular among the Thai peop up to the reign of King Rama VIII.

Jiraboon Thasanbanchong

## Thai-style Sachets

Many Thai flowers are delicately scented and lend themselves well as ingredients in sachet-making. Thai ladies, since the old days, have perfected the arts of making fragrant sachets from these dried flowers. The flowers used for this purpose are usually small in size and possess long lasting fragrance. Flowers from bullet wood, rose petals, jasmine, henna flowers, bread flowers (*Vallaris glabra* Ktze.) and *Coffea bengalensis* Roxb. are commonly used. In addition, the leaves of fragrant screw pine and bachelor's button (*Gomphrena globosa* Linn.) are usually included in the pot-pourri. In making the sachets, petals from selected flowers are air-dried while the leaves of fragrant screw pine are finely shredded and air-dried. The dried ingredients are then mixed together and placed in a tightly closed container. The mixture of flowers is sprinkled with the concentrated Thai-style fragrant water and the container sealed for 1-2 days. After the impregnation process, the flower mixture can be packed into suitable containers such as small bags of various shapes made of finely netted material, small porcelain or clay pots. These sachets are usually used as souvenirs on special occasions such as wedding and birthday celebrations.

# Thai-style Fragrant Water

This very popular form of fragrant water is made from freshly gathered flowers and contains no alcohol. The flowers used are selected for their sweet and lingering fragrance, some of the more common ingredients being the flowers of damask rose (*Rosa damascena* Mill.), jasmine, 'lam-chiak' (*Pandanus tectorius* Bl.), 'kradang-ngaa-thai' (*Cananga odorata* Hook.f. & Th.), orange champaka (*Michelia champaca* Linn.), 'chammanaad' (*Vallaris glabra* Ktze.), bullet wood, 'lamduan' (*Melodorum fruticosum* Lour.) and 'chan-ka-pho' (*Vatica diospyroides* Syming.). Other ingredients used include the leaves of fragrant screw pine, the inner bark of 'chaluut' (*Alyxia reinwardtii* Bl. var. *lucida* Markgr.), sandalwood, Siam benzoin, jasmine and hyacinth (*Hyacinthus orientalis* Linn.) oils.

The initial step involves the blanching of coarsely chopped fragrant screw pine leaves, 'chaluut' bark and sandalwood with boiling water. After filtration, the extract is allowed to cool and then divided among several tightly-closed containers made of glass or enamel. This is followed by the absorption process which is usually carried out in the evening when jasmine flowers begin to bloom. The petals of jasmine, shredded petals of 'kradang-ngaa-thai', orange champaka and the aforementioned flowers are carefully floated on the surface of the prepared water and the containers sealed overnight. After the removal of the flowers, the content of each vessel is transferred into a large porcelain jar, typically a blue and white urn. Fumigation of the water with a mixture of Siam benzoin, shredded peels of leech lime and sandalwood oil follows. The concluding step involves the mixing of Borneo camphor together with jasmine and hyacinth oils with scented marl in a mortar. A small amount of the scented water is then added to this mixture, at a time, with stirring. The resultant slurry is filtered through muslin cloth into a glass bottle fitted with a tight lid. The procedure is repeated until all the scented water has been processed.

Thai-style fragrant water is applied liberally onto the face, chest and arms during the hot climate. It is also recommended for use in cases of fainting. A thick paste made by mixing scented marl with fragrant water is used as an anointment in various ceremonies.

Chapter 4

# THAI MEDICINAL PLANTS—TODAY

Thailand, being an agricultural country, is richly endowed with a wide variety of indigenous flora, some of which have long been employed for their medicinal properties. The fact that traditional Thai medicine has been in practice long before the introduction of modern medicine into Thailand, is manifested by the existence of 'Khampee Bai Laan' or old herbals written on palm leaves and in 'Samud Khoi' as well as other writings concerning the use of medicinal plants within each region.

After modern medicine had taken root in Thailand with the inauguration of Siriraj Hospital, the first modern-style hospital in Thailand, in 1888, the use of herbal medicine began to dwindle, particularly in state-run hospitals and health centres. In great contrast to the medical professionals whose education in modern medicine dictated their preference for the use of modern drugs, a portion of the Thai population still adhered to the old ways of life, in which herbal medicine played a vital role. This is especially true in rural areas where traditional healers and herbalists are still held in reverence by the communities. This being the case, Somdej Phra Wanarat (Poon Poonasiri) the abbot of Wat Phra Chetuphon Wimonmang khalaram (Wat Po) at the time, ordered the establishment of a school of Thai traditional medicine within the temple in 1957. A succession of schools of Thai traditional medicine both in Bangkok and in other provinces followed. A number of temples in rural areas also established their own medicinal plant gardens which served as a source of herbs for the treatment of patients as well as an educational venue. The fact that there are no modern drugs available for the treatment of certain diseases coupled with the rapid increase in the costs of modern drugs has given new impetus to the search for new

drugs from age-old medicinal plants. Research work is now in progress both in government institutions and universities in order to isolate and identify the bioactive constituents of plants which may potentially lead to the discovery of more potent drugs with little or no side effects. In pursuit of this cause, a number of medicinal gardens has been established to preserve, cultivate and perpetuate species of useful medicinal plants for further studies. Some of these medicinal plant gardens are listed below.

1. Department of Medical Sciences' medicinal plant garden, situated in Baan Aang, Chantaburi Province.
2. Royally initiated medicinal plant garden at Khao Hin Sorn, Chachoengsao Province.
3. The botanical garden at Pukae, in Saraburi Province.
4. The medicinal plant garden at Buddhamonthon, in Nakhon Pathom Province.
5. Suan Luang Ror Gao (King Rama IX Garden), built to commemorate the 60th birthday of His Majesty the King; it is situated on the outskirt of Bangkok.
6. Suan Sireerukhachart, Mahidol University's Salaya Campus, in Nakhon Pathom Province.

In addition to the above mentioned gardens, there also exist various medicinal plant gardens at the Faculties of Pharmacy and schools of Thai traditional medicine throughout the country.


Suan-pa-samunprai-chalerm-prakiat, Chantaburi.

Suan Sireerukhachart, Nakhon Pathom.

Dr. Veluree's safflower plantation, Chiang Mai.

Palm trees.

The development of Thai herbal medicine may be carried out in three different directions. Firstly, the traditional drug preparations could be presented in new dosage forms so as to render them more palatable and more convenient to use. Secondly, the active constituents could be isolated and identified; such studies could be carried out on each individual plant or they could be performed on a given drug preparation. More commonly, individual plants are selected for studies which are normally carried out in educational institutions and related government agencies. Research into medicinal plants may follow one of two routes, the first of which is preceded by the isolation and identification of the chemical constituents from selected drug plants and these compounds subsequently tested for their biological activities. On the other hand, crude extracts from selected plants may be primarily screened for their pharmacological activities. Bioassay-directed fractionation of the active principles then follows. The latter practice is preferred by some researchers as the success rate is somewhat higher than the former route. In cases where the active principles are present in the plant(s) in minute quantities, they may have to be synthesized chemically before further studies can be carried out. Once sufficient quantity of the active compound is obtained, toxicological and comprehensive pharmacological studies are performed in test animals. If the drug passes the safety tests and shows promising results in animal tests, clinical studies may be initiated to ensure the efficacy and safety of the drug in human subjects. An integrated study of a drug plant such as the one described above is both time-consuming and costly. Nevertheless, such endeavour has, in recent years, resulted in the discovery of a novel antipeptic ulcer drug from 'plaunoi' *(Croton sublyratus* Kurz*)*, a medicinal plant indigenous to Thailand.

The third strategy for the promotion of Thai medicinal plants would be the careful selection and development of medicinal plants as economic crops to supply both the export markets and the local drug industry. At present, Thailand is exporting a number of plant drugs into international markets, for example, 'plaunoi', Madagascar periwinkle and snakeroot.

It is clearly evident that medicinal plants still play an important part in Thai cultural system today as they have done in the past. The conservation and development of Thai herbal medicine have been made possible through the effort of interested individuals, the private sector and government agencies alike. Some of the individuals and organizations which have played key roles in the promotion of traditional Thai medicine are listed below:

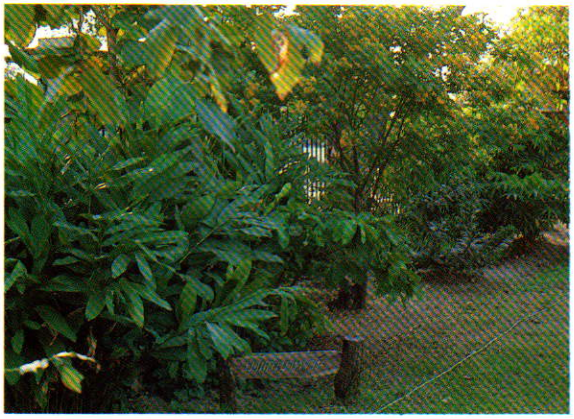
## 1. His Royal Highness Prince Chumphon Khate-Udomsak

A son of King Chulalongkorn, he is mainly recognized for his role in the Royal Thai Navy, but his interest also encompassed modern medicine while at the same time attempting to preserve the use of medicinal plants as a form of treatment. As a testimony to his passion for Thai medicinal plants, there existed a herbal garden, Suan Samunprai Maw Porn, named after him in the vicinity of his monument in Chumphon Province. This garden has recently been restored to its original state.

## 2. His Majesty King Bhumibol Adulyadej

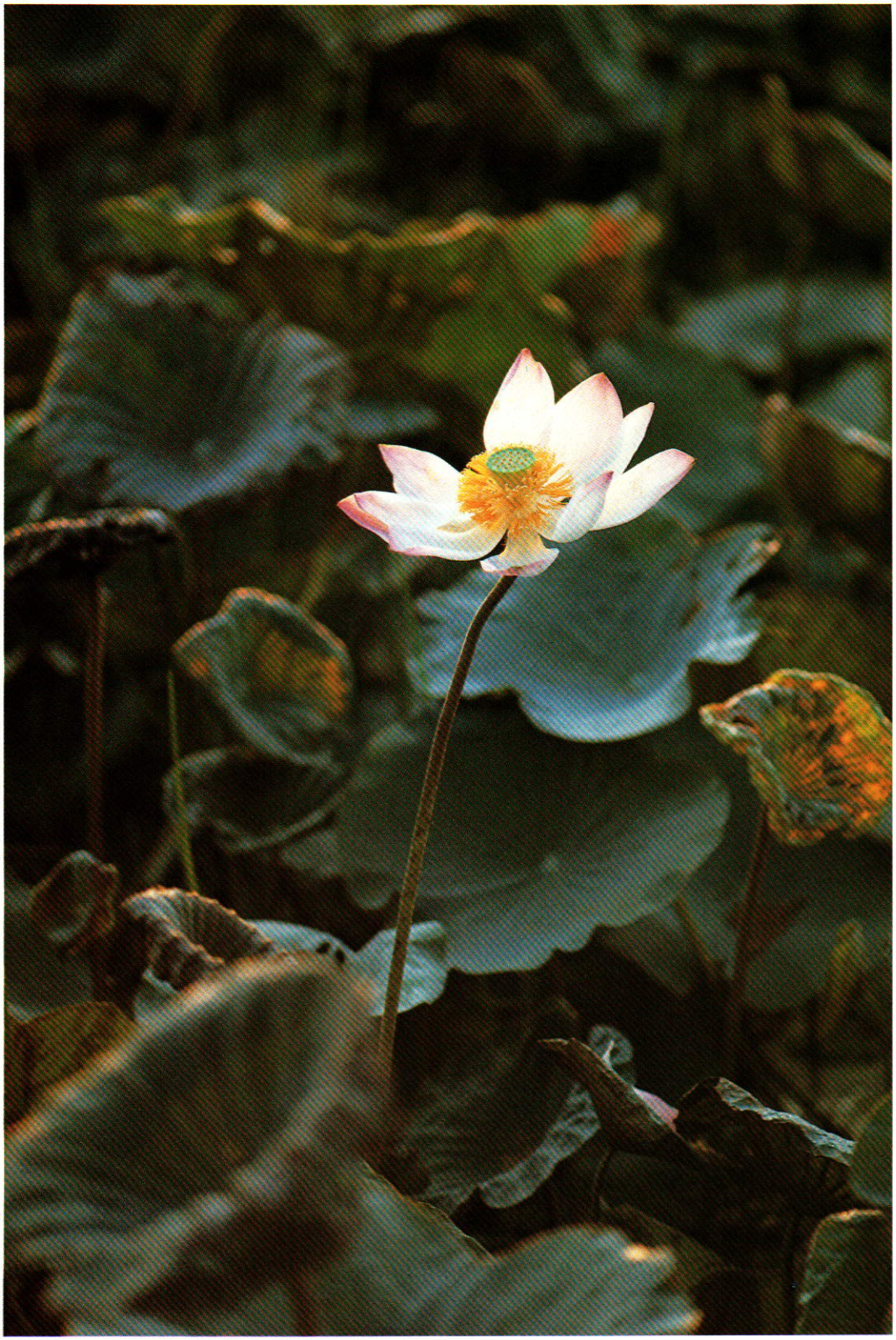
Our present monarch is widely recognized for his tireless efforts for the betterment of his subjects. As far as traditional Thai medicine is concerned, His Majesty King Bhumibol has played a vital role in the initiation of a number of projects aimed at the conservation of indigenous medicinal plant species in their natural habitats. One such example is the "Suan Pa Samunprai" at Khao Hin Son in Chachoengsao Province. Set up in 1979 under royal initiation, the garden is operated by the Royal Forest Department and contains a conglomeration of medicinal plant species native to Thailand. The garden serves as a centre for the conservation and propagation of valuable medicinal plant species as well as a centre for the study of silviculture, ecology and chemistry of Thai medicinal plants which may lead to the goal of self-reliance in medicine.

A medicinal plant garden at khao Hin Sorn, Chachoengsao.



A medicinal plant garden within the compound of Chitralada Palace, Bangkok.

Another example is the medicinal plant garden within the royal palace. Situated on a narrow strip of land of approximately 1,000 square metres between the palace, outer ring road and the wall on the southern side of Chitralada Palace, this garden was initiated by the King's own Research Project together with the Royal Forest Department and Department of Agriculture, Ministry of Agriculture and Cooperatives in 1986 with the main objective of amassing species of important medicinal plants, particularly those which are now rare or those which are in danger of becoming extinct in the near future. Attached to the garden is a laboratory where scientists are conducting research into finding suitable methods of propagation, both by conventional and tissue culture techniques, as well as cultivation and production of high quality plant drugs. To date, the garden boasts some 378 species of medicinal plants which are arranged into 23 groups in accordance with their medicinal properties.



## 3. Her Royal Highness Princess Maha Chakri Sirindhorn

A learned historian, the Princess has taken a keen interest in all aspects of Thai culture and is well aware of the importance of our invaluable heritage in traditional Thai medicine. She has personally documented a number of traditional drug formulae, noting in particular the ingredients, their quantities and their uses. The Princess' concern over the preservation of traditional Thai medicine has inspired the setting up of 'Suan Samunprai Somdej Phra Thepratanarajasuda' by the Petroleum Authority of Thailand. This impressive medicinal plant garden is situated in a 30 acre piece of land in Rayong Province. The inauguration of this garden was presided over by Princess Maha Chakri on the 18th of April 1985 and it now contains an extensive collection of indigenous medicinal plant species arranged according to their medicinal properties.

Suan Samunprai Somdej Phra Thepratanarajasuda, Rayong.

Chan-thed trees.

Petcha-sungkart.

## 4. Her Royal Highness Princess Chulabhorn

The youngest daughter of the present monarch, the Princess has been actively promoting Thai medicinal plants by giving series of lectures at international venues, notably in the United States, Europe and Japan, in order to obtain funds for the study of medicinal plants in Thailand. A recipient of a doctorate degree in Natural Product Chemistry from Mahidol University, the Princess is particularly interested in anti-cancer, anti-AIDS and other drugs from Thai medicinal plants. She is also the founder and patron of the Chulabhorn Research Institute which annually gives research grants to Thai scientists working on medicinal plants. To honour the Princess for her scientific endeavours, Srinakharinwirot University in collaboration with Maha Sarakham Province has established a medicinal plant garden named after the Princess. 'Suan Walairuka-vej' was set up in 1989 in Maha Sarakham Province and contains a number of medicinal plants as well as plant species relating to the livelihood of the people of the Northeast.

Wat Po, Bangkok.

## 5. Buddhist Monks

Thai monks have assumed the roles of both spiritual and physical healers since ancient times. Many revered monks are well versed in the art of traditional medicine and have used their skill in alleviating the suffering of poor villagers in rural areas. Furthermore, several well known schools of Thai traditional medicine are to be found in Buddhist temples such as Wat Phra Chetuphon Wimonmankararam, Wat Rajanadda and Wat Parinayok.

## 6. The General Public

Apart from people whose ancestors were knowledgable in traditional medicine and who have inherited the knowledge, a section of the public is fascinated by the alluring properties of medicinal plants. Through their common interest, they have formed various groups and societies, some of which are listed below.

- The Pharmacognosy Society of Thailand (T.P.S.), situated in Bangkok.
- Medicinal Plants and Traditional Medicine Society of Chiang Mai.
- Adaptive Technology for Herbal Drugs, Faculty of Pharmacy, Chulalongkorn University.
- Project on Medicinal Plants for Self-Reliance
- Medicinal Plants and Primary Health Care Project supported by UNICEF, Ministry of Public Health.
- Royally initiated Projects on Suan Pa Samunprai

## 7. Government Agencies

Activities conducted by government agencies relating to the promotion of medicinal plants in Thailand appear to concentrate in the area of research which involves certain departments of the Ministry of Public Health, the Ministry of Agriculture and Cooperatives, various universities as well as the Scientific and Technological Research Institute of Thailand. The responsibility for the implementation of the use of medicinal plants in the communities, on the other hand, rests with the Office of the Committee for Primary Health Care, community hospitals and health service units in rural areas.

While the government has always pledged its support for the use of medicinal plants, it was not until 1979 that the Department of Medical Sciences in cooperation with various related government agencies actually initiated a comprehensive programme for the study of Thai medicinal plants. Realizing the significance of such endeavour, the cabinet endorsed the appointment of a Committee for the Development of Thai Medicinal Plant Drugs, with the Director of the Department of Medical Sciences as the chairman. The committee, in turn, appointed a number of sub-committees to carry out research into the different disciplines of plant drug studies.

Moreover, the Ministry of Public Health was responsible for the inclusion in the National Development Plans since 1977 of a primary health care project in which health volunteers in rural areas are instructed on the use of medicinal plants in alleviating common ailments. This project received financial support from UNICEF during 1983-1985 in order to implement a programme to promote the use of medicinal plants in 25 target provinces covering all four regions of the country. Following the successful execution of the UNICEF funded programme, the German-based GTZ foundation donated a fund for the study of five medicinal plants, namely turmeric, 'fa-thalaai' *(Andrographis paniculata)*, aloë *(Aloë barbadensis)*, candelabra bush *(Cassia alata)* and 'phayaa-yaw' for use in five selected community hospitals and two provincial hospitals together with a separate fund for the support of activities relating to the promotion of medicinal plants in five districts.

Lastly, the National Economic and Social Development Board has attested to the importance of medicinal plants and indigenous medicine by including strategies for the development of Thai medicinal plants in all the "National Development Plans" beginning in the year 1977. It is clearly evident, therefore, that Thai medicinal plants still play an important part in Thai society today.

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## Medicinal Plants of Thailand : Past and Present


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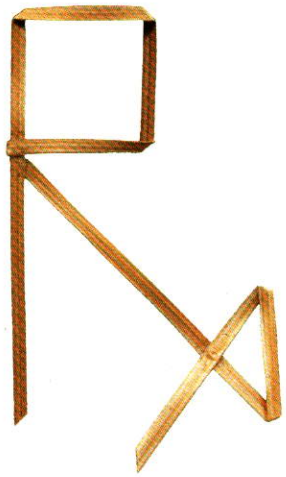

**Cover :**

$R_x$

This symbol is popularly believed to be derived from the Latin word 'recipe' meaning 'take thou', the cross stroke being a sign of abbreviation. However, some authorities claim that the symbol is of much earlier origin and represents the sign of the God Jupiter ( ♃ ). It was placed at the top of a prescription in order to influence this King of the Gods so that the medicine would act favourably. This symbol remains in use today but its significance has long been in oblivion.